

ELLEN KOVNER SILBERGELD, Ph.D.

I. Qualifications

Dr. Silbergeld is an environmental scientist and toxicologist who is the Chief Toxicologist for the Environmental Defense Fund and a Research Scientist in the Reproductive Toxicology Laboratory of the National Institutes of Health in Bethesda, Maryland. Her curriculum vitae is attached.

II. Subject Matter

Dr. Silbergeld will testify in the following areas:

A. Receptors/TCDD, including:

1. the receptor model and its role in physiology;
2. the detection of receptors and the mode of how receptors are linked to function;
3. the mode by which receptors recognize TCDD, that is, e.g. structural "fine-tuning";
4. the existence of receptors in humans, and in their various organs, with the implications of their presence for TCDD potency;
5. its occupancy by the TCDD ligand and its relationship to the biological effects of TCDD at the subcellular level, specifically:
 - a. DNA-RNA directed proteinsynthesis;
 - b. enzyme induction;
 - c. pleiotrophic changes in the cell.

B. Animal toxicology, and more specifically the extrapolations between animal data, and its predictive qualities in humans, including:

1. biological bases for interspecies comparision;
2. mathematical models for such extrapolation;
3. physiological chemistry among mammalian systems (including humans);
4. relevant studies on derived cell lines from humans.

C. Reproductive toxicology, and more specifically the effects of TCDD and 2,4,5-T on reproductive physiology in the male and female, including:

1. Gonadotoxicity;
2. Endocrine toxicity;
3. Alteration in hormonal metabolism;

4. Teratology;
 5. Feto-toxicity;
 6. Significance and persistence of such effects in animals and humans;
 7. Sensitivity of the reproductive system, both endocrine and gonadal, to the receptor-mediated effects of TCDD.
- D. Neurotoxicology, and more specifically the various effects of 2,4-D, TCDD and 2,4,5-T on peripheral and central nervous system functions, including:
1. Neuromuscular control;
 2. Nerve conductive dynamics;
 3. CNS function (including cognitive, motor, and affective aspects);
 4. Experimental and clinical studies with particular emphasis on:
 - a. dose-response mechanisms;
 - b. acute versus chronic exposure;
 - c. early versus long latency effects.
 5. Methods for assessing nervous system functions in animal and humans, including:
 - a. neurochemistry;
 - b. electrophysiology;
 - c. neurobehavioral techniques.
 6. Interrelationships between effects on other organ systems and the nervous system, particularly with respect to altered porphyrin metabolism, including:
 - a. the effects of decreased cellular energy
 - b. the effects of decreased heme-synthesis on the integrity of myelin;
 - c. the neuroactive properties of certain porphyrin precursors.

III. Scientific Principles

See General Statement of Scientific Principles and Assumed Facts attached.

IV. Substance of Opinions

- A. That animal data has and can be used, particularly with respect to 2,4-D, 2,4,5-T, and TCDD to demonstrate their potential and real toxicity, neuro-toxicity, reproductive toxicity, and carcinogenicity in humans.
- B. That TCDD receptors exist in human cells, and in their various organs, which are similar, if not identical, to the TCDD receptor described in rodents; that this fundamental cellular mechanism explains scientifically many of the toxic (including carcinogenic) effects of TCDD, and moreover provides a scientific basis for predicting similar toxic effects in humans as in experimental animals; that this receptor explains the very great, indeed exceptional potency of TCDD as an acute and chronic toxin (including carcinogen).
- C. That TCDD and 2,4,5-T can and, under certain circumstances, will cause male-mediated transmittable damage manifesting in birth defects, miscarriages, and other untoward pregnancy outcomes.
- D. That 2,4-D, TCDD, and 2,4,5,-Td are neuro-toxic.

V. Grounds for each Opinion

A. General

The bases for Dr. Silbergeld's testimony as to various facts and opinions include: educational background; professional training and experience; personal research; review of clinical data as set forth in attachments; review of the medical and scientific literature.

B. Specific

1. As to opinion IV A, i.e. animal toxicology, see list of references and other grounds under "Animal Toxicology" attached.
2. As to opinion IV B, i.e. role of receptors in the presence of TCDD, see list of references and other grounds under "Receptors/TCDD" attached.
3. As to opinion IV C, i.d. as to male-mediated genetic damage, see list of references and other grounds under "Reproductive Toxicology" attached.
4. As to opinion IV D, i.e. as to neuro-toxicity of Agent Orange, see list of references and other grounds under "Neurotoxicology" attached.

13605

SILBERGLED - NEUROTOXICOLOGY

- Bleiberg, Walon, Brodken and Applebaum, 1964; Archives of Dermatology, Volume 89, p. 793.
- Poland and Smith, 1971, Archives of Environmental Health; Volume 22, p. 316.
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- Kociba, Keeler, Park and Gehring, 1976, Toxicology and Applied Pharmacology, Volume 35, p. 553.
- Allan, Barsotti, Van Miller, Abrahamson and Lalich, 1977, Food, Cosmetics and Toxicology, Volume 15, p. 401.
- Elovaara, Savolainen, Parkki, Aitio and Vanio, 1977, Research Communications, Chemical Pathology and Pharmacology, Volume 18, p. 487.
- Farrah, 1977, Teratology, Volume 16, p. 365.
- McConnel, Moore, Harris and Haseman, 1977, Environmental Health Perspectives, Volume 20, p. 245.
- Kociba, Keys, Beyer, Carreon, Wade, et al., 1978, Toxicology and Applied Pharmacology, Volume 46, p. 297.
- Marcilos, Terronon and Aitio, 1978, Zenobiotica, Volume 8, p. 397.
- Bogen, 1979, Journal of the American Medical Association, Volume 242, p. 2391.
- Field, 1979, Lancet, Volume 1, p. 1342.
- Nienstedt, et al., 1979, Toxicology, Volume 13, p. 233.
- Strik, 1979, Annals, New York Academy of Sciences, Volume 320, p. 308.
- Strik and Koeman, 1979, "Chemical Porphyria in Man."
- Zach and Suskind, 1980, Journal of Occupational Medicine, Volume 22, p. 11.
- Cantoni, Salmona and Rizzardini, 1981, Toxicology and Applied Pharmacology, Volume 67, p. 156.
- Pazderova, Lucas, Pickova and Jirasek, 1981, Archives of Environmental Health, Volume 36, p. 5.

13606

International Society for Neurochemistry and International Brain
Research Organization Meetings on Neurotoxicology

Editor, Journals on Neurotoxicology and Neurobehavioural
Toxicology and Teratology

Research at NIH and National Center for Toxicology Research

13607

SILBERGELD - RECEPTORS/TCDD

- Vos, Moore and Zinkl, 1973, Environmental Health Perspectives, Volume 5, p. 149.
- Kouri, Ratrie, Atlas, Niwa and Nebert, Life Sciences, Volume 15, p. 1585.
- Vos, Moore and Zinkl, 1974, Toxicology and Applied Pharmacology, Volume 29, p. 229.
- Beatty and Neal, 1975, Toxicology and Applied Pharmacology, Volume 33, p. 151.
- Kimbrough, 1974, CRC Critical Reviews in Toxicology, p. 445.
- Kupfer, 1975, CRC Critical Reviews in Toxicology, Volume 4, p. 83.
- Oliver, 1975, British Journal of Industrial Medicine, Volume 32, p. 49.
- Poland and Glover, 1975, Molecular Pharmacology, Volume 11, p. 389-398.
- Barry, Zacharia, Namkung and Juchau, 1975, Toxicology and Applied Pharmacology, Volume 36, p. 569.
- Goldstein, McKinney, Lucier, Hickman, Burgman and Moore, 1976, Toxicology and applied Pharmacology, Volume 36, p. 81.
- Alastair Hay, 1981, "The Chemical Scythe."
- Kimbrough, Editor, 1980, Halogenetic Biphenyls, Terphenyls, Naphthalenes, Dibenzodioxins and Related Products.
- Poland and Kende, 1976, Federation Proceedings, Volume 35.
- McConnel, Moore, Haseman and Harris, 1978, Toxicology and Applied Pharmacology, Volume 44, p. 335.
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- Boobis, Nebert and Paelkonen, 1979, Biochemical Pharmacology, Volume 28, p. 11.
- Carlstedt-Duke, Elstrom, Hogburg and Gustofsun, 1979, Journal of Biochemistry,
- Carlstedt-Duke, 1979, Cancer Research, Volume 39, p. 3172.
- Gasiewicz and Neal, 1979, Toxicology and Applied Pharmacology, Volume 51, p. 329.
- Greenly and Poland, 1979, Journal of Biological Chemistry, Volume 254, p. 9814.
- Gunther, Fysh and Nebert, 1979, Pharmacology, Volume 19, p. 12.
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13608

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Huff, Moore, Saracci and Tomatis, 1980, Environmental Health Perspectives, Volume 36, p. 221.

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Strik and Koeman, 1979, "Chemical Porphyria in Man."

Olson, Gasiewicz and Neal, 1980, Toxicology and Applied Pharmacology, Volume 56, p. 78.

Olson, Hoscher and Neal, 1980, Toxicology and Applied Pharmacology, Volume 65, p. 67.

Poland and Glover, 1980, Molecular Pharmacology, Volume 17, p. 86.

Eisen, Hanna, Legraverend, Okey and Nebert, 1983, Journal of Biological Chemistry,

Legraverend, Hanna, Eisen, Owens, Nebert and Henkens, 1982, Journal of Biological Chemistry, Volume 257, p. 6402.

Tukey, Hanna, Negishi, Nebert and Eisen, 1982, Cell, Volume 31, p. 275.

Okey, Bonde, Mason and Nebert, 1980, Journal of Biological Chemistry.

Participation as invited Speaker and participant in International Symposia on TCDD conducted by Rockefeller University (October, 1983).

Current Research in the Reproductive Toxicology Section NICHD NIH

Papers in Preparation describing this research.

Training and Research experience at Johns-Hopkins and the NIH in receptor and cellular biochemistry and toxicology.

Society for Occupational and Environmental Health (December, 1983)

SILBERGELD - REPRODUCTIVE TOXICOLOGY

- Courtney, Daler, Hogan, et al., 1970, Teratogenic Evaluation of 2,4,5-T; Science Volume 168, p. 864.
- Sparschu, Dunn and Rowe, 1970, Toxicology and Applied Pharmacology; Volume 17, p. 317.
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- Khera and McKinley, 1972, Toxicology and Applied Pharmacology; Volume 22, p. 14.
- Moore, Glupta, Zinkl and Vos, 1973, Environmental Health Perspectives, Volume 5, p. 81.
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- Kimbrough, Editor, 1980, Halogenetic Biphenyls, Terphenyls, Naphthalenes, Dibenzodioxins and Related Products.
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- Barry, Slaga, Wilson, Zacharia, Namkung, et al., 1977, Biochemical Pharmacology, Volume 26, p. 1383.

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Schantz, Barsotti, and Allan, 1979, *Toxicology and Applied Pharmacology*, Volume 48, p. 360.

Cook, Towasend, Opst, and Silverstein, 1980, *Journal of Occupational Medicine*, Volume 22, p. 530.

Lee and Suzuki, 1980, *Journal of Pharmacology and Experimental Therapeutics*, Volume 215, p. 501.

Cantoni, Salmona, and Rizzardini, 1981, *Toxicology and Applied Pharmacology*, Volume 67, p. 156.

McNolte, Pomerantz, and Farrell, 1981, *Food, Cosmetics, Toxicology* Volume 19, 0. 57.

Remotti, Virgilis, Bionco, and Candiani, 1981, *Placemat*, Volume 2, p.

Townsend, Bodner, Van Peenen, Olsen and Cook, 1982, *American Journal of Epidemiology*, Volume 115, p. 695.

Lamb, Marx, Gladen, Allen and Moore, 1981, *Journal of Toxicology and Environmental Health*, Volume 8, p. 825.

Research at National Institute of Health

Research Reproductive Toxicology Section NICHD

SILBERGELD - ANIMAL TOXICOLOGY

Bleiberg, Walon, Brodken and Applebaum, 1964; Archives of Dermatology, Volume 89, p. 793.

Poland and Smith, 1971, Archives of Environmental Health; Volume 22, p. 14.

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Lamb, Marx, Gladen, Allen and Moore, 1981, Journal of Toxicology and Environmental Health, Volume 8, p. 825.

Tukey, Hanna, Negishi, Nebert and Eisen, 1982, Cell, Volume 31, p. 275.

Attendance International Symposium on TCDD, Rockefeller University (Oct., 1983)

Member EPA Expert Committee on Dioxin (July, 1983)

Service EPA Expert Committees on Several Toxins

Review Clinical Data, Nitro, W.Va., Seveso, Italy, Times Beach, Mo.

Experience in Risk Assessment

Experience in toxicology & toxicology assessment

RAYMOND SINGER, Ph.D.

I. QUALIFICATIONS

Dr. Raymond Singer, Ph.D., is a neurotoxicologist and neuropsychologist practicing at Occupational Health Consulting, Inc., New York, New York. Dr. Singer's curriculum vitae is attached.

II. SUBJECT MATTER

Dr. Singer will testify to the toxic effects of toxic chemicals, Agent Orange, PCDD and TCDD on the human nervous system and the consequences thereof. Dr. Singer will testify to various studies, including a study conducted by Dr. Singer, which demonstrate the nervous disorders resulting from exposure to Agent Orange and TCDD. His testimony will also include an explanation of the method using nerve conduction velocity studies to show the resulting nervous disorders and the results of the examination of each representative plaintiff.

III. GENERAL SCIENTIFIC PRINCIPLES

The effects of phenoxy herbicides and related contaminants have been studied in a number of research efforts in both animals and humans. These include case reports and epidemiological reports. Occupational health studies are often helpful in determining the toxicity of chemicals.

The doctor will testify to a review of the literature concerning the evidence of toxicity in humans to the central nervous system and the peripheral nervous system.

Dr. Singer will not testify on the biochemical process within the body by which the nervous system results are produced, but merely on the presence of those results in the literature and the fact that there are deficits in mental and nervous function that can be related to herbicide toxicity. Some of the specific areas are set out below in relation to his opinions.

IV. SUBSTANCE OF OPINIONS

Dr. Singer's opinions are as follows:

1. Agent Orange and its contaminant TCDD can cause nervous system damage in humans, which will vary from individual to individual.

2. Agent Orange and its contaminant TCDD produce central nervous system effects which include:

- a. Irritability.
- b. Nervousness.
- c. Sleep Disorders.
- d. Memory Problems.
- e. Other Mental Dysfunctions.

They also produce neuropsychological results which include distortions of perceptual function and cognitive reaction time.

3. Agent Orange and its contaminant TCDD produce peripheral nervous system effect, which include:

C. Opinion IV(3) (Reference Nos. 3, 31, 35, 37)

D. Opinion IV(4) (Reference Nos. 9, 10, 35)

E. Opinion IV(5) (Reference Nos. 5, 12, 13, 41-43, 45, 46)

In addition, Dr. Singer may rely upon some or all of the following
as the basis for his opinions:

(Reference Nos. 1, 4, 6-7, 11-12, 14, 16-18, 20-25, 27-28, 30,
32-34, 36, 38-40, 47-52.)

1. Anastasi, A. (1976). "Psychological Testing," 4th ed. Macmillan Co., New York.
2. Ashe, W., and Suskind, R. R. (1950). "Reports on Chloracne Cases." Monsanto Chemical Co., Nitro, West Virginia. Department of Environmental Health, University of Cincinnati College of Medicine.
3. Bauer, H., Schulz, K. H., and Spiegelberg, U. (1961). Berufliche Vergiftungen bei der Herstellung von Chlorphenol-Verbindungen. *Arch. Gewerbepathol. Gewerbehyg.* 18, 538-555. Reported in IARC (1978). Long-term hazards of polychlorinated dibenzodioxins and polychlorinated dibenzofurans.
3. Behse, F., and Buchthal, F. (1971). Normal sensory conduction in the nerves of the leg in man. *J. Neurol. Neurosurg. Psychiatry* 34, 404-414.
4. Behse, F., and Buchthal, F. (1978). Sensory action potentials and biopsy of the sural nerve in neuropathy. *Brain* 101, 473-493.
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6. Berwick, P. (1970). 2,4-Dichlorophenoxyacetic acid poisoning in man. *J. Amer. Med. Assoc.* 214(6), 1114-1117.
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9. Boeri, E., Bordo, B., Crenna, P., et al. (1978). Preliminary results of a neurological investigation of the population exposed to TCDD in the Seveso region. *Riv. Pat. Nerv. Ment.* 99, 111-128.
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Nerve Conduction Velocity Studies of Workers Employed in the Manufacture of Phenoxy Herbicides

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Conduction velocities (NCV) of the median motor, median sensory, and sural nerves were measured in 56 workers employed in the manufacture of 2,4,5-trichlorophenoxy acetic acid (2,4,5-T) and 2,4-dichlorophenoxy acetic acid (2,4-D). Mean age was 35 years and mean duration of employment was 7 years. The control group consisted of 25 subjects without exposure to neurotoxic agents. When compared with controls, slowing was noted in the sural nerve (mean = 34.0 vs 40.1 m/sec, $P < 0.02$). All values were then adjusted for age and temperature and were transformed to Z values (mean = 0, standard deviation = 1), where-upon slowing was seen in the sural (-2.21 vs -0.52, $P < 0.0001$) and median motor nerves (0.19 vs 0.91, $P < 0.03$). Duration of employment was significantly correlated with slowing of sural velocity ($r = -0.40$, $P < 0.004$). Altogether, 46% of the study group had one or more slowed nerve conduction velocity, versus 5% of the control group ($P < 0.001$).

INTRODUCTION

The phenoxyaliphatic acid herbicides 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) and 2,4-dichlorophenoxyacetic acid (2,4-D) have been widely used in maintenance of right of ways and in forest, range, and crop management for over 30 years. These compounds are readily metabolized and excreted (Kohli *et al.*, 1974; Sauerhoff *et al.*, 1977) and their acute mammalian toxicity is low. The LD_{50} of 2,4,5-T is reported to be 300 and 100 mg/kg in the rat and dog, respectively, and that of 2,4-D ranges from 300 to 1000 mg/kg in rats, guinea pigs, and rabbits (Herbicide Handbook, 1979). However, during the manufacture of these herbicides undesirable byproducts such as chlorinated dioxins have been found to contaminate the final products. 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD), which contaminates 2,4,5-T, is thought to be the most toxic contaminant. 2,3,7,8-TCDD has an LD_{50} of 0.6 μ g/kg in the guinea pig and is an animal carcinogen and teratogen in very low doses (Huff *et al.*, 1980). 2,4-D may also be contaminated with chlorinated dioxins. However, the highly toxic 2,3,7,8-TCDD was not found in 2,4-D (Norstrom *et al.*, 1979). Recently some Canadian formulations of 2,4-D have been found to be contaminated with 1,3,6,8-TCDD (Cochrane *et al.*, 1980).

A 1:1 combination of the *n*-butyl esters of 2,4,5-T and 2,4-D comprised Agent Orange, a defoliant widely used by the U.S. military in South Vietnam from 1965 to 1970 (Young *et al.*, 1978). In 1971, the U.S. Environmental Protection Agency suspended most food crop uses of 2,4,5-T and most other uses were suspended in

1978 based upon unresolved questions regarding effects of low-level exposures to chlorinated dioxins on human health (U.S. Environmental Protection Agency, 1978). 2,4,5-T is no longer being manufactured in the United States.

HUMAN HEALTH EFFECTS

There have been many reports of adverse effects on human health from exposure to 2,4,5-T and its contaminants in relation to industrial accidents (Huff *et al.*, 1980). The first known accident occurred in 1949 in the United States when a trichlorophenol reactor exploded. Similar accidents occurred in 1952 and 1953 in Germany, in 1963 in Holland, and in 1968 in England. In 1976 an explosion occurred at a chemical plant in northern Italy, resulting in release of a toxic cloud over the surrounding community. Evacuation of the town of Seveso, which was heavily contaminated with 2,3,7,8-TCDD, was ordered (Homberger *et al.*, 1979). Health effects are also known to occur from the manufacturing process itself when overexposure occurs unrelated to an explosion, most notably in the United States in 1962 (Bleiberg *et al.*, 1964) and 1964 (Hay, 1977), and in Czechoslovakia in 1965 to 1968 (Pazderova-Vijlupkova *et al.*, 1981). Adverse health effects have also been alleged in Vietnam veterans and in South Vietnamese exposed to Agent Orange but few data are available for evaluation of the problem and it is not yet known whether 2,3,7,8-TCDD is a factor in the reported effects.

While there is no pathognomonic syndrome related to exposure to 2,3,7,8-TCDD, effects on the skin, liver, and nervous system have been reported in workers exposed in several industrial accidents (Huff *et al.*, 1980). A consistently reported effect has been chloracne, a refractory follicular dermatosis of varying extent and severity depending on the duration and amount of exposure. Central and peripheral nervous system effects also have been frequently reported and are reviewed below.

Ashe and Suskind (1950) examined four workers who developed chloracne following exposure to the contents of an overheated reactor accidentally released in 1949 during the manufacture of trichlorophenol for the production of 2,4,5-T. Irritability, nervousness, insomnia, loss of libido, and impotence were reported. Symptoms of peripheral neuropathy included pain and weakness in the lower extremities. Histopathologic examination of several small cutaneous nerves in one case showed destruction of myelin sheaths and nerve fibers with replacement by connective tissue. In a follow-up study (Suskind, 1953) of 11 affected workers exposed at the 1949 accident and 25 affected workers from the 2,4,5-T production area, 35 of whom had shown chloracne, symptoms of peripheral neuropathy were found in 27 cases. Fatigue, nervousness, irritability, and decreased libido were also found.

Bauer *et al.* (1961) studied workers who had developed chloracne while employed in the manufacture of 2,4,5-T. Fatigue, muscle weakness, and pain, mostly in the lower extremities, were prevalent symptoms. Paresthesia and hyperesthesia (sensory neuropathy) were found, as well as inability to concentrate, memory deficits, decreased drive, intolerance to alcohol and sleep disturbances, including increased somnolence.

Poland *et al.* (1971) studied 73 current employees at a 2,4,5-T and 2,4-D manufacturing plant. 13 of whom had chloracne. An increased prevalence of neurological findings was not reported. A positive correlation between severity of chloracne and score on the hypomania scale of the Minnesota Multiphasic Personality Inventory was found.

Kleu and Goltz (1971) conducted a follow-up study of ten workers acutely exposed to TCDD 15 years earlier and reported fatigue, muscle weakness, decreased libido, alcohol intolerance, and memory loss.

Goldmann (1972) studied 42 workers involved in an accidental venting of steam during the manufacture of trichlorophenol. Seven showed signs or symptoms of central nervous system (CNS) involvement and three of polyneuropathy.

Pazderova-Vijlupkova *et al.* (1981) examined 55 of 80 workers employed at a plant manufacturing 2,4,5-T who were exposed from 1965 through 1968 and were examined during the years 1967 to 1973. Peripheral nervous system involvement was indicated by symptoms such as muscle weakness and pain in the lower extremities. Abnormal nerve conduction velocities were found in 17 cases (31%). Mild Schwann cell pathology was found at autopsy in the most severely affected worker. CNS effects were indicated by symptoms such as fatigue, sleep disorders, headache, and sexual dysfunction. Abnormal electroencephalographic responses were found in 27% of 34 cases examined, with borderline findings in an additional 21%. On the basis of severity of CNS symptoms, a subsample of 36 workers were examined by a psychiatrist, who characterized 35 as "neurasthenic" or "depressive."

Boeri *et al.* (1978) utilized nerve conduction velocity to assess the presence of possible neurophysiologic dysfunction resulting from chemical exposure associated with the Seveso accident. They compared two groups which differed in degree of TCDD contamination; 470 from the more contaminated zone and 152 from the zone at lower risk. NCV of the ulnar and peroneal motor nerves was measured. A relatively high prevalence of abnormalities was found in both populations (19.8 versus 13.2%). The authors attributed the increased prevalence in part to the prior exposure of the less heavily exposed population to chemicals associated with the industries of the area: woodworking, metalworking, and chemical industries. Still, a greater prevalence of polyneuropathy was found in the group living closer to the site of the accident.

In a follow-up examination of the Seveso population (Boeri, 1980) a subgroup of the exposed population ($N = 277$) was compared with residents of an unexposed town ($N = 380$) for signs and symptoms of peripheral neuropathy. Motor nerve conduction velocity was measured on the ulnar and peroneal nerves. A 4.5% frequency of peripheral neuropathy was found in the Seveso population for which no other etiology (such as diabetes) could be found. A significantly greater prevalence of peripheral neuropathy was found in the Seveso population than in the control group. Sensory nerve conduction velocities were not assessed.

A few reports are available concerning the human health effects of 2,4-D. Goldstein *et al.* (1959) found severe sensory and motor disorders in three cases of percutaneous exposure to 2,4-D used as a spray. Cases of neuropathy following exposure to 2,4-D have also been reported by Todd (1962), Berkeley and Magee

(1963), Berwick (1970), and Wallis *et al.* (1970). In all of these cases the exposure was to the already formulated product. Chloracne has not been reported with exposure to 2,4-D. The only reports in which chloracne had been found in 2,4-D workers occurred with concomitant exposure to 2,4,5-T (Bleiberg *et al.*, 1964; Poland *et al.*, 1971).

ANIMAL STUDIES

While there have been a large number of studies of chlorinated benzo-*p*-dioxins and related compounds in experimental animals, very few have focused on the nervous system. Elovaara *et al.* (1977) administered a single intragastric dose of 2,3,7,8-TCDD to rats, and found anomalous CNS function in some of the treated rats. Creso *et al.* (1978) found that 2,3,7,8-TCDD administered intraperitoneally or orally in rats resulted in CNS symptoms of irritability, restlessness, and increased aggression. Bucher (1946) and Hill and Carlisle (1947) found that mice, rats, rabbits, guinea pigs, and monkeys exposed to 2,4-D could develop myotonia, motor disorders, and paralysis of extremities. Desi *et al.* (1962) found that parenteral administration of 2,4-D in rats resulted in electroencephalographic abnormalities and decrements of rat performance, associated with pathology in the spinal cord. Elo and Ylitalo (1979) and Way (1969) presented additional histological evidence of nervous system susceptibility to 2,4-D.

NERVE CONDUCTION VELOCITY

Nerve conduction velocity (NCV) assessment has been used by many investigators in studies of toxic agents such as lead, mercury, and solvents (Spencer and Schaumberg, 1980; Seppäläinen *et al.*, 1978, 1979, 1980; Buiatti *et al.*, 1978). Buchthal *et al.* (1975) and Behse and Buchthal (1978) have studied the association of slowed NCV with symptoms of neuropathy and histological findings and provide evidence concerning the importance of electrodiagnosis in the evaluation of toxic neuropathies. NCV measurement is well suited for epidemiological studies since (1) the technique is noninvasive, (2) it can be performed quickly and accurately on large numbers of people, and (3) the results are quantitative (in continua) and can be related to other quantitative, continuous variables such as duration of exposure or biological indicators of exposure when available.

An important aspect of NCV assessment is its sensitivity to toxic changes before other signs or symptoms are present. When rats are injected with a neurotoxic agent such as *n*-hexane, NCV slowing is found before signs of overt neuropathy such as weakness and paralysis appear (Takeuchi *et al.*, 1980). Pre-symptomatic NCV slowing is also found among diabetics before symptoms or other signs of neuropathy (Thomas, 1980). Since NCV slowing is an early indicator of neuropathy, measurement of NCV is being used increasingly to assess subclinical dysfunction in studies of environmental and occupational toxic exposures.

PRESENT STUDY

In April 1979, chlorinated dibenzo-*p*-dioxin contamination was found in locations away from a chemical plant producing 2,4,5-T and 2,4-D in Jacksonville.

Arkansas, a small community near Little Rock. The source of the contamination was found to be toxic wastes leaking from drums stored above ground at the 93-acre plant site. Levels of 40 ppm of 2,3,7,8-TCDD were found in the wastes and 2 ppb in a sewer system outlet at the plant that discharged into the city system. The problem was investigated by the Arkansas State Department of Health, and the Governor's office ordered production of 2,4,5-T suspended until the health and safety implications of the findings were investigated and evaluated. 2,4,-D, however, continued to be produced.

2,4,5-T and 2,4-D had been produced at this plant since 1957. In the late 1960s more than 14 million pounds of Agent Orange (a 1:1 combination of the *n*-butyl ester of 2,4,5-T and 2,4-D) were manufactured at this site. Phenoxy herbicides had been the exclusive product of this plant since 1971, when the manufacture of other organic acid herbicides was discontinued.

In 1974 there was a reactor accident during the manufacture of trichlorophenol resulting in an outbreak of chloracne in the crew assigned to do the cleanup. Except for this episode, which involved fewer than a dozen workers, chloracne had not been a serious problem at this facility.

In July 1979, at the request of the Arkansas State Health Department, a health survey of current and former workers at this plant was conducted by the Environmental Sciences Laboratory of the Mount Sinai School of Medicine. While 2,4,5-T production had ceased at the plant in April, nonetheless, some workers were involved in redrumming of contaminated wastes in leaking drums. All workers were exposed to 2,4-D which was still being produced.

METHODS

Subjects. During July 1979 a health survey was conducted of 190 active, retired, and former workers of the plant. All 88 current workers were invited to participate and 76 did so, representing 86% of the active work force. Workers were included for NCV assessment if no positive history of diabetes, neurological disease, or excess alcohol consumption was found in the screening interview. Because of time limitations, NCV was measured in only 55 of these workers (53 active, 2 retirees).

All workers were at risk for exposure to phenoxy herbicides to some degree. Subjects were interviewed regarding exposure to other toxic chemicals, since some of these might affect NCV. Concurrent exposure to other neurotoxic agents was not found in any of the workers studied. Nine workers were found to have had possibly significant prior exposure to such agents, which included pesticides, solvents, and—in two workers—2,4-D.

The original protocol included examination of workers who had had minimal or no direct exposure to 2,4,5-T or 2,4-D. However, due to time limitations, this was not done. The electrophysiologic team remained unaware of the exposure history of the individual subjects.

The control group consisted of 17 Environmental Sciences Laboratory staff and 8 brake workers examined as part of a survey of asbestos-exposed workers ($N = 25$). All subjects were screened prior to testing for exposure to neurotoxic agents, history of diabetes, stroke, other neurological disease, and alcohol use. No con-

control subject had significant exposure to neurotoxic agents. Control subjects were excluded if alcohol consumption exceeded four drinks per day. Exposed workers were interviewed concerning alcohol use and an index of weekly consumption was computed. Only limbs that had suffered no significant trauma were tested. If the back had been injured, or if disk disease or "sciatica" were reported, the subject's sural nerve velocity was not measured.

Conduction velocities of the median motor, median sensory, and sural nerves were assessed. Median motor velocity was measured in 53 cases and 25 controls; median sensory velocity in 54 cases and 23 controls; and sural sensory velocity in 50 cases and 20 controls. All stimulation was supramaximal. Sensory stimulation was antidromic. Latency was measured in the motor nerves at the first point of negative deflection, and for the sensory at the peak negative deflection. Waveform measurement was conducted without knowledge of the subject's employment history.

The recording electrode for the median motor nerve was affixed at the center of the thenar eminence over the adductor pollicis brevis, and the reference electrode ringed its tendon of insertion at the thumb. The nerve was stimulated proximally medial to the aponeurosis musculi bicipitis brachii, and distally at the wrist between the palmaris longus and the flexor carpi radialis tendons. The median sensory evoked potential was recorded using a ring electrode around the middle interphalangeal joint of the index finger, and the reference electrode was affixed around the distal interphalangeal joint. The nerve was stimulated at the distal median motor stimulation point. The recording electrode for the sural was a ring electrode shaped into a strip and taped so that one end touched the lateral malleolus and the distal end pointed toward the posterior tip of the calcaneus. The reference electrode was placed approximately 2 cm distal and parallel to the recording electrode. The stimulation site for the sural varied somewhat, since occasionally the evoked potential could not be detected without varying the stimulation site. The initial site chosen for each subject was slightly distal to the midsection of the two heads of the gastrocnemius. If the evoked potential was inadequately defined, the nerve was stimulated more distally in a line extending from the initial stimulation site toward the recording electrode. Stimulation and recording procedures were rechecked if the sural evoked response was not elicited. The distance between the stimulation site and the recording electrode was never less than 11 cm.

A Teca TE42 electromyograph with digital averager was used in the field research. The unit had been calibrated by the manufacturer prior to the study. The calibration trace was printed on each EMG trace. The unit remained in calibration throughout the study.

Skin temperature of the limb was measured using a Rochester Electro-Medical thermistor probe applied to the skin surface successively at three points on the arm (the proximal and distal stimulation sites, and at the thenar eminence of the palm) and at two points on the leg (over the stimulation and recording electrode sites). The temperature values were averaged for each limb.

The distance of the nerve segment was assessed using flexible mylar measuring tape. The shortest distance between the points was followed, and the tape mea-

sure was in contact with the skin at all points along the surface of the tape measure. Care was taken not to stretch the skin by pressing too hard on the tape measure. Nor was the distance shortened by pulling the tape measure so that contact with the skin was lost. (Relatively short distances can have a large effect on the actual calculation of the NCV for a given nerve.) A difference of 1 mm was acceptable for inter-rater reliability, a procedure conducted on half the cases.

A Disa 1500 electromyographic system was used for the examination of some of the control subjects. Since it was possible that the two units might not be measuring in concordance, both units were compared using volunteer subjects at the Environmental Sciences Laboratory. Nine sural, two median motor, and one median sensory nerves were used. Each nerve was examined using both the Teca and Disa units, utilizing their respective recording electrodes. The units had been recently calibrated by the manufacturer, and the calibrations were frequently checked. The Teca stimulating electrode was used throughout the study, since indentations remain temporarily on the surface of the skin—this is more convenient for marking the points of stimulation. The correlation between the measurement of the two units, using the same points of stimulation and pickup, was calculated to be $+0.97$, $P < 0.0001$. Therefore, the two units were measuring evoked potentials in concordance.

ANALYSIS

In this group, chloracne was infrequent and could not serve as a variable in the analysis.

Limb temperature. Nerve conduction velocity is affected by temperature at the approximate rate of 2 m/sec/°C (Goodgold and Eberstein, 1978; de Jesus *et al.*, 1973; Halar *et al.*, 1980). Limb temperature is a function of many variables not related to exposure to neurotoxic agents, such as room temperature, outdoor temperature, the amount of clothing worn, blood circulation, and the subject's age. Limb temperature can vary to the extent that interpretation of significant differences between two groups can be compromised; a mean temperature difference of only 2°C could lead to false conclusions concerning true group differences.

To reduce the variance produced by temperature on nerve conduction velocity, some investigators warm the limb to a standard temperature. However, this is not a practical technique in the field when many subjects must be examined and time is limited. An approach currently used by some investigators (Halar *et al.*, 1980; de Jesus *et al.*, 1973) is the mathematical adjustment of all velocities to that expected at a standard temperature. The equations were derived from experimental manipulation of limb temperature in the laboratory. The equations presented by de Jesus *et al.* (1973) were used in this study to adjust each velocity to 36°C (Appendix A). This temperature was chosen following the approach of Rosenfalk (1975), who reported norms based upon the heating of limbs to 35–37°C.

Age. Nerve conduction velocity declines with age at the approximate rate of 1.5 m/sec/decade depending upon the nerve examined (Behse and Buchthal, 1971; Nielsen, 1973; Rosenfalk, 1975; Buchthal *et al.*, 1975). Investigators who have considered the effect of age upon nerve conduction velocity usually attempt to

match each subject with an appropriate control when comparing two groups. However, under some circumstances the appropriate control data may not be available. An additional shortcoming of the matching procedure is that the control data are based upon a single observation. Assuming linearity of the age effect upon conduction velocity, a regression equation can be constructed which is based upon many data points, that is, all subjects in the data pool.

In a recent study of lead-exposed workers, Buchthal and Behse (1979) used regression equations to determine the expected nerve conduction velocity of a theoretical matched control. The mean difference in velocity between the subjects and the regression-produced "matched control" was calculated. The significance of the difference between the groups was evaluated with the *t* test for correlated means.

Z-score standardization. The *Z*-score transformation is widely used when comparing values from distributions with different means and standard deviations, since after transformation the distributions have a mean of zero and a standard deviation of one (Anastasi, 1976; Valciukas and Lilis, 1980). This transformation can be applied to reduce the contribution of confounding variables, such as age, by determining the departure of an observed value from that expected on the basis of confounding variables.

All conduction velocity values were converted to *Z* values in this study by using the equation

$$Z = \frac{\text{observed velocity} - \text{velocity predicted on the basis of age}}{\text{the standard error of estimate}}$$

The velocity predicted on the basis of age is derived from the regression equations presented by Buchthal *et al.* (1975) for the sensory nerves and by Nielsen (1973) for the median motor. Velocity was adjusted to that expected at 36°C, as discussed above (Appendix A).

The study and control groups were compared in two ways: prevalence of slowed nerve conduction velocities and comparison of means. The study group was further analyzed by examining velocity as a function of duration of employment. A *Z* value corresponding with the 0.01 (one-tailed test) or less probability level was designated as a slowed value.

RESULTS

Forty-six percent of the study group had one or more slowed nerve conduction velocities, versus 5% of the control group ($\chi^2 = 17.1, P < 0.001$). Twenty-four of the 50 sural nerves measured fell below the first percentile, versus 2 of the 20 control sural nerves, using the equation presented by Buchthal *et al.* (1975). One subject's sural nerve evoked potential was absent.

The effect of alcohol on nerve conduction velocity within the study group was examined. In general, alcohol consumption was low, averaging 2.7 drinks per week. There was no difference ($P < 0.39$) in the alcohol consumption of those subjects with a slowed velocity when compared with that of subjects with normal velocities. The correlation of reported alcohol consumption and nerve con-

duction velocity in the three nerves was not significantly different from zero. Therefore, the effect of alcohol consumption is unlikely to have produced the observed group differences.

Table 1 presents the *t*-test analyses of the *Z* scores of the study versus control populations.

The probability of a one-tailed *t* value is shown, since the study group is hypothesized to have slower velocities than the control group. The mean velocities of the median motor and sural sensory nerves were significantly slower in the study group than in the control group. (The nerve conduction velocity values before the adjustment for age and temperature are presented in Appendix B.)

The mean sural velocity *Z* value of the study group is approximately 1.3 standard deviation units below that of the control group. This difference corresponds with a mean slowing of approximately 5.2 m/sec. For the median motor nerve, the mean velocity slowing was approximately 1.9 m/sec.

Additional *t*-test analyses were conducted with the study population reduced by removing eight individuals who reported consuming more than 28 alcoholic drinks per week. Also removed was the one case of mild diabetes. The results of the *t* tests are presented in Table 2.

The mean velocities of the median motor and sural sensory nerves were still significantly slower in the study group than in the control group, suggesting that the slowed velocities were not due to consumption of alcoholic beverages.

A correlation coefficient was computed to assess the association of velocity (age and temperature adjusted) with duration of employment (Table 3). Sural nerve conduction velocity was highly correlated with duration of employment ($r = -0.40$, $P < 0.004$), while the velocities measured in the median motor and median sensory were not correlated with duration of employment.

Further *t*-test analyses were performed after removing the nine workers with

TABLE 1
MEAN NERVE CONDUCTION VELOCITIES OF STUDY VERSUS CONTROL GROUPS^a

Nerve	Group	<i>N</i>	Mean <i>Z</i> value	SD	<i>t</i>	Prob. <i>t</i> (one-tailed)
Median motor	Study	53	0.20	1.19	1.89	0.03
	Control	25	0.91	1.70		
Median sensory	Study	54	-0.16	1.15	0.52	0.30
	Control	23	-0.04	0.81		
Sural	Study	50	-2.21	1.09	4.28	0.0001
	Control	20	-0.52	1.62		

^a Based upon *Z* values which represent the velocity expected on the basis of age subtracted from the temperature corrected observed velocity, divided by the standard deviation.

TABLE 2
MEAN NERVE CONDUCTION VELOCITIES OF STUDY VERSUS CONTROL GROUPS^a

Nerve	Group	N	Mean Z value	SD	t	Prob. t (one-tailed)
Median motor	Study	44	0.28	1.26	1.77	0.04
	Control	25	0.91	1.02		
Median sensory	Study	45	-0.10	1.15	0.22	0.41
	Control	23	-0.04	0.81		
Sural	Study	41	-2.17	1.04	4.13	0.0002
	Control	20	-0.52	1.62		

^a Based upon Z values which represent the velocity expected on the basis of age subtracted from the temperature corrected observed velocity, divided by the standard deviation. The data of subjects who consumed more than 28 alcoholic beverages per week ($N = 8$) and the one subject with slight diabetes were removed from these analyses.

possibly significant prior exposure to neurotoxic agents. Removal of these cases did not affect the previous findings (Table 4). The correlation of sural NCV with duration also was essentially the same ($r = -0.42$, $P = 0.006$).

It was possible that a residual effect of age upon sural NCV remained after the standardization process. Such an effect could have spuriously increased the correlation between NCV and duration of employment. This possibility was explored by computing the partial correlation of sural NCV (standardized) with duration of employment, controlling for age. A significant relationship was still found ($r = -0.32$, $P < 0.03$), supporting the previously described negative correlation of exposure with sural NCV.

In theory, the variance of sural velocity can be better modeled as a function of age, skin temperature, and duration of exposure, without using statistical parameters derived from calculations based upon other samples. Such a model is expected to reflect more accurately the partial correlation of the dependent variables within this sample since the parameters are based upon variation within the study sample. This model was tested by computing the multiple correlation of age, skin temperature, and duration of employment with unstandardized sural velocity.

TABLE 3
YEARS OF EMPLOYMENT VERSUS NERVE CONDUCTION VELOCITY ADJUSTED
FOR AGE AND TEMPERATURE

	Median motor	Median sensory	Sural
r	-0.04	-0.10	-0.40
P	0.80	0.48	0.004
N	53	54	50

Note. Mean years of employment = 7.0, standard deviation = 6.2, range = 1-28 years.

TABLE 4
MEAN NERVE CONDUCTION VELOCITIES OF STUDY VERSUS CONTROL GROUPS^a

Nerve	Group	N	Mean Z value	SD	t	Prob. t (one-tailed)
Median motor	Study	44	0.11	1.17	2.29	0.01
	Control	25	0.92	1.02		
Median sensory	Study	44	-0.23	1.06	1.01	0.15
	Control	23	0.04	0.81		
Sural	Study	41	-2.11	1.17	4.58	0.0001
	Control	20	-0.52	1.62		

^a Based upon Z values which represent the velocity expected on the basis of age subtracted from the temperature corrected observed velocity, divided by the standard deviation. Nine subjects with possibly significant previous exposure to neurotoxic agents were removed.

The multiple correlation coefficient was computed to be 0.52 ($P < 0.002$), which exceeded the correlation of duration of employment and standardized sural NCV (as described above, $r = -0.40$, $P < 0.04$). The t test for difference between correlated r 's showed that the correlation coefficients differed significantly ($t = 2.08$, $P < 0.05$). As expected, the model using unstandardized sural NCV provided better fit for these data. When comparing the relative contribution of age, skin temperature, and duration of employment to the multiple correlation coefficient, it was found that the variable contributing most to the correlation coefficient was duration of employment (accounting for 83% of the total sum of squares). The partial correlation of sural NCV with duration of employment in this model was essentially the same as that found when correlating standardized sural NCV with duration of employment.

DISCUSSION

An increased prevalence of slowed nerve conduction velocities was found among chemical workers exposed to the phenoxy herbicides 2,4,5-T and 2,4-D and related contaminants (chlorinated dioxins). Conduction velocities of the median motor and sural sensory nerves were significantly slower in the study versus the control group. Slowed sural sensory velocity was significantly correlated with duration of employment.

The sural nerve seemed to be especially affected in this study. In other studies, toxic susceptibility of neurons has been associated with increased fiber length and smaller nerve diameter (Thomas, 1980). Since the center of neuron metabolism for the sural nerve can reside over a meter from the axon site, and the fibers are few, have smaller diameter, and less myelination, the sural nerve may be especially vulnerable to disruption of normal nervous tissue metabolism and function.

Other researchers have indicated the importance of assessing the sural nerve response in studies of both alcohol toxicity and polyneuropathy of varied etiology. Behse and Buchthal (1978) found, in a study of 167 patients with polyneuropathy

of varied etiology, that abnormal electrophysiologic responses were more frequent in the sural nerve than in the median sensory. (Findings in the sural and superficial peroneal were similar.) D'Amour *et al.* (1979) compared the NCV of four motor and two sensory nerves with the sural NCV in alcoholic subjects, and found that abnormalities of the sural nerve were most likely to be detected.

Although the dioxins are known to be highly toxic, the significant findings here may also be due to 2,4-D exposure. This possibility is being investigated by studies of another group of workers who had been exposed to 2,4,5-T (contaminated with dioxins) but not exposed to 2,4-D.

In addition to occupational exposure, important public health questions are raised regarding environmental presence of these chemicals. Much public debate and concern was evident among the citizens of Arkansas in response to the toxic waste problem at the Jacksonville plant, while worldwide concern was stimulated by the episode in Seveso, Italy. Early detection of adverse health effects can help to provide guidance concerning implementation of preventive and control measures. Since slowed nerve conduction velocity can be an important early indicator of toxic exposure, the study of the relationship of such signs of neurological impairment to adverse effects in other body systems, either concomitant or delayed, remains an important clinical and scientific endeavor.

APPENDIX A. EQUATIONS FOR TEMPERATURE AND AGE

$$\text{VMMT} = \text{VMM} \times (10^{0.018 \times (36 - \text{temp} - \text{arm})}),$$

$$\text{VMST} = \text{VMS} \times (10^{0.018 \times (36 - \text{temp} - \text{arm})}),$$

$$\text{VSST} = \text{VSS} \times (10^{0.018 \times (36 - \text{temp} - \text{leg})}),$$

$$\text{VMMP} = 69.5 - (0.18 \times \text{age}),$$

$$\text{VMSP} = 59.5 - (0.15 \times \text{age}),$$

$$\text{VSSP} = 57.4 - (0.05 \times \text{age}),$$

$$\text{ZMM} = (\text{VMMT} - \text{VMMP})/3.4,$$

$$\text{ZMS} = (\text{VMST} - \text{VMSP})/4.6,$$

$$\text{ZSS} = (\text{VSST} - \text{VSSP})/3.7,$$

where

VMMT = velocity median motor temperature adjusted.

VMST = velocity median sensory temperature adjusted.

VSST = velocity sural temperature adjusted.

VMM = velocity median motor observed.

VMS = velocity median sensory observed.

VSS = velocity sural observed.

VMMP = velocity median motor predicted on the basis of age.

VMSP = velocity median sensory predicted on the basis of age.

VSSP = velocity sural predicted on the basis of age.

ZMM = standardized median motor velocity, age and temperature adjusted.

ZMS = standardized median sensory velocity, age and temperature adjusted.

ZSS = standardized sural velocity, age and temperature adjusted.

APPENDIX B. MEAN NERVE CONDUCTION VELOCITIES (m/sec) OF STUDY VERSUS CONTROL GROUPS

Nerve	Group	N	Age	Mean Velocity	SD	t	p ^a
Median motor	Study	53	34.3	57.0	3.26	0.56	0.29
	Control	25	32.8	57.6	5.20		
Median sensory	Study	54	34.4	47.8	5.36	0.81	0.21
	Control	23	37.2	46.8	4.47		
Sural ^b	Study	50	34.0	40.3	3.48	2.05	0.02
	Control	20	40.1	42.8	4.90		

^a One-tailed test.

^b The controls are significantly older for the comparison of sural NCV.

ACKNOWLEDGMENTS

We wish to express our thanks to Robert Whipple, Albert Einstein College of Medicine, New York City, for his most generous and expert guidance. We thank David Nicholson and Michael Moses for their diligent assistance during the data collection phase. We also wish to thank the City University of New York Computing Center and the Department of Biostatistics, Mount Sinai School of Medicine, for their continuing support in computer operations. Funded in part by a NIEHS center grant (ES00928) and by fellowship support from training grant S T32 ES07010-03.

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THEODOR D. STERLING, Ph.D.

I. Qualifications

Dr. Sterling is a Professor in the Faculty of Interdisciplinary Studies and Department of Computing Science, Simon Fraser University, Vancouver, British Columbia, Canada. His Curriculum Vitae is attached. Dr. Sterling is presently on sabbatical; he teaches when active in that regard: Computation; Computers and Public Policy; Statistics; and various advanced topics.

II. Subject Matter

Dr. Sterling is a mathematician, statistician, and epidemiologist; as well, Dr. Sterling is intimately familiar with existing data and analyses concerning the effects of phenoxy herbicides and impurities, e.g., 2,3,7,8-TCDD, contained therein. Dr. Sterling has devoted much of his teaching and research to the collection and analysis of data and their use for scientific inference.

III. Scientific Principles

See General Statement of Scientific Principles and Assumed Facts attached.

IV. Substance of Opinions

A. Dr. Sterling will testify that there exists a considerable body of medical and scientific evidence which demonstrates that the preparations of 2,4,5-T and 2,4,-D are toxic, teratogenic and carcinogenic. That part of Dr. Sterling's testimony is based on the reviews of the literature and critical evaluation of data pertaining to the health effects of 2,4,5-T and 2,4-D on animals and humans and is contained in documents of which Dr. Sterling is the sole or contributing author.

V. Grounds for Each Opinion

1. Report of the National Academy of Sciences Committee on 2,4,5-T, to the Administrator of the Environmental Protection Agency, May 7, 1971 (of which Dr. Sterling was a member).
2. Summary of Evidence presented to The Royal Commission Hearings on Herbicides and Pesticides, July 16, 1974.
3. Hearings of the Assembly Committee on Natural Resources of the State of Wisconsin, March 19, 1975.
4. Hearings: Emergency Suspension Order for 2,4,5-T and Silvex, FIFRA, Docket 409-410, April 23, 1979.
5. Submissions to Environmental Appeal Board of British Columbia, Canada, May 18 and July 20, 1982.
6. Evaluation of Data Submitted by Vietnamese Investigators in International Group of Experts.
7. Sterling, T. and Arundel, A., The Epidemiology of 2,4,5-T (from 1969 to the present), Journal of Northwest Coalition for Alternative to Pesticides, (in print), April, 1984.

B. Further, there is no credible scientific evidence of a no effect level; said another way, as a carcinogen, there is no safe level and therefore a single exposure years ago may be responsible for human cancer which develops today.

C. In addition, Dr. Sterling will testify that there is ample evidence that exposure to 2,4,5-T is teratogenic in humans when the mother is exposed, and convincing evidence is not extant that the outcome of pregnancy is influenced by exposure of the father alone.

1. Besides review documents listed above, additional evidence on teratogenic properties of 2,4,5-T for exposed mothers comes from two recent studies from Vietnam and one from Italy:

1. This is based on Dr. Sterling's analysis of data in Kociba, R.J., et al., Toxicology and Applied Pharmacology, 35, 553-574, 1976, and Rose, J.Q., et al., Toxicology and Applied Pharmacology, 36, 209-226, 1976.
2. IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemical to Humans
3. Nicholson, William J., 1976. Occupational Carcinogenesis. New York Academy of Sciences. 271: 152-169
1. Tofilan, P.J., Piper, W.N. 1982 2,3,7,8-TCDD. Mediated Depression of Rat Testicular Heme Synthesis and Micromal Cytochrome P. 450 Biochem. Pharmacol. 31: 3663-3666
2. Constable, J., Hatch, M., Herbicide Exposure and Reproductive Outcome. In: Herbicides in War: The Long Term Effects for Man and Nature, A.W. Westing, ed. New York: Taylor and Francis, 1984 (in press)
1. Nguyen Thi, et al., International Symposium on Herbicides and Defoliants in War, Ho Chi Minh City, January 13-20, 1983.
2. Nguyen Can, et al., International Symposium on Herbicides and Defoliants in War, Ho Chi Minh City, January 13-20, 1983.
3. Bisanti, L., et al., Malformation Registry, Department of Seveso, Italy, June 28, 1982.

13638

2. Evidence of birth defects of children of fathers exposed to 2,4,5-T comes from:

1. Ton Duc Lant, et al., International Symposium on Herbicides and Defoliants in War, Ho Chi Minh City, January 13-20, 1983.

Hguyen Can, et al., International Symposium on Herbicides and Defoliants in War, Ho Chi Minh City, January 13-20, 1983.

Report to the Ministers for Veterans Affairs: Case-Control Study of Congenital Anomalies and Australian Publishing Service, Canberra, January, 1983.

IV. D. and V. D.

Most especially, Dr. Sterling will testify of the incidence of subjective symptoms and/or medical records documenting such symptoms. These symptoms are those which have been compiled by the National Center For Health Statistics, and will be compared, to the extent available, to those symptoms of the Vietnam veterans, particularly those of the representative plaintiffs. The purpose will be to ascertain the incidence of such symptoms in the general population so as to analyze statistically the symptoms of the plaintiffs. The product of such overall incidence will be calculated to examine the possibility or likelihood of such a constellation of Agent Orange/dioxin related symptom complex to occur in a random fashion. Statistical analysis is based on data provided by Health Interview Survey of the National Center for Health Statistics. Tapes for the years 1969 through 1975 have been obtained by Dr. Sterling from the National Center for Health Statistics. The Health Interview Survey is a probability sample of the U. S. population consisting of ongoing

13639

interviews of approximately 40,000 families per year. (so that Dr. Sterling's analyses is based on interviews of approximately 240,000 U.S. families). Dr. Sterling's projection of the probability of various symptoms in the U. S. population is based on the analysis of the HIS Data for the frequency with which these certain symptoms have been observed. singly or in combination. The symptoms include: lymphomas, soft tissue sarcomas, malignancy, various skin rashes, chloracne, eye light sensitivity, orthopedic impairment, especially of joint and of multiple sites, certain nervous symptoms memory lapse or temporary loss of memory, headache (but not migraine), depression, insomnia and tremors.

Besides the review of data listed here, the bases or grounds for the facts and opinions of Dr. Sterling's testimony are: educational and professional background; publications regarding the subject phenoxy herbicides; review of the applicable medical and scientific literature; attendance and participation in various symposia dealing with the scientific issues in question; training as a mathematician, statistician, and epidemiologist; and training and experience in the computer sciences.

FURTHER REFERENCES.

1. TCDD is toxic, teratogenic and carcinogenic:

That part of Dr. Sterling's testimony is based on reviews of the literature and critical evaluation of data pertaining to the health effects of 2,4,5-T and 2,4-D on animals and humans and is contained in documents of which Dr. Sterling the sole or contributing author:

1. Report of the (National Academy of Sciences) Committee on 2,4,5-T to the Administrator of the Environmental Protection Agency, May 7, 1971 (of which Dr. Sterling was a member).
2. Summary of Evidence presented to The Royal Commission Hearings on Herbicides and Pesticides, July 16, 1974.
3. Hearings of the Assembly Committee on Natural Resources of the State of Wisconsin, March 19, 1975.
4. Hearings: Emergency Suspension Orders for 2,4,5-T and Sylvex, FIFRA Dockets 409 and 410, April 23, 1979.
5. Submissions to Environmental Appeal Board in British Columbia, Canada, May 18 and July 20, 1982.
6. Evaluation of data submitted by Vietnamese investigators to international group of experts.
7. Sterling, T., and Arundel, A., The Epidemiology of 2,4,5-T (From 1969 to the Present), Journal of the Northwest Coalition for Alternatives to Pesticides, in print, April, 1984.

2. There is no known safe level nor is there "no effect" level:

This is based on Dr. Sterling's analysis of data in Kociba, R.J., et al, Toxicology and Applied Pharmacology, 35, 553-574, 1976, and Rose, J. Q., et al, Toxicology and Applied Pharmacology, 36, 209-226, 1976.

3. TCDD is teratogenic:

Besides review documents listed above, additional evidence on teratogenic property of 2,4,5-T for exposed mothers comes from two recent studies from Vietnam and one from Italy:

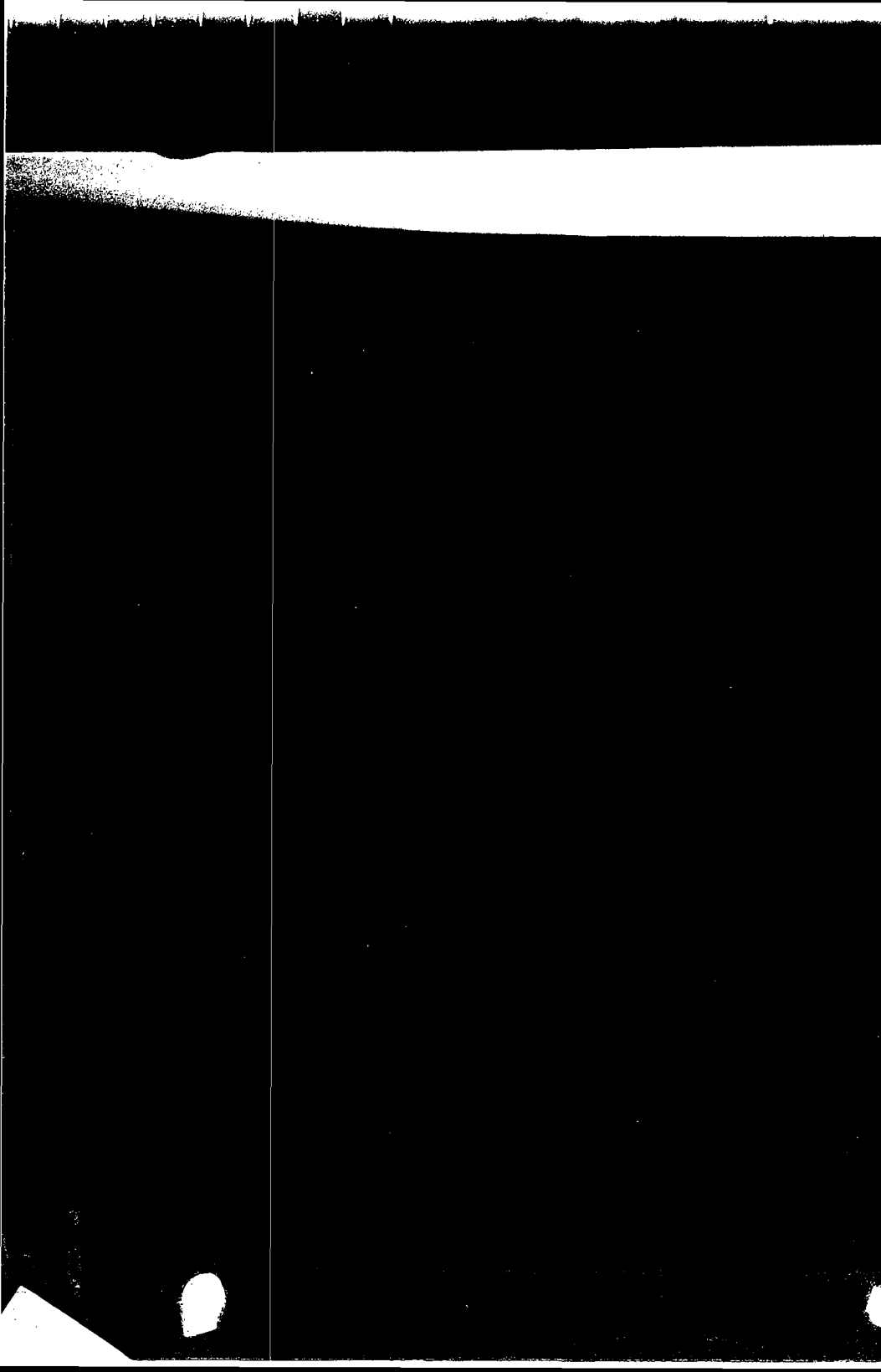
1. Nguyen Thi, et al, International Symposium on Herbicides and Defoliants in War, Ho Chi Minh City, January 13-20, 1983.
2. Nguyen Can, et al. International Symposium on Herbicides and Defoliants in War, Ho Chi Minh City, January 13-20, 1983.
3. Bisanti, L., et al, Malformation Registry, Department of Seveso, Italy, June 28, 1983.

Evidence of birth defects of children of fathers exposed to 2,4,5-T comes from:

1. Ton Duc Lang, et al, International Symposium on Herbicides and Defoliants in War, Ho Chi Minh City, January 13-20, 1983.
2. Nguyen Can, et al, International Symposium on Herbicides and Defoliants in War, Ho Chi Minh City, January 13-20, 1983.
3. Report to the Minister for Veteran's Affairs: Case-control study of congenital anomalies and Vietnam Service (Birth Defects Study), Australian Publishing Service, Canberra, January, 1983.

4. Further support for the "constellation" of symptoms:

Statistical analysis is based on data provided by the Health Interview Survey of the National Center for Health Statistics. Tapes for the years 1969 to 1975 have been obtained by Dr. Sterling from the National Center for Health Statistics. The Health Interview Survey is a probability sample of the U.S. population consisting of ongoing interview of approximately 40,000 families per year. (So that Dr. Sterling's analysis is based on interviews of approximately 240,000 U.S. families.) Dr. Sterling's projection of the probabilities of various symptoms in the U.S. population is based on the analysis of the HIS data for the frequency with which these certain symptoms have been observed, singly or in combination. The symptoms include: lymphomas, sarcomas, malignancies, various skin rashes, chloracne, eye light sensitivity, orthopedic impairment, especially of joints and of multiple sites, certain nervousness symptoms, memory lapse or temporary loss of memory, headaches (but not migraine), depression, insomnia and tremors.



AGENT ORANGE TRIAL TESTIMONY
DAY 9

MOYER V DOW

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FILED
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U. S. DISTRICT COURT E.D. N.Y.
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UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

----- X

In re

MDL No. 381
(All Cases)

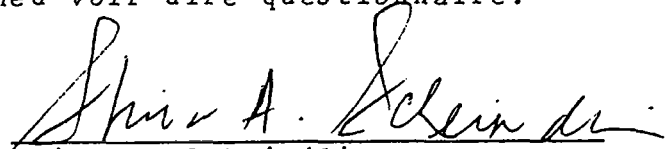
"Agent Orange"

MAGISTRATE'S
PRETRIAL ORDER
No. 21

Product Liability Litigation,

----- X

After receiving proposed voir dire questionnaires from plaintiffs and defendants, and hearing oral argument on those proposals, it is respectfully recommended that the Court adopt the attached voir dire questionnaire.


Shira A. Scheindlin
United States Magistrate

Dated: Brooklyn, New York
April 6, 1984

13646

2371

INSTRUCTIONS TO VOIR DIRE QUESTIONNAIRE

The attached questionnaire is to be filled out by you in order to assist the Court and counsel in the important task of selecting a jury in the trial of a lawsuit concerning "Agent Orange," a product that was used during the Vietnam War. You are to answer all of the questions to the best of your ability, without help from any other person.

We are requesting this information from you only to the limited extent necessary to select a fair and impartial jury in this litigation. Only the Court and counsel in this litigation will know your identity. After the questionnaire has been reviewed, you will be called back to Court for further questioning.

The issues in this case will be fully explained to you by the Court at a latter date. The case will involve a good deal of scientific, medical and statistical testimony. You need not be expert in any of these fields in order to serve on this jury.

The Court and counsel are aware that every person has certain beliefs and prejudices concerning many things. Nonetheless you should answer the questionnaire with your

13647

true feelings, whatever those may be. Do not assume that any of your answers will qualify you or disqualify you from serving on this jury. The test for being a juror is whether or not you can hear the evidence fairly and impartially and that determination will be made by the Court and counsel during jury selection.

Please fully answer each question to the best of your ability. Take as much time as you need to answer each question. The Court has approved the use of this questionnaire and requests your full cooperation.

13648

I. QUESTIONS ABOUT YOU AND YOUR FAMILY

1. Your sex
 - male
 - female

2. Year of birth: _____

3. Marital status
 - single
 - married or permanent companion
 - divorced or separated
 - widow

4. Schools (last school)
 - grade school
 - high school graduate
 - some college
 - college graduate
 - trade school
 - graduate school

5. Do you have a degree in
 - science or engineering
 - business
 - law-related field
 - health-related field
 - other

6. Have you ever taken any courses in chemistry?
 - yes
 - no

7. Do you have any children?

If yes: list ages for

females: ___' ___' ___' ___' ___

males: ___' ___' ___' ___' ___

8. What is the current yearly income of your household?

() Up to \$15,000

() \$15,001 - \$24,000

() \$24,001 - \$39,000

() \$39,001 or more.

9. What is your present occupation?: _____

10. Name of employer: _____

11. List your prior occupations: _____

12. What is the occupation of your spouse?

13. List the occupations of all your children.

Child #1 _____

Child #2 _____

Child #3 _____

Child #4 _____

Child #5 _____

Others _____

14. Have you ever worked for any agency of the Federal government in any capacity other than military service?

No ()

If yes, what agency _____

15. Have you ever worked for an insurance company?

() no

() yes

If yes:

In what capacity?

16. Have you ever done any claims adjustment work for any employer?

() yes

() no

17. If you are not employed outside the home, are you:

() a homemaker If so, how long? _____

() a student If so, how long? _____

() retired If so, how long? _____

() disabled If so, how long? _____

() seeking work If so, how long? _____

() other (specify) _____

18. What are your hobbies?

19. How many years have you lived at your present address? _____

20. Do you rent or own your home?

() rent

() own

21. Is anybody in your family

-- a medical doctor?

() yes

() no

-- in law enforcement?

() yes

() no

13651

-- a nurse or other health attendant?

() yes

() no

-- a lawyer or employee of a law firm?

() yes

() no

22. Have you or your spouse or companion ever received veterans disability compensation payments from the government?

() not to my knowledge

() yes, for partial disability

() yes, for total disability

23. Have you or your spouse or companion ever been denied veterans disability compensation payments, to your knowledge?

() yes

() no

24. Have any of your children or their spouses or companions ever received veterans disability compensation payments from the government?

() not to my knowledge

() yes, for partial disability

() yes, for total disability

25. Have any of your children or their spouses or companions ever been denied veterans disability compensation payments, to your knowledge?

() yes

() no

II. QUESTIONS ABOUT SERVICE IN THE ARMED FORCES

1. Have you ever served in the armed forces?

yes

no

If yes:

a) In what branch

Army

Navy

Air Force

Marines

Coast Guard

National Guard

Reservist

Other

b) During which years: 19 __ to 19 __

c) What was your rank _____

d) Did you serve in:

World War II

Korea

Vietnam

e) Have you suffered any ill effects from your military service?

yes

no

f) If yes, what ill effects?

2. Did any family members, close friends, or relatives ever serve in the armed forces?

yes

no

If yes:

a) Did any of them ever serve in

World War II

Korea

Vietnam

13653

- b) Did any of them suffer any ill effects from their military service?
 yes
 no

If yes:

- a) What ill effects were suffered?

- b) Please state that person's relationship to you _____

- 3. Have you, or your spouse or companion, or a relative, or close friend ever been in a Veterans Hospital?
 yes
 no

If yes:

Please state that person's relationship to you _____

- 4. Have you, your spouse or companion or another member of your family ever been a member of one of the following veterans organizations?
 yes
 no

If yes, check which ones:

- American Legion
- Veterans of Foreign Wars
- Amvets
- Disabled American Veterans
- Vietnam Veterans of America
- Other (fill in):

- 5. Has anyone close to you been killed or seriously injured, or suffered a serious disease during military service?
 yes
 no

13654

If yes:

- Killed
- Seriously injured
- Serious disease

Where?

- Vietnam
- Korea
- World War II
- Other (fill in): _____

6. Do you believe that the government benefits made available to Vietnam veterans are:

- too low
- too high
- about right
- don't know

III. QUESTIONS ABOUT CONTACT WITH CHEMICALS

1. Have you, your spouse or companion, ever had a job working in contact with chemicals?

- yes
- no

If yes:

a) Has any of them suffered any ill effects from these chemicals?

- yes
- no

If yes:

What ill effects?

2. Do you have any close friends or relatives who have ever had a job working in contact with chemicals?

- yes
- no

13655

If yes:

a) Has any of them suffered any ill effects from these chemicals, to your knowledge?

yes

no

If yes: What ill effects?

3. Have you, your spouse or companion, or one of your children, relatives or close friends ever worked for any chemical company?

yes

no

If yes, which one?

4. Have you had any personal experience with pesticides or other chemicals in the course of farming, gardening, tending the lawns or some like activity?

none

a little

some

quite a lot

5. To your knowledge, have you or any member of your family ever purchased or used any chemical manufactured by the defendant chemical companies listed on the next page?

yes

no

If yes, please check those companies whose chemicals you have purchased or used.

- Dow
- Monsanto
- Hercules
- T-H Agriculture
- Diamond Shamrock
- Uniroyal
- Thompson Chemical

6. Have you or any member of your family ever owned or worked for a company which manufactures or sells herbicides (plant and weed killers)?

- yes
- no

If yes, please name that company:

7. Do you believe you have ever been exposed to Agent Orange, a herbicide sprayed by the American military in Vietnam?

- yes
- no

8. Do you know anyone who believes he or she has ever been exposed to Agent Orange?

- yes
- no

If yes, is he or she a:

- spouse or companion?
- child?
- close relative?
- close friend?
- acquaintance?

9. Have you any views about the use of Agent Orange?

- yes
- no

13657

If yes, what are those views?

10. Do any of your close friends or family have any views concerning the use of Agent Orange?

() yes

() no

If yes, what are those views?

11. If you have answered yes to the previous question, will the views of those friends and/or relatives affect your views about the use of Agent Orange?

() yes

() no

12. Will your views or those of family or friends affect your ability to be fair and impartial in deciding the issues in this case?

() yes

() no

IV. QUESTIONS ABOUT CHEMICAL CORPORATIONS AND BIG CORPORATIONS IN GENERAL

1. How do you feel generally about big corporations?

() I like them

() I do not like them

() I have no strong feelings
one way or the other

2. How do you feel about corporations in the chemical industry?

- I like them
- I do not like them
- I have no strong feelings one way or the other

3. Would your feelings about big corporations affect your ability to be fair and impartial in deciding the issues in this case?

- yes
- no

4. Do you own any stocks, bonds or other securities?

- yes
- no

If yes:

- I own just a few.
- I own many.
- I own some but would say I fall somewhere in between the first two answers.

5. Are you a shareholder or stockholder in any chemical companies?

- yes
- no

6. Are you a shareholder or stockholder in an insurance company?

- yes
- no

7. Do you own stock in or have you worked for any company which to your knowledge does business with the United States government?

- yes
- no

13659

8. Does any member of your family own stock in, or been employed by, any company which to your knowledge does business with the United States government?

() yes

() no

V. QUESTIONS ABOUT YOUR HEALTH

1. Would you say your health (considering your age, etc.) is

() excellent

() o.k.

() not too good

2. If you have experienced any of the illnesses or symptoms on the attached list please place an "X" through that illness:

Cloracne; porphyria cutanea tarda; hyperpigmentation; hyperkeratosis; hirsutism; asthenia; weakness in lower extremities; loss of strength; easy fatigability; fatigue; headaches; peripheral neuropathy; polyneuropathy; intolerance to cold; other neurological deficits; irritation to eyes; impairment of sight; impairment of hearing; impairment of smell; impairment of taste; loss of weight; loss of appetite; anorexia; loss of sexual drive; sleep disturbances; orthostatic hypotension; abdominal pain; nausea; vomiting; diarrhea; other gastrointestinal disorders; neurasthenia; depression; violent behavior; other psychobehavioral disorders; myocardial infarction; atherosclerosis; other cardiovascular disorders; liver damage; pancreatic dysfunction; kidney disorders; urinary tract disorders;

pulmonary pathologies; other respiratory disorders; fat metabolism disorders; carbohydrate metabolism disorders; cholangiocarcinoma; other liver cancers; kidney cancer; bladder cancer; pancreatic cancer; colon cancer; stomach cancer; other gastrointestinal cancers; lung cancer; fibrosarcoma; leiomyosarcoma; liposarcoma; rhabdomyosarcoma; myofibrosarcoma; neurofibrosarcoma; fibrous histiocyoma; retroperitoneal neurogenic sarcoma; fibrosarcomatous mesothelioma; other soft-tissue sarcomas; leukemia; angiosarcoma; other blood cancers; hepatoma; lymphoma; squamous cell carcinoma of skin; other skin cancers; thyroid cancer; other glandular cancers; cancer of tongue; cancer of hard palate; other cancers of mouth; chronic lymphocytic leukemia, various brain cancers; ischemic heart disease; lung fibrosis; loss of body weight; loss of lymphoid tissue; loss of thymus tissue; sensitivity to infections; immune system disturbances; brain cancer; multiple sclerosis; testicular cancer; DNA disturbances; RNA disturbances; skin eruptions and cysts; slowing of nerve impulses; hypertension; elevated blood lipid levels; elevated cholesterol levels; prediabetic and diabetic states; abnormal cell proliferations; organ enlargements; cellular atrophy; decreased cell proliferation; birth defects in offspring; miscarriages; increased white blood cell counts; elevation of eosinophil; decrease in IgM and IgD; decrease in B-cell and T-cell capabilities; skin rash; scalp tumors; aching muscles; blepharoconjunctivitis; porphyria; untoward pregnancy outcomes, including birth defects or malformations, miscarriages, sponaneous abortions, and stillbirths; intolerance to alcohol; insensitivity to light, i.e. photosensitivity; muscle spasm; joint pain; muscle pain; ear infections; basal cell carcinoma; malignant lymphoma; night sweating; memory loss; rectal bleeding; epileptic seizures; black-outs; other skin problems; migraine headaches; blurred vision; autotonic neuropathy.

13661

3. Do any of the conditions which you checked off above prevent you from functioning normally in day to day life now?

() yes

() no

4. If your spouse, companion, close relative or close friend has experienced any of the illnesses or symptoms on the attached list, please place an "X" through that illness:

Cloracne; porphyria cutanea tarda; hyperpigmentation; hyperkeratosis; hirsutism; asthenia; weakness in lower extremities; loss of strength; easy fatigability; fatigue; headaches; peripheral neuropathy; polyneuropathy; intolerance to cold; other neurological deficits; irritation to eyes; impairment of sight; impairment of hearing; impairment of smell; impairment of taste; loss of weight; loss of appetite; anorexia; loss of sexual drive; sleep disturbances; orthostatic hypotension; abdominal pain; nausea; vomiting; diarrhea; other gastrointestinal disorders; neurasthenia; depression; violent behavior; other psychobehavioral disorders; myocardial infarction; atherosclerosis; other cardiovascular disorders; liver damage; pancreatic dysfunction; kidney disorders; urinary tract disorders; pulmonary pathologies; other respiratory disorders; fat metabolism disorders; carbohydrate metabolism disorders; cholangiocarcinoma; other liver cancers; kidney cancer; bladder cancer; pancreatic cancer; colon cancer; stomach cancer; other gastrointestinal cancers; lung cancer; fibrosarcoma; leiomyosarcoma; liposarcoma; rhabdomyosarcoma; myofibrosarcoma; neurofibrosarcoma; fibrous histiocytoma; retroperitoneal neurogenic sarcoma; fibrosarcomatous mesothelioma; other soft-tissue

sarcomas; leukemia; angiosarcoma; other blood cancers; hepatoma; lymphoma; squamous cell carcinoma of skin; other skin cancers; thyroid cancer; other glandular cancers; cancer of tongue; cancer of hard palate; other cancers of mouth; chronic lymphocytic leukemia, various brain cancers; ischemic heart disease; lung fibrosis; loss of body weight; loss of lymphoid tissue; loss of thymus tissue; sensitivity to infections; immune system disturbances; brain cancer; multiple sclerosis; testicular cancer; DNA disturbances; RNA disturbances; skin eruptions and cysts; slowing of nerve impulses; hypertension; elevated blood lipid levels; elevated cholesterol levels; prediabetic and diabetic states; abnormal cell proliferations; organ enlargements; cellular atrophy; decreased cell proliferation; birth defects in offspring; miscarriages; increased white blood cell counts; elevation of eosinophil; decrease in IgM and IgD; decrease in B-cell and T-cell capabilities; skin rash; scalp tumors; aching muscles; blepharoconjunctivitis; porphyria; untoward pregnancy outcomes, including birth defects or malformations, miscarriages, sponaneous abortions, and stillbirths; intolerance to alcohol; insensitivity to light, i.e. photosensitivity; muscle spasm; joint pain; muscle pain; ear infections; basal cell carcinoma; malignant lymphoma; night sweating; memory loss; rectal bleeding; epileptic seizures; black-outs; other skin problems; migraine headaches; blurred vision; autotonic neuropathy.

5. Do any of the conditions which you checked off above prevent your spouse, companion, close friend or close relative from functioning in day to day life now?

() yes

() no

13663

6. Are you sensitive to chemicals?

() yes

() no

() I don't know

7. Are you sensitive to dust and other things in the air?

() yes

() no

() I don't know

8. Do you have any allergies?

() yes

() no

a) If yes, what symptoms do you suffer?

9. Do you smoke?

() no

() somewhat

() heavily

VI. QUESTIONS ABOUT THIS CASE

1. Many people are sympathetic to people who have injuries or are disabled. How important would such sympathy be to the way you would weigh the evidence and decide as a juror in this case?

() Extremely

() Very

() Somewhat

() Not too

() Not at all

13664

2. If the Judge instructs you that sympathy should not affect your verdict, could you follow such directions?
- () yes
() no
3. Assume there are badly injured people including children who testify in this case. If the evidence shows that they, plaintiffs, are not entitled to a recovery, would you be able to render a verdict against the plaintiffs?
- () yes
() no
() I don't know
4. If the evidence shows that defendants, chemical companies, are at fault for plaintiffs' injuries, would you be able to render a verdict against defendants?
- () yes
() no
() I don't know
5. Plaintiffs are making claims for money damages in this case. Do you have any feelings about people making claims for money damages?
- () yes
() no
6. Plaintiffs claim the defendants have caused them serious injuries. If you find in favor of the plaintiffs, would you have any hesitation in awarding the plaintiffs money damages, even if such sum of money was very large?
- () yes
() no
7. Do you read any newspapers on a regular basis?
- () yes
() no

13665

If yes, which newspapers?

8. Do you read any magazines on a regular basis?

yes

no

If yes, which magazines?

9. How often do you watch TV news and news documentaries?

never

rarely

fairly regularly

very frequently

10. About how many newspaper, TV or radio stories have you seen or heard that discussed Agent Orange?

none

one or two

3 to 10

more than 10

11. Have you seen a movie or TV show within the past two or three years that reminds you of or is similar to issues concerning the use of Agent Orange?

yes

no

If yes, which movies or TV shows?

12. Would anything you have read or seen concerning Agent Orange affect your ability to fairly decide this case?

() no

() yes (please state how)

13. List all the organizations you have belonged to in the last 20 years of a civic, political, social or fraternal type:

VII. QUESTIONS ABOUT YOUR EXPERIENCE WITH THE LAW

1. Have you ever been a juror before in a trial?

() yes

() no

If yes:

a) In about how many criminal trials?#___

In about how many civil trials? #___

If you were a juror in a civil trial, what was the most recent one about?

Did the jury deliberate?

() yes

() no

13687

If yes, did it reach a verdict?

() yes

() no

If you were a juror in a civil trial before the one just described, what was that earlier case about?

Did the jury deliberate?

() yes

() no

If yes, did it reach a verdict?

() yes

() no

b) If you were a juror in criminal trials, what were they about?

Did the jury deliberate?

() yes

() no

If yes, did it reach a verdict?

() yes

() no

2. Have you or another member of your family ever sued somebody for money in a court?

() yes

() no

If yes:

a) What was it about?

b) How did the case end?

c) Would that outcome affect your ability to be a fair and impartial juror in this case?

() yes

() no

3. Have you or another member of your family ever been sued by somebody?

() yes

() no

If yes:

a) What about?

b) How did the case or cases end?

c) Would that outcome affect your ability to be a fair and impartial juror in this case?

() yes

() no

4. Have you or another member of your family ever made a claim against someone for a personal injury, even though no lawsuit was brought?

() yes

() no

If yes:

a) What about?

13669

b) What was the outcome?

c) Would that outcome affect your ability to be a fair and impartial juror in this case?

() yes

() no

5. Have you ever been a witness at trial?

() yes

() no

If yes, please describe:

6. Do you feel that you know a great deal about the law?

() no

() about some parts of it

() yes

7. Would you fully discuss the case with your fellow jurors during jury deliberation which occurs at the end of the case?

() yes

() no

8. Would you be willing to change your mind if you were convinced to do so as a result of discussions with your fellow jurors?

() yes

() no

9. Would you be willing to stick with your views if you were not convinced to change them after discussion with your fellow jurors?

() yes

() no

13670

10. How important to you are facts when you decide something?
- extremely
 - very
 - somewhat
 - not too
 - not at all
11. How important are hunches when you decide something?
- extremely
 - very
 - somewhat
 - not too
 - not at all
12. When someone is seriously injured, do you believe he or she should be compensated regardless of what the evidence shows?
- yes
 - no
13. There are differences of opinion concerning the amount of environmental regulation the government should insist on. Would you say
- there are already too many regulations
 - the amount is about right
 - there should be more
 - no opinion
14. Have you heard others in your family or among your friends and acquaintances express an opinion as to the merits of this case?

19. There will be testimony in this case on complex medical questions with many technical words and terms you have probably never heard of. Their meaning will be explained to you at trial. Do you feel this would affect your ability to be a juror in this case?

() yes

() no

20. Do you, a companion, anyone in your family or any close friend have any feelings about chemical companies that would prevent you from hearing the evidence in this case impartially?

() yes

() no

If yes, describe these feelings:

21. Do you, a companion, anyone in your family or any close friend have any feelings about the Vietnam War that would prevent you from hearing the evidence in this case impartially?

() yes

() no

If yes, describe these feelings:

22. Is there any personal, occupational, medical, emotional or other reason that you should not be selected as a juror in the Agent Orange case which may last for several months?

() yes

() no

If yes, please state:

23. Is there anything you would like to add to your responses that might aid the court in selecting a fair and impartial jury in this case?

T H A N K Y O U

RTS · AGENT ORANGE JURY QUESTIONAIRE

1. What is your name?
2. What is your address?
3. What is your date of birth?
4. What is your occupation?
5. Who is your employer?
6. For how long have you had your present job?
7. Please describe your prior job.
8. Education you have completed:

Grade School -

High School -

College -

Post graduate -

9. Family:

Spouse's name -

Spouse's occupation -

Childrens names, ages and occupations -

10. Do you or any members of your family belong to any organizations? If so, which ones.
11. Are you or any members of your family an officer, director or trustee in any of the above organizations? If so, please identify.
12. Have you ever been a juror before? If so, where, when and what kind of case?
13. Are you now or have you ever made a claim for personal injuries caused by accidents of any kind? If so, please describe giving the type of claim and if it is still pending.
14. Have any members of your family made claims for personal injuries caused by accident of any kind? If so, please describe giving the type of claim and if it is still pending.
15. Have you ever had a claim brought against you? If so, please describe giving the type of claim and if it is still pending.
16. Have any members of your family had a claim brought against them? If so, please describe giving the type of claim and if it is still pending.

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P.M. *JRP*

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17. Are you now or have you ever been an officer, director, stockholder, shareholder or in any way interested in any insurance company insuring against claims for personal injury?
18. Are any members of your family now or have they ever been an officer, director, stockholder, shareholder or in any way interested in any insurance company insuring against claims for personal injury?
19. Have you or any members of your family ever testified in Court? If so, please describe the circumstances.
20. Do you have any hobbies? If so, please so state.
21. Have you ever taken any courses in chemistry?
22. Are you now or have you ever worked in any occupation involving chemistry or chemicals?
23. Have any members of your family, now or in the past, ever worked in any occupation involving chemistry or chemicals?
24. Are you now or have you ever worked for a chemical company? If so, please describe.
25. Have any members of your family, now or in the past, ever worked for a chemical company? If so, please describe.
26. Are you now or have you ever owned or worked for a company which did business with any chemical companies? If so, please describe.
27. Have any members of your family, now or in the past, ever owned or worked for a company which did business with any chemical company? If so, please describe.
28. Are you now or have you ever owned or worked for a company which manufactured or sold herbicides (plant killers)? If so, please describe.
29. Have any members of your family, now or in the past, ever owned or worked for a company which manufactured or sold herbicides (plant killers)? If so, please describe.
30. Have you or any members of your family ever used herbicides (plant killers)? If so, please describe the type of use and the product used.
31. To your knowledge, have you or any members of your family ever purchased or used any product or products manufactured by the defendant chemical companies? If so, please describe in detail.
32. To your knowledge, have you or any members of your family ever purchased or used any chemicals manufactured by the defendant chemical companies? If so, please describe in detail.
33. Have you or any members of your family ever lived or worked on a farm? If so, do you know whether herbicides (plant killers) were used?
34. Have you or any members of your family ever served in the armed forces? If so, please describe by name, years and place of service.


13676

35. Do you now or have you ever owned any stocks and bonds?
36. Do you now or have you ever owned any stocks and bonds in chemical companies?
37. Do you now or have you ever owned any stocks and bonds in any companies doing business with chemical companies?
38. Do you now or have you ever owned or worked for a company which did business with the Government?
39. Have any members of your family, now or in the past, ever owned or worked for a company which did business with the Government?
40. If you were selected as a juror in the Agent Orange case, and if the trial lasted for several months, would you be able to be a juror?

Dated: April 2, 1984

Respectfully submitted,

PLAINTIFFS' MANAGEMENT COMMITTEE



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(516) 248-9888

13677

CERTIFICATE OF SERVICE

On this, the 2nd day of April, 1984, the undersigned caused the annexed proposed Agent Orange Jury Questionnaire to be served upon the attached service list by regular mail, with the exception of the service upon the Chambers of Judge Weinstein; Hon. Shira Scheindlin; Nancy Petrillo, Deputy Clerk and Rivkin, Leff, Sherman & Radler, Esqs., who were served by hand this 2nd day of April, 1984.



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NANCY PETRILLO, DEPUTY CLERK

U. S. District Court
Eastern District of New York
225 Cadman Plaza East
Brooklyn, New York 11201

ALLAN FREIDMAN

CHAMBERS OF JUDGE WEINSTEIN
U. S. District Court
Eastern District of New York
225 Cadman Plaza East
Brooklyn, New York 11201
*Chambers gets two copies

HON. SHIRA SCHEINDLIN

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* APR 4 1984 *
TIME A.M.
P.M. MP

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

----- x

In re

"AGENT ORANGE"

MDL 381
(All Cases)

Product Liability Litigation

----- x

PLAINTIFFS' SECOND AMENDED LIST OF
FACT WITNESSES IN SUPPORT OF CLAIMS

APR 3 5 46 PM '84

April 3, 1984

PLAINTIFFS' MANAGEMENT COMMITTEE
Room 304
26 Court Street
Brooklyn, NY 11242
(212) 330-0900

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PLAINTIFFS' SECOND AMENDED LIST OF
FACT WITNESSES IN SUPPORT OF CLAIMS

Plaintiffs submit the following list of potential witnesses to be called at trial pursuant to the Magistrate's Pretrial Order No. 18, dated March 26, 1984, reserving the right to supplement this list with additional names and addresses from time to time as additional information and witnesses are discovered.

Those witnesses designated with an asterick "*" have been deposed in these proceedings. Their addresses and the nature of relevant portions of their testimony are as equally well-known to the defendants as to the plaintiffs.

The witnesses not covered by the above reservations, are, as follows:

DR. THOMAS ABOUD
Toledo Clinic
4235 Secor
Toledo, Ohio

Cardiologist for Mrs. Ford
Treated Danny Ford for
hypertension.

EDWARD E ADAMS
St. Louis, Mo.

Govt. Witness, T-H
Agriculture

GORDON A. ANDERSON*
102 Hickory Lane
Naugatuck, Connecticut

IRENE ANTONIK
812 Sussex
Austin, TX 78745

Texas Disability Officer
and friend of Jordans'

LOUIS B.ARNOLDI*

EUGENE BAK*

DONALD K. BALLMAN*
7722 Revelle Drive
La Jolla, California

13681

DONALD BARNES	EPA
E. D. BAUMGARTNER	
R. E. BAYNARD	
JEANNIE BEAVERS Flower Hospital Personnel Department Sylvania, Ohio	Knows the hospital and business strain re Danny Ford
BILLIE MARIE BELL 4404 Bonnie Drive Ft. Worth, TX 76116	Danny Jordan's mother
CLOYCI G. BELL 4404 Bonnie Drive Ft. Worth, TX 76116	Danny Jordan's Step- Father
BELL TELEPHONE OF PA. 1 Park Way Philadelphia, Pa. 19101	Personnel records of George Ewalt
W. B. BELLS Attempting to Locate	
PETER S. BING*	
ETCYL H. BLAIR*	Dow Employee Deposed twice
JOHN BLISH Attempting to Locate	Contract Officer re Monsanto
A. A. BLOCK KANSAS CITY, MO. Attempting to Locate	Govt. Witness re T-H Agriculture
WILLIAM BLUMENAUER Attempting to Locate	
JOSEPH L. BOLTON Attempting to Locate	Gov't Contracting Officer Particularly re; Hercules
JACK BORRER* 12920 Wellswood Trail Chesterfield, Ohio 44026	
AL BOTHWELL 610 Hudson Terrace Newport News, Va. 23605	High School friend of Lambiotte's who was with him in Vietnam

13682

JAMES E. BOWERS
ST. LOUIS, MO.
Attempting to Locate

Govt. Witness re T-H
Agriculture

DANIEL BRAXTON
c/o Bell Telephone of PA
100 E. Armat
Philadelphia, PA.

George Ewalt's Foreman,
1975

BOB BROWN
Attempting to Locate

Served with Dan. Jordan
in Vietnam

BROWN, SGT.
Attempting to Locate

With Danny Ford in
sprayed areas

DAVE BUNIN

Economist - Will
supply address and
summary materials

JOHN S. BUSH, Jr.*

WILLIAM CALLAHAN
West Virginia
Attempting to Locate

Was with Ewalt in Vietnam

MELVIN CALVIN*
2683 Buena Vista Way
Berkeley, California

Former member of PSAC
and director of Dow
Chemical re government
knowledge vs. Dow's
knowledge and failure
to warn.

RICHARD CASEY
Cincinnati, Ohio
Attempting to Locate

Testimony from point of
view of "Ranchhander"
concerning facts of
spraying and defoliation

ELLIS CASH
Attempting to Locate

Govt. Contracting Officer
re Hercules

EDWARD LEE CHANDLER*

EDWARD E. CHAPMAN*
6748 N. Euclid
Gladstone, Missouri

J. G. CHARLTON

ROBERT L. CHONOLES*
23 Carmella Drive
Edison, New Jersey

EMIL CHRISTOFANO*

Re Hercules' liability

13683

GEORGE F. COLLINS	Director of procurement Production, Richmond, Va. (Procurement, supply and failure to warn issues)
J. G. COPELAND, Jr. Attempting to Locate	Asst. Gen. Manager, '64 Gen. Mgr. Synthetics, 65-72 (Re Hercules)
DIANE COURTNEY*	Government expert witness on causation
GEORGE & MARGE CRAWFIS 49 Heck Rd. Kennessaw, Ga.	Saw changes in Danny Ford Chris's Brother and Sister in Law
JOHN CRAWFIS 1179 Beach Valley Rd. Atlanta, Georgia	Chris' Brother
OWEN & BETTY CRAWFIS 61-83 Whiteford Center Rd. Toledo, Ohio	Mother and dad of Chris. Used to take Danny for treatment (6138?)
ROBERT CROCKER Attempting to Locate	Amounts - doing away of herbs - has tapes to determine exposure to Veterans II's
EUGENE D. CRITTENDEN, Jr.*	Dir. Sales, 66-67 Asst. Gen. Mgr. Synthetics 67-68 908 DuPont Road Wilmington, Del.19807
ROBERT CROCKER Attempting to Locate	
WARREN CRUMMETT* 808 Crescent Drive Midland, Michigan	Dow scientist; evidence concerning Dow liability issues.
GENE CUMMINGS Attempting to Locate	Served with Jordan in Vietnam
BILL CURTIS c/o CBS News 524 West 57th Street New York, New York 10019	Evidence concerning eyewitness observations as to the condition of the country of Vietnam, extent of residual defoliation and possible photographic exhibits; investigation

13684

THOMAS P. DALBY	continues. Govt. Contracting Officer re Hercules
S. S. DANIELS	
L. L. DANIELSON Attempting to Locate	U.S.D.A. Liason NACA
EDWARD DEBOLT Attempting to Locate	
DIAZ, STAFF SGT. Attempting to Locate	With Ewalt in Vietnam
CHARLES DILLEY Attempting to Locate KANSAS CITY, MO.	Govt. Contracting Officer re T-H Agriculture
LINDA DIMOLA 42 Gibbs Pond Rd. Nesconsett, NY 11767	Kerry Ryan's Babysitter
CHARLES DISHNER	
M DOJNY	Govt. Contract Officer re Uniroyal
OWEN DOLIN* 5225 Sun Valley Drive Charleston, West Virginia	
LAWRENCE E. DOTSON*	
WILLIAM DUFFIELD	
CHARLES L. DUNN*	Chairman, NACA; evidence re liability issues affecting many defendants in addition to Hercules.
JOSEPH DUQUETTE 96 Hallock Sanding Rd. Rockey Point, NY 11778	On Suffolk County Police Force with Mike Ryan
J. M. EAGAN*	
JACK D. EARLY* 8024 Lakenheath Way Potomac, Maryland 20854	
WAYNE EDWARD*	

13685

PLATOON SGT. ELLY Attempting to Locate	Was with Ewalt in spray areas.
DONALD ELMORE Attempting to Locate	Government Contracting Officer re Hercules
GEORGE W. & EUNICE EWALT SR. 731 Penn Pines Blvd. Clifton Heights, Pa.	Parents of George Ewalt and familiar with family situation
TEN EYCK Attempting to Locate	Inspector re Monsanto
WILLIAM A. FAIRCLOUGH* 24871 Via San Fernando Mission Viejo, California 92692	
FRED FALANA Attempting to Locate	With Danny Ford in sprayed areas
WILLIAM F. FALSEY* 6706 Lakeview Drive Lake City, Michigan	
OTIS E. FANCHER Attempting to Locate	Bio-Test Labs
FARMER, CAPT. Attempting to Locate	With Danny Ford in sprayed areas
L. E. FAST	
WILLIAM FENNER*	
J. R. FISCHER HERCULES, INC. JACKSONVILLE, ARK.	
BETTY FMAYDA 1899 Rapids Road Hiram, Ohio	Chris Ford's Business partner and good friend (See Smayda)
THOMAS FORBES Monestary Avenue Philadelphia, Pa.	Friend of George Ewalt who served in same area in Vietnam
JOHN J. FORD* 15 Winterbury Circle Wilmington, Delaware	
KERRY & JEANETTE FORD 6507 Secore Rd. Lambertville, Michigan	Brother of Danny Ford

13686

RAY & ROSE FORD
13478 South County Line
Highway
Ottawa Lake, Mich. 49267

Danny Ford's Parents

MARGARET FORLANO
First Street
Ft. Dix, N.J.

Sister of George Ewalt

JOSEPH W. FOWLER
Attempting to Locate

Govt. Contract Officer
re T-H Agriculture

E/4 FRANKS
(in jail)

423d Combat Supply,
with Lambiotte in
Vietnam

JOHN P. FRAWLEY*

Chief toxicologist
Hercules, re many
liability and
causation issues

H. G. FREDERICKS*

VAL K. GAERTNER

JESSE GERSHBERG
Attempting to Locate

Govt. Contract Officer
re Monsanto

Er. D. Gladney
East St. Louis, Mo.
Attempting to Locate

With Ewalt in Vietnam

A. W. GLENN

HAROLD GILL*

Dow analytical chemist
who allegedly developed
analytical method for
determination of
2,3,7,8 TCDD in '64.

CHERYL GONDEK
4009 Shawnee Trail
Ft. Worth, TX 76135

Danny Jordan's sister

CHARLES E. GRANITO*

RAYMOND A. GUIDI*
420 Essex Place
Memphis, Tennessee

COLONEL HAIG
Attempting to Locate

Was with Ewalt in spray
area

WALTER D. HARRIS*

13687

199 ALLERTON RD.
NAUGATUCK, CONN.

E. ROSS HART

DAVID G. HELM*
5009 Forest
Kansas City, Kansas

RICHARD HICKMAN*
Route 4, No. 10 Yocum Rd.
Rogers, Arkansas

Dow government sales
Mgr. re Dow's attempts
to sell products
including herbicides
to the government

JESSE HILSEN

PAUL E. HOFFMAN*
1202 Lake Shore Drive North
Barrington, Illinois

GRAYDON HOLDEMAN*

BENJAMIN B. HOLDER*
5203 BLOOMFIELD ST.

Dow Medical Director re
health effects in workers,

MIDLAND, MICH.

failure to warn and lack
of minimum effect level.

HARRY HOLLAND
1626 Dryden Way
Crofton, MD

Friend of Lambiotte's

RAY HOLMES*

Dow plant supervisor
who contracted
chloracne; re health
effects and failure to
warn of Dow knowledge
of Dioxin in end
products in 1964

G. HOLSING

DONALD HOLT
c/o Bell Telepone of PA
100 East Armat
Philadelphia, PA

George Ewalt's Foreman '80

VERNON HOUCK

CDL

F. GERARD & VADA HUKILL
220 W. Tyler
Magnum, Okl. 73554

Danny Jordan's In-Laws

13688

THOMAS R. HUNT

RAPHAEL H. HUSTON
Attempting to Locate

PETER INFANTE
Attempting to Locate

GEORGE JACKSON
c/o Bell Telephone of PA
100 East Armat
Philadelphia, PA

JOHN JENNINGS
Apt. B
12 Lansdowne Avenue
Lansdowne, Pa.

DAVID JORDAN*

LYNNE KELLER
208 Braeswood
Austin, TX 78704

R. EMMET KELLY*
665 SO. SKINNER
ST. LOUIS, MO.

VAN A. KELLY
Philadelphia, Pa.
Attempting to Locate

GEORGE C. KEMPSON*
143 South Gore
Webster Groves, Missouri

EUGENE E. KENAGA*
1281 N. Wagner Road
Essexville, Michigan

FRANCIS KENNEDY*

WILLIAM KIDD

CARL & CARLA KING
33-42 Romaker
Toledo, Ohio

NIOSH

George Ewalt's Foreman
late '70s to early '80s

High School friend of
George Ewalt who was
in Vietnam at same
time and knows his
medical problems.

Friend of Danny Jordan's

Monsanto

With Ewalt in Vietnam

Dow employee re
environmental
persistence, toxicity
and liability issues

Closest friends of the
(Danny) Fords; she was
with Chris when they
found out that Danny
Ford's leg was can-
cerous and how much
pain he was in. Address
may also be 3320

13689

Romaker Road

J. O. KING*

J. M. KIRGIS

A. Y. KISTNER
KANSAS CITY, MO.
Attempting to Locate

FRANK W. KLEMAN
ST. LOUIS, MO.
Attempting to Locate

Govt. Contracting Officer
re T-H Agriculture

GEORGE KLINE

J. KLINGMAN

PHILIP LANDRIGAN*

JULES LAM
39 Brandon Rd.
Newport News, Va.

David Lambiotte's Uncle

MICHAEL LAMBIOTTE
18 Melford Rd.
Newport News, Va. 23601

Brother of David
Lambiotte

J. K. LEASURE*
R. R. No. 2 - Box 157
Makanda, Illinois

FRANK LEMAK*

P. R. LITTLE

HAROLD A. LLOY

DR. ANNETTE LYNCH
Wissahicken & Schoolhouse
Lane
Philadelphia, Pa.

Ewalt's daughter's
psychologist

J. R. MALLETT

W. MALONEY

DAVE MANN
Box 26
Kittery Point, Me. 03905

Employer of Lambiotte
before and after
Vietnam

THOMAS MARKWOOD*
Jeep Corp.
940 N. Coe. Blvd.

Payroll Records and lost
income re Danny Ford

13690

Toledo, Ohio

ROBERT E. MASKILL*
41 East 53rd Street
Kansas City, Missouri

T-H Agriculture; liability
issues

RICHARD J. MARRESE*

JAMES MASON

JOHN MASON*
12 Tanners Dean
Leatherhead, Surrey
England

L. G. MAUREY
Attempting to Locate

PAUL MAYFIELD
Attempting to Locate

Inspector re Monsanto

M. McCALLEY
Attempting to Locate

WILLIAM J. McCARVILLE*
12 Ridge Crest Court
Chesterfield, Missouri

Deposed February 11, 1983

DONALD McCOLLISTER*
5522 Whitehall Street
Midland, Michigan

Deposed March 30, 1983.

WILLIAM D. McELROY*
9651 BLACK GOLD RD.
CALIFORNIA

Deposed July 13, 1983

JUDY McKINSEY
1899 Rapids Road
Hiram, Ohio

Business partner of Chris
Ford and close friend
(See McKimnley)

SGT. TIMOTHY MEDDOR

Served with Jordan in
Vietnam

COL. BRUCE MEYERS
6914 W. MERCER WAY
ST. LOUIS, MO.

ROY MEYERS
Attempting to Locate

Inspector, re Monsanto

CHARLES E. MINARICK*

RONALD MOODY

Ranch Hand Witness

13691

SHERRY MOSHER
184335 Winchester Rd.
Toledo, Ohio

Business manager of the
kennel. Stress and
strain on Chris Ford
Address may also be

DEBDAS MUKERJEE*

BOB NOBER
71 Lempa Road
Holland, Pa

Was with Ewalt in Vietnam

WILLIAM R. NUMMY*
711 W. Meadowbrook Drive
Midland, Michigan

JACKIE OCHS
c/o GREEN MOUNTAIN POST FILMS
P. O. BOX 229
TURNER FALLS, MA.

Photographic exhibits
& personal observations
& investigations

BRIAN O'CONNOR
5545 Netherland Ave.
Bronx, N.Y.

Friend of the Ryans

J. F. O'CONNOR

SGT. THOMAS O'DONNELL

Served with Jordan in
Vietnam

DR. OERTNER

J. E. PALLARD

FRANCIS PANNETON

L. A. PARDEE

PHIL PENN

Amounts - doing away
of herbs - has tapes
to determine exposure
to Veterans II's

REBECCA PEPPER
6718 Silvermine Drive
#1004
Austin, TX 78736

Neighbor of Jordan's

JACK E. PETERSON
664 Forest Grove Circle
Brookfield, Wisconsin

Former Dow employee who
addressed industry
representatives at
March, 1965 meeting
concerning rabbit ear
testing

13692

F. H. PLACET
Attempting to Locate

Govt. Contract Officer re
Uniroyal

WILLIAM L. POPHAM

Consultant to NACA

DONALD PURDY*
160 Fredericksberg Drive
Avon Lake, Ohio

THOMAS RAFFERTY
2221 56 Drive
Brooklyn, NY 11234

With Mike Ryan in
Vietnam

VIRGIL B. ROBINSON*
2620 Quail Hill Drive
Upper St. Clair, Pa. 15241

V. K. ROWE*

Dow's former Chief
Toxicologist - liability
issues as well as
causation questions; Dow's
knowledge of extreme
toxicity and failure to
warn.

ROBERT R. RUMER*

CECIL RUSSELL*
46 Wingfield Row
Glendale, MO.

MAUREEN RYAN
82 Fifth Ave.
Kings Park, New York

School Principal who
knows Kerry's education

MICHAEL RYAN
54 Woodsdale Ave.
Kings Park, N.Y.

Mike Ryan's Father

VICKY RYAN
54 Woodsdale Ave.
Kings Park, N.Y.

Kerry's Grandmother

HENRY SADLER
Florida

Boyhood friend of
Lambiotte's who was
with him in Vietnam

UMBERTO SAFFIOTTI*

Government causation
witness with factual
testimony re government
contract defense,
liability issues and
issuance of Bionetics
Laboratories Report.

13693

DR. SALTER
97 York Street
York, Maine 03909

Dr. who told Lambiotte
to stop working.

ED SAWGRASS

SUSAN SCANLON
Riplen Street
Philadelphia, Pa.

Sister of George Ewalt

WILLIAM R. SCHAMBRA*
1411 W. St. Andrews
Midland, Michigan

Dow former employee re
failure to warn and
business of selling
herbicides to the
government.

ARTHUR J. SCHLESSINGER

OLGA SCHNELL
78 University Heights Dr.
Stony Brook, N.Y. 11790

Neighbor of the Ryans

W. SCHUBACK

LAPIN O. SCOTT

R. B. SCOTT

Hercules employee.

RICHARD SCOTT

Drafted with Lambiotte
and saw in Vietnam

SGT. SHARKEY

David Lambiotte's
platoon Sergeant
in Vietnam

DEXTER B. SHARP*
13042 Weatherfield Drive
St. Louis, Mo.

A. E. SIDWELL*

Hercules employee.

LARRY SILVERSTEIN

Dow former employee re
March, 1965 meetings at
Dow and other liability
issues and health
effects to Dow employees.

BETTY SMAYDA
1899 Rapids Rd.
Hayram, Ohio

Business partners - Chris
Ford's, plus good friend.
What Fords went through
and personal strains

J. G. SMERALDI*

13694

CAPT. SMITH	With Ewalt in spray areas
PLATOON LT. SMITH	With Ewalt in spray areas
TOM K. SMITH	
ROBERT SNODGRASS Huntington, W. Va.	With Danny Ford in Sprayed areas
HOWARD C. SPENCER* 11008 Cameo Drive Sun City, Arizona 85351	Developed rabbit ear test in 1941 while a Dow employee.
L. P. SEITZ	
A. JOHN SPEZIALE* 311 N. Umberland Avenue Redwood City, California 94061	
JOHN A. STEPHENS* 800 N. Lindbergh Blvd. St. Louis, Missouri	
FREDERICK G. STEWARD* 173 Woodland Forest, Section 3 Tuscaloosa, Alabama 35405	
CHARLES N. STEWART*	
MICHAEL STRANGE 521 Bomber Road Ft. Worth Texas	Friend of Danny Jordan
FREDERICK STRANSKY 53 S. Mallard Selden, N.Y.	Mike Ryan's Brother-in-Law
SGT. STRAWBERRY	Was with Ewalt in spray areas
DEIRDRE STRANSKY 24 Alma Ave. Selden, N.Y.	Teacher - knows Kerry Ryan - a specialist in learning disabilities
PATRICIA STRANSKY 53 S. Mallard Selden, N.Y.	Nurse and Family Counseller for Ryan family
JACK STRUM* 712 Short Spoon Circle North Carolina	
JOHN S. SULLIVAN	

13695

WINFIELD W. SUNDERLAND*
5300 Westpath Way
Bethesda, Maryland

DANIEL W. SWEET*

MILTON A. TAVES*
210 N. Spring Valle Road
Wilmington, Delaware

CLINTON TAYLOR
309 Piez Ave.
Newport News, Va.

Business partner of
David Lambiotte's

R. D. THOMPSON

WILLIAM THOMPSON*
318 GEORGINA AVE.
SANTA MONICA, CAL.

A. L. TREISBECK

Hercules employee. Depos-
ed.

DAN TWISS
Woodland Street
Sylvania, Ohio

Union commission man at
Danny Ford's job. Also
a friend of Dan's. Has
information about union
contract (current) and
personnel matters. See
also Twiff.

DAN TWIFF
4910 Woodland
Sylvania, Ohio

Committee man at AMC Jeep
See Twiss above

WILLIAM R. UDELL
60 Tealwood
Creve Coeur, MO.

EDWIN T. UPTON

T-H liability issues
Deposed April 7, and
April 8, 1983

W. VANDERVENTER*

JANE WARD
3527 M. 151
Temperance, Mich. 48182

Neighbor of Fords

ROBERT T. WEBBER*
4 Media Drive
St. Louis, Missouri 63146

13696

ADAM WENKUS
Route 5 - Box 904
Waupaca, Wisconsin

Supply and distribution,
defendants' failure to
warn; former Defense
Military Supply Office
employee.

BUTCH WESTERLAND

Served with Jordan in
Vietnam

HARTLEY WILDER

SGT. J. WILLIS

Served with Danny Jordan
in Vietnam

MARK G. WILTSE*

N. WIRZ

WILBUR WOHLGAMUTH
49-21 Barton Place
Sylvania, Ohio

Union Stewart at Danny
Ford's - knew Dan when
he had the cancer and
the wages at the time
and the changes in Dan

L. K. WOOLFOLK

JOHN WRIGHT

R. WRIGHT
Attempting to Locate

Govt. Inspector re
Monsanto

R. T. YATES

YORK HOSPITAL
15 Hospital Dr.
York, Maine

Former employer of
Lambiotte

MITCHELL ZARON
Kettering Labs
3223 Eden Ave.
Cincinnati, Ohio.

CHARLES P. ZORSCH*
Route 5, box 30
Pacific, MO.

13697

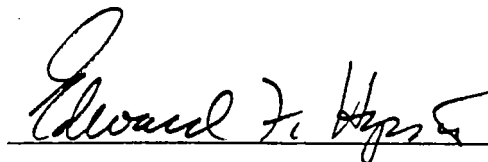
The names above without identifying information are listed on the parties' priority lists and will be deposed at future dates. It is the plaintiffs' understanding that these lists may be supplemented as the depositions are taken.

AGENT ORANGE PLAINTIFFS'
MANAGEMENT COMMITTEE

Edward F. Hayes

CERTIFICATE OF SERVICE

EDWARD F. HAYES, III, hereby certifies that the foregoing was duly served upon the parties this date by Federal Express at the addresses below listed:



Dated: April 3, 1984

SERVICE LIST

Rivkin, Leff, Sherman & Radler
Attorneys for Dow Chemical Co.
100 Garden City Plaza
Garden City, N.Y. 11530

Cadwalader, Wickersham & Taft
Attorneys for Diamond-Shamrock
One Wall Street
New York, N.Y. 10005

Shea & Gould
Attorneys for Uniroyal, Inc.
330 Madison Avenue
New York, N.Y. 10017

Budd, Larner, Kent, Gross,
Picillio & Rosenthal
Attorneys for Thompson Chemical
33 Washington Street
Newark, N.J. 17102

Kelley, Drye & Warren
Attorneys for Hercules, Inc.
101 Park Avenue
New York, N.Y. 10178

Townley & Updike
Attorneys for Monsanto Co.
405 Lexington Avenue
New York, N.Y. 10017

Arthur, Dry & Kalish
Attorneys for Uniroyal, Inc
1230 Avenue of the Americas
New York, N.Y. 10020

Clark, Gagliardi & Miller
Attorneys for T&H Agriculture
99 Court Street
White Plains, N.Y. 10601

United States Attorney's Office
United States Dept. of Justice
Attorneys for United States
Safeway Building, Rm 9040
Washington, D.C. 20530

Original

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

-----X
IN RE :
"AGENT ORANGE" :
PRODUCT LIABILITY LITIGATION :
-----X

MDL No. 381
(All Cases)

FILED
IN CLERK'S OFFICE
U. S. DISTRICT COURT E.D. N.Y.
APR 27 1984
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P.M. *UMP*

SECOND LIST OF MONSANTO FACT WITNESSES

TOWNLEY & UPDIKE

13699

CHRYSLER BUILDING
405 LEXINGTON AVENUE
NEW YORK, N. Y. 10174

TELEPHONE
(212) 682-4567

2247

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

-----X
IN RE : MDL No. 381
 : (All Cases)
 "AGENT ORANGE" :
 PRODUCT LIABILITY LITIGATION :
-----X

SECOND LIST OF MONSANTO FACT WITNESSES

Defendant Monsanto Company ("Monsanto"), pursuant to the schedule established by Magistrate Scheindlin, hereby submits a second list of fact witnesses who might give testimony at trial in support of Monsanto's claims. This list supplements the First List of Monsanto Fact Witnesses Identified Pursuant to Order of the Court Dated January 10, 1984, which was served on February 29, 1984.

Monsanto reserves the right to amend the descriptions that follow of the general nature of the testimony to be given, should Monsanto's continuing trial preparation indicate any such amendment is appropriate.

1. Richard A. Atkinson.

4242 Kanawha Turnpike
South Charleston, West Virginia

Monsanto's production of 2,4,5-T in the 1960's;
Monsanto's efforts to reduce worker exposure to its 2,4,5-T process; Monsanto's efforts to reduce or to remove dioxin in its 2,4,5-T process; the health experience of Monsanto workers involved in the 2,4,5-T process.

2. Philip B. Balderson.

101 Stewart Park
Cross Lanes, West Virginia

Monsanto's analytic efforts to detect and to measure the presence of dioxin in its 2,4,5-T.

3. Robert Baynard.

231 Jeffrey Lane
Newton Square, Pennsylvania

The marketing and sale of herbicides containing Monsanto-manufactured 2,4,5-T, both to the United States Government and to commercial customers; the health experience of persons who used or were otherwise exposed to herbicides containing 2,4,5-T.

4. Stanley C. Beach.

760 Sotano Drive
Sacramento, California 95833

The methods and procedures used to aeriaily disseminate herbicides in Vietnam; the duties and responsibilities of a flight mechanic of a C-123 airplane during herbicide operations in Vietnam; the health experience of persons in Vietnam who used or were otherwise exposed to herbicides containing 2,4,5-T.

5. Donald J. Birmingham.

19811 Wedgewood Drive
Gross Point Woods, Michigan

The United States Government's investigation of the health experience of Monsanto workers involved in the 2,4,5-T process in the 1950's and/or exposed to the materials formed during a runaway reaction in the manufacture of sodium trichlorophenate at Monsanto's Nitro, West Virginia plant in 1949.

13701

6. Russell Bishop.

Ambler, Pennsylvania

The health experience of commercial formulators of 2,4,5-T produced by Monsanto.

7. Carl D. Bohl.

455 Wildwood Parkway
Ballwin, Missouri

The historical knowledge of the toxicity of herbicides containing 2,4,5-T and the toxicity of dioxin; the health experience of Monsanto workers involved in the 2,4,5-T process; Monsanto's efforts to reduce or to remove dioxin from its 2,4,5-T process and to reduce worker exposure to that process.

8. John S. Bush, Jr.

2232 North Military Road
Arlington, Virginia

Monsanto's contracts with the United States Government for the production of Agent Orange and other military herbicides; the Government's plan to build and to operate an Agent Orange plant at Weldon Spring, Missouri.

9. Robert E. Cox.

203 East Belerest Road
Bel Air, Maryland

Visit to Monsanto's Nitro plant in connection with the proposed manufacture of Agent Orange by the United States Government.

10. Eugene A. Cutright.

1474 Maplewood Drive
Macon, Georgia

Monsanto's production of 2,4,5-T in the 1960's;
Monsanto's efforts to reduce worker exposure to its

13703

13702

2,4,5-T process; Monsanto's efforts to reduce or to remove dioxin in its 2,4,5-T process; the health experience of Monsanto workers involved in the 2,4,5-T process.

11. Burnie R. Dallas, Jr.

1775 East 20th Street
Apt. D-8
San Bernardino, California

The methods and procedures used to aeriaily disseminate herbicides in Vietnam; the duties and responsibilities of a flight engineer of a C-123 airplane during herbicide operations in Vietnam; the health experience of persons in Vietnam who used or were otherwise exposed to herbicides containing 2,4,5-T.

12. Stewart D. Daniels.

Monsanto Singapore Co. PTE Ltd.
2601-2606 Clifford Center
Raffles Place
Singapore

The manufacture, marketing, and sale of herbicides containing 2,4,5-T, both to the United States Government and to commercial customers; the health experience of persons who used or were otherwise exposed to those herbicides.

13. Robert A. Darrow.

7613 Baltimore National Pike
Frederick, Maryland

The United States Government's development, testing, and use of Agent Orange; the Government's specifications for Agent Orange.

14. Robert Dennis.

Route 6, Box 302
Yakima, Washington

The methods and procedures used to aeriaily disseminate herbicides in Vietnam; the duties and

13704

responsibilities of a pilot of a C-123 airplane during herbicide operations in Vietnam; the health experience of persons in Vietnam who used or were otherwise exposed to herbicides containing 2,4,5-T.

15. Jon R. Dudenhoeffer.

5639 King Road
Erie, Pennsylvania

The methods and procedures used to aeri ally disseminate herbicides in Vietnam; the duties and responsibilities of a navigator of a C-123 airplane during herbicide operations in Vietnam; the duties and responsibilities of a targeting officer for herbicide operations in Vietnam; the health experience of persons in Vietnam who used or were otherwise exposed to herbicides containing 2,4,5-T.

16. Jack D. Early.

8024 Lakenheath Way
Potomac, Maryland

Monsanto's contacts with the United States Government in the 1960's regarding pesticide regulation; the activities of the National Agricultural Chemicals Association.

17. Henry Good.

The methods and procedures used to aeri ally disseminate herbicides in Vietnam; the duties and responsibilities of a pilot of a C-123 airplane during herbicide operations in Vietnam; the duties and responsibilities of a targeting officer for herbicide operations in Vietnam; the health experience of persons in Vietnam who used or were otherwise exposed to herbicides containing 2,4,5-T.

18. Paul D. Halley.

The involvement of the West Virginia occupational health authorities in an investigation of the runaway reaction that occurred in 1949 during the manufacture

13705

of sodium trichlorophenate at Monsanto's Nitro, West Virginia plant, including efforts to identify and to determine the toxicity of materials formed during that reaction; the health experience of Monsanto workers exposed to those materials and/or the 2,4,5-T process in the 1950's.

19. Frank Helmer.

2825 Flamewood Drive
St. Louis, Missouri

Monsanto's manufacture of 2,4,5-T at its Nitro, West Virginia plant; improvements in Monsanto's manufacturing process for 2,4,5-T.

20. Paul F. Hoffman.

1202 Lakeshore Drive North
Barrington, Illinois

Monsanto's marketing and sale of herbicides containing 2,4,5-T in the 1960's, both to commercial customers and to the United States Government; the health experience of persons who used or were otherwise exposed to herbicides containing 2,4,5-T.

21. Charlie Hubbs.

Camp Springs, Maryland

The methods and procedures used to aeriually disseminate herbicides in Vietnam; the duties and responsibilities of a pilot of a C-123 airplane during herbicide operations in Vietnam; the health experience of persons in Vietnam who used or were otherwise exposed to herbicides containing 2,4,5-T.

22. Allan M. Jokela.

1511 North Rock 38th Road
Rock, Michigan

The methods and procedures used to aeriually disseminate herbicides in Vietnam; the duties and

responsibilities of a navigator of a C-123 airplane during herbicide operations in Vietnam; the duties and responsibilities of a targeting officer for herbicide operations in Vietnam; the health experience of persons in Vietnam who used or were otherwise exposed to herbicides containing 2,4,5-T.

23. George C. Kempson.

Monsanto's marketing and sale of herbicides containing 2,4,5-T, both to the United States Government and to commercial customers; the health experience of persons who used or were otherwise exposed to herbicides containing 2,4,5-T.

24. Kettering Laboratory.

University of Cincinnati
Cincinnati, Ohio

Work performed for Monsanto by the Kettering Laboratory in the 1950's regarding the health experience of Monsanto workers exposed to materials formed during a runaway reaction in the manufacture of sodium trichlorophenate at Monsanto's Nitro, West Virginia plant in 1949 and/or to the 2,4,5-T process, including the treatment of affected workers and efforts to determine the toxicity of the materials formed during the runaway reaction and of 2,4,5-T and its process intermediates.

25. Paul Lacey.

117 Rosetta Court
Springdale, Ohio

The methods and procedures used to aeriaily disseminate herbicides in Vietnam; the duties and responsibilities of a flight mechanic of a C-123 airplane during herbicide operations in Vietnam; the health experience of persons in Vietnam who used or were otherwise exposed to herbicides containing 2,4,5-T.

13707

26. John S. Leary, Jr.

2002 Sea Cove Court
Nassau Bay, Texas

Contacts in the 1960's between Monsanto and the United States Government regarding the toxicity of 2,4,5-T.

27. Charles F. Luecke.

12747 Spruce Pond Drive
St. Louis, Missouri

Monsanto's manufacture, marketing, and sale of herbicides containing 2,4,5-T, both to the United States Government and to commercial customers; the health experience of Monsanto workers involved in the 2,4,5-T process and persons who used or were otherwise exposed to herbicides containing 2,4,5-T; the United States Government's specifications for Agent Orange and Monsanto's compliance with them; the historical knowledge of the toxicity of herbicides containing 2,4,5-T and of the toxicity of dioxin; Monsanto's efforts to identify impurities, including dioxin, created in its manufacture of 2,4,5-T.

28. Charles E. Minarik.

P.O. Box 682
W. Harwich, Massachusetts

The United States Government's development, testing, and use of Agent Orange; the Government's specifications for Agent Orange.

29. John Mullendore.

1020 Grove
Evanston, Illinois

Monsanto's manufacture of phenoxy herbicides; contact with the United States Government regarding dioxin.

13708

30. Verne L. Rhodes.

2120 Windport Lane
St. Louis, Missouri

Monsanto's production of 2,4,5-T in the 1960's;
Monsanto's efforts to reduce worker exposure to its
2,4,5-T process; Monsanto's efforts to reduce or to
remove dioxin in its 2,4,5-T process.

31. Frank S. Serdy.

13275 Windy Gate Lane
Creve Coeur, Missouri

The United States Government's field testing of
herbicides in Thailand; the health experience of
persons who used or were otherwise exposed to
herbicides containing 2,4,5-T.

32. Robert G. Sido.

7611 Shirley Drive
Clayton, Missouri

The United States Government's specifications for
Agent Orange and Monsanto's compliance with them;
registration of Monsanto products containing 2,4,5-T.

33. Anthony Sinclitico.

7800 William Road
Baltimore, Maryland

The United States Government's specifications for
Agent Orange.

34. Milt Smid.

#3 Zinzer Court
St. Louis, Missouri

The United States Government's specifications for
Agent Orange and Monsanto's compliance with them.

Tom K. Smith.

Monsanto's contracts with the United States Government for sale of herbicides containing Monsanto-manufactured 2,4,5-T; Monsanto's manufacture and sale of herbicides containing 2,4,5-T.

Robert E. Soden.

15998 Kettington Road
Clarkson Valley, Missouri

The health experience of Monsanto workers exposed to the 2,4,5-T process in the 1950's; Monsanto's efforts to determine the toxicity of 2,4,5-T and its process intermediates; Monsanto's efforts to reduce worker exposure to the 2,4,5-T process.

John R. Spey.

850 Tarpon Drive
Fort Walton Beach, Florida

The methods and procedures used to aeriually disseminate herbicides in Vietnam; the duties and responsibilities of a pilot of a C-123 airplane during herbicide operations in Vietnam; the health experience of persons in Vietnam who used or were otherwise exposed to herbicides containing 2,4,5-T.

James E. Springgate.

13060 East Sunset Drive
Los Altos Hills, California

Monsanto's production of 2,4,5-T in the 1960's; Monsanto's efforts to reduce worker exposure to its 2,4,5-T process; the health experience of Monsanto workers involved in the 2,4,5-T process.

Earl Spurrier.

Madison Building, Suite 301
1155 15th Street N.W.
Washington, D.C.

The methods and procedures used to apply herbicides containing 2,4,5-T for weed control in the United

13720

States; the health experience of persons who used or were otherwise exposed to herbicides containing 2,4,5-T.

40. Jack C. Strum.

712 Short Spoon Circle
Rocky Mount, North Carolina

Monsanto's production of 2,4,5-T in the 1960's; Monsanto's efforts to reduce worker exposure to its 2,4,5-T process; Monsanto's efforts to reduce or to remove dioxin in its 2,4,5-T process; the health experience of Monsanto workers involved in the 2,4,5-T process.

41. Frank E. Take, Jr.

480 Hillbrook Drive
Ballwin, Missouri

Monsanto's manufacture of 2,4,5-T at its Nitro, West Virginia plant; the United States Government's specifications and Monsanto's compliance with them; Monsanto's efforts to identify impurities, including dioxin, created in its manufacture of 2,4,5-T; Monsanto's efforts to reduce or remove dioxin in its 2,4,5-T process; the health experience of Monsanto workers involved in the 2,4,5-T process.

42. Wayne E. Vandeventer.

The United States Government's specifications for Agent Orange and Monsanto's compliance with them.

43. Richard C. Wallace.

P.O. Box 230
St. Albans, West Virginia

The health experience of Monsanto workers involved in the 2,4,5-T process.

44. Robert T. Webber.

4 Media Drive
St. Louis, Missouri

Monsanto's efforts to reduce worker exposure to its
2,4,5-T process.

45. Elmer P. Wheeler.

110 Cool Springs Drive
Camden, South Carolina

Monsanto's efforts to identify impurities, including
dioxin, created in its manufacture of 2,4,5-T;
Monsanto's efforts to determine the presence of dioxin
in its 2,4,5-T process and to reduce or remove it from
that process; the historical knowledge of the toxicity
of herbicides containing 2,4,5-T and the toxicity of
dioxin; the health experience of Monsanto workers
involved in the 2,4,5-T process and of persons who
used or were otherwise exposed to herbicides
containing 2,4,5-T; contacts with United States
Government representatives and others outside Monsanto
concerning all of the above.

46. Herbert Woodcock.

The methods and procedures used to aeri-ally disseminate
herbicides in Vietnam; the duties and responsibilities
of a navigator of a C-123 airplane during herbicide
operations in Vietnam; the health experience of
persons in Vietnam who used or were otherwise exposed
to herbicides containing 2,4,5-T.

47. Younger Laboratories.

Monsanto's efforts to determine the toxicity of
2,4,5-T and its process intermediates.

New York, New York
March 26, 1984

TOWNLEY & UPDIKE

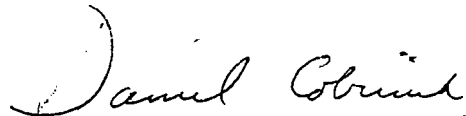
By: John C. Sabetta (JMS)
A Member of the Firm

Attorneys for Defendant
Monsanto Company
405 Lexington Avenue
New York, New York 10174
(212) 682-4567

13712

CERTIFICATE OF SERVICE

I HEREBY AFFIRM THAT I am an attorney duly admitted to practice in the State of New York and in the Eastern District of New York. I HEREBY CERTIFY that on March 26, 1984 I caused to be served a true and correct copy of the Second List of Monsanto's Fact Witnesses by courier on all counsel on the attached service list.



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Kelley, Drye & Warren
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Picillo & Rosenbaum
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Law Offices of Benton
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Houston, Texas 77002

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Reilly, Like & Schneider
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Babylon, New York 11700

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Department of Justice
Safeway Building - Room 904 D
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Washington, D.C. 20530

Hon. Raymond J. Dearie
United States Attorney
By: L. Kevin Sheridan
Executive Assistant
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225 Cadman Plaza East
Brooklyn, N.Y. 11201

Agent Orange Plaintiffs' Management Committee
26 Court Street, Room 905
Brooklyn, New York 11242

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

-----x
In re :
"AGENT ORANGE" :
Product Liability Litigation :
-----x

FILE
IN CLERK'S OFFICE
U. S. DISTRICT COURT
MDL No. 381
MAY 11 1984
TIME A.M. P.M.

DEFENDANT DIAMOND SHAMROCK
CHEMICALS COMPANY'S SUPPLEMENTAL
LISTING OF FACT WITNESSES

Pursuant to Magistrate's Pretrial Order No. 16 and Magistrate's directions at the March 7, 1984 pretrial conference, defendant Diamond Shamrock Chemicals Company ("Diamond Shamrock") sets forth below its list of fact witnesses who may give testimony at trial in support of Diamond Shamrock's claims and defenses. Diamond Shamrock also joins in Defendants' List of Fact Witnesses dated March 26, 1984, which is being served and filed under separate cover.

Diamond Shamrock reserves the right to supplement and amend this list based on information developed in continuing discovery proceedings or other trial preparations, and to call a live witness or use the deposition testimony of any persons listed by any other party. Diamond Shamrock also reserves the right to supplement and amend this list in the "witness list" section of the pretrial order following receipt and review of plaintiffs' final fact witness list, now due on March 27, 1984.

13716
223/

Name and
Present Address

Description of General
Nature of Testimony

Louis Anderson
220 E. 17th Street
Chicago Heights, Illinois 60411

Testimony concerning purchases by Riverdale Chemical Company of 2,4,5-T acids and esters supplied by Diamond Shamrock.

Eugene Bak*

Dr. Donald J. Birmingham*
19811 Wedgewood Drive
Gross Point Woods, Michigan

Testimony concerning research and investigation of chloracne by U.S. Public Health Service in the 1950's and 1960's, including visits to Diamond Shamrock's former Newark plant.

Jack A. Borrer*

Dr. Roger H. Brodtkin
769 Northfield Avenue
West Orange, New Jersey 07052

Testimony concerning medical conditions at the Newark plant, including: communications with and investigations by the U.S. Public Health Service; and preparation and publication of the article by Bleiberg, et al. (1964).

Lawrence L. Cecil, Jr.
12825 S.W. 69 Court
Miami, Florida 33156

Testimony concerning foreign sales of Diamond Shamrock's 2,4,5-T products, including sales in Colombia.

Edward L. Chandler*

Robert L. Chonoles*
Diamond Shamrock Chemicals
Company
Berry Avenue at Route 17 North
Carlstadt, New Jersey 07072

Testimony concerning manufacturing operations at Diamond Shamrock's former Newark plant, including: the removal of dioxin from trichlorophenol; and the U.S. Public Health Service study of the Newark workers in 1968-69.

Howard E. Everson*

Raymond A. Guidi*

Alfred M. Hauser
Diamond Shamrock Chemicals
Company
Berry Avenue at Route 17 North
Carlstadt, New Jersey 07072

Testimony concerning Diamond Shamrock's contractual arrangements with the United States for the sale of Agent Orange.

* Witnesses designated by an asterisk (*) have been deposed in MDL No. 381.

Name and
Present Address

Description of General
Nature of Testimony

Melvin Hochberg*

Stanley B. Honour*
829 Eggleston
Fort Collins, Colorado 80524

Testimony concerning foreign sales of Diamond Shamrock's 2,4,5-T products, including sales in Colombia.

Francis R. Kennedy*
2711 Bernadette Lane
Houston, Texas 77043

Testimony concerning manufacturing operations at Diamond Shamrock's former Newark plant, including: the development, installation and operation of a method for removing dioxin from trichlorophenol; visits to the Newark plant by the U.S. Public Health Service in the 1960's; and the production and shipment of Agent Orange pursuant to contracts with the United States.

Dr. Marcus M. Key*
University of Texas Health
Science Center
P.O. Box 20186
Houston, Texas 77025

Testimony concerning research and investigation of chloracne by U.S. Public Health Service in the 1960's, including visit to Diamond Shamrock's former Newark plant.

James O. King*
P.O. Box 900
Alpharetta, Georgia

Testimony concerning domestic and foreign sales of Diamond Shamrock's 2,4,5-T products, including sales of Agent Orange pursuant to contracts with the United States.

Jane Lewis*
5125 Temple Hills Road
Temple Hills, Maryland 20748

Testimony concerning the procurement and production of Agent Orange pursuant to the Defense Production Act, including directives and priority ratings issued by the United States.

Richard J. Marrese*

Dr. Richard W. McBurney
315 Steeple Chase Drive
Irving, Texas 75062

Testimony concerning medical conditions at the Newark plant, including communications with U.S. Public Health Service and with treating physicians at Newark.

Name and
Present Address

Description of General
Nature of Testimony

Dr. Alan P. Poland*
2918 Nottingham Way
Madison, Wisconsin

Testimony concerning medical study of the workers at Diamond Shamrock's former Newark plant in 1968-69, and research and investigation of trichlorophenol, 2,4,5-T and dioxin at National Communicable Disease Center in the 1960's.

Dr. Paul A. Possick*
46 Winding Way
Woodcliff Lake, New Jersey

Testimony concerning medical study of the workers at Diamond Shamrock's former Newark plant in 1968-69.

Donald M. Purdy*

F. Gordon Steward*
Diamond Shamrock Agricultural
Chemicals Inc.
P.O. Box H
Tuscaloosa, Alabama 35404

Testimony concerning manufacturing operations at Diamond Shamrock's former Newark plant, including: the development, installation and operation of a method for removing dioxin from trichlorophenol; the U.S. Public Health Service study of the Newark workers in 1968-69; and the production and shipment of Agent Orange pursuant to contracts with the United States.

Dated: New York, New York
March 26, 1984

Respectfully submitted,

CADWALADER, WICKERSHAM & TAFT

By Wendell B. Alcorn Jr.
A Member of the Firm
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13719

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Arvin Maskin
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(for THIRD PARTY DEFENDANT US
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L. Kevin Sheridan
Executive Assistant
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Brooklyn, New York 11201

COPIES OF ALL DOCUMENTS MUST
BE SENT TO:

Clerk of the Panel
Judicial Panel on Multidistrict
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Washington, D.C. 20005

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Carle Place, New York 11514

Agent Orange Plaintiffs'
Management Committee
26 Court Street, Suite 304-8
Brooklyn, N.Y. 11242

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

FILED
IN CLERK'S OFFICE
U. S. DISTRICT COURT E.D. N.Y.

★ MAR 19 1984 ★
TIME A.M. MP
P.M. _____

----- x

In re

"AGENT ORANGE"

MDL 381
(All Cases)

Product Liability Litigation

----- x

PLAINTIFFS' INITIAL LIST OF FACT WITNESSES
IN SUPPORT OF CLAIMS

MARCH 15, 1984

U.S. DISTRICT COURT
EASTERN DISTRICT
OF NEW YORK

MAR 15 4 39 PM '84

RECEIVED

PLAINTIFFS' MANAGEMENT COMMITTEE
26 Court Street
Brooklyn, NY 11242
(212) 330 - 0900

13722

2110

PLAINTIFFS' INITIAL LIST OF FACT
WITNESSES IN SUPPORT OF CLAIMS

Plaintiffs submit the following list of potential witnesses to be called at trial pursuant to the Scheduling Order For the Completion of Discovery dated January 10, 1984. Plaintiffs reserve the right to call any of the below listed individuals as a witness at trial. In addition, reference is hereby made to Plaintiff's Response To Paragraph No. 7 of the Magistrate's Pretrial Order No. 1 which lists witnesses plaintiffs wish to depose. To the extent the depositions of those individuals elicit relevant information, plaintiffs reserve the right to supplement this list and to call such witnesses at trial as well. To the extent those named individuals are not produced for deposition but are interviewed by plaintiffs, and to the further extent that it appears any of them can give relevant factual testimony, plaintiffs reserve the right to call them at trial as well. Plaintiffs will supplement this list promptly upon the receipt of information tending to indicate that such additional witnesses might be called at trial.

Since there are at least portions of the testimony of most of the witnesses who have been previously deposed, most of whom have been named by the defendants on their preliminary lists of fact witnesses, plaintiffs reserve the right to either call each of those witnesses or to present excerpts from the testimony of each. We suggest that the organization of that testimony and the obvious need to reduce the amount of those references will be done in connection with the preparation of the parties' pretrial memoranda and orders. The reservation of such rights is therefore not prejudicial to any party at this time.

Pursuant to the Court's instructions and permission,

13723

addresses have not been given for some of the witnesses named below who have been deposed. Attached for the Court's convenience is a listing prepared by Wager & Spinelli, court reporters, of all witnesses deposed between June 29, 1982 and February 7, 1984. As to those witnesses who have not been deposed and as to whom no address is listed, plaintiffs are endeavoring on a priority basis to locate the accurate addresses, and this list will be supplemented to include that information on an "as received" basis.

The additional witnesses not covered by the above reservations, are, as follows:

DR. THOMAS ABOUD
Toledo Clinic
Toledo, Ohio

Cardiologist for Mrs. Ford
Treated Danny Ford for
hypertension.

EDWARD E ADAMS

GORDON A. ANDERSON
102 Hickory Lane
Naugatuck, Connecticut

IRENE ANTONIK
812 Sussex
Austin, TX 78745

Texas Disability Officer
and friend of Jordans'

EUGENE BAK

DONALD K. BALLMAN
7722 Revelle Drive
La Jolla, California

DONALD BARNES

E. D. BAUMGARTNER

R. E. BAYNARD

JEANNIE BEAVERS
Flower Hospital
Personnel Department
Sylawia, Ohio

Knows the hospital and
business strain re
Danny Ford

BILLIE MARIE BELL
4404 Bonnie Drive
Ft. Worth, TX 76116

Danny Jordan's mother

13724

CLOYCI G. BELL
4404 Bonnie Drive
Ft. Worth, TX 76116

Danny Jordan's Step-
Father

BELL TELEPHONE OF PA.
1 Park Way
Philadelphia, Pa. 19101

Personnel records of
George Ewalt

W. B. BELLS

ETCYL H. BLAIR

JOHN BLISH

A. A. BLOCK
KANSAS CITY, MO.

WILLIAM BLUMENAUER

JOSEPH L. BOLTON

JACK BORRER
12920 Wellswood Trail
Chesterfield, Ohio 44026

AL BOTHWELL

High School friend of
Lambiotte's who was with
him in Vietnam

JAMES E. BOWERS
ST. LOUIS, MO.

DANIEL BRAXTON

George Ewalt's Foreman,
1975

BOB BROWN

Served with Dan. Jordan
in Vietnam

BROWN, SGT.

With Danny Ford in
sprayed areas

DAVE BUNIN

Economist

JOHN S. BUSH, Jr.

WILLIAM CALLAHAN
West Virginia

Was with Ewalt in Vietnam

MELVIN CALVIN
2683 Buena Vista Way
Berkeley, California

Former member of PSAC
and director of Dow
Chemical re government
knowledge vs. Dow's
knowledge and failure
to warn.

13725

RICHARD CASEY	
ELLIS CASH	
EDWARD LEE CHANDLER	
EDWARD E. CHAPMAN 6748 N. Euclid Gladstone, Missouri	
J. G. CHARLTON	
ROBERT L. CHONOLES 23 Carmella Drive Edison, New Jersey	
EMIL CHRISTOFANO	Re Hercules' liability
GEORGE F. COLLINS	Director of procurement Production, Richmond, Va. (Procurement, supply and failure to warn issues)
J. G. COPELAND, Jr.	Asst. Gen. Manager, '64 Gen. Mgr. Synthetics, 55-72 (Re Hercules)
DIANE COURTNEY	Government expert witness on causation
GEORGE & MARGE CRAWFAS 49 Heck Rd. Kennessaw, Ga.	Saw changes in Danny Ford Chris's Brother and Sister in Law
JOHN CRAWFAS Beach Valley Rd. Atlanta, Georgia	Chris' Brother
OWEN & BETTY CRAWFIS 61-33 Whiteford Center Rd. Toledo, Ohio	Mother and dad of Chris. Used to take Danny for treatment (6138?)
ROBERT CROCKER	Amounts - doing away of herbs - has tapes to determine exposure to Veterans II's
EUGENE D. CRITTENDEN, Jr.	Dir. Sales, 66-67 Asst. Gen. Mgr. Synthetics 67-68 908 DuPont Road Wilmington, Del.19307

13726

ROBERT CROCKER

WARREN CRUMMETT
808 Crescent Drive
Midland, Michigan

Dow scientist; evidence
concerning Dow liability
issues.

GENE CUMMINGS

Served with Jordan in
Vietnam

BILL CURTIS
c/o CBS News
524 West 57th Street
New York, New York 10019

Evidence concerning
eyewitness observations
as to the condition
of the country of
Vietnam, extent of
residual defoliation and
possible photographic
exhibits; investigation
continues.

THOMAS P. DALBY

S. S. DANIELS

L. L. DANIELSON

U.S.D.A. Liason NACA

EDWARD DEBOLT

DIAZ, STAFF SGT.

With Ewalt in Vietnam

CHARLES DILLEY
KANSAS CITY, MO.

LINDA DIMOLA

Kerry Ryan's Babysitter

CHARLES DISHNER

M DOJNY

OWEN DOLIN
5225 Sun Valley Drive
Charleston, West Virginia

LAWRENCE E. DOTSON

WILLIAM DUFFIELD

CHARLES L. DUNN

Chairman, NACA; evidence
re liability issues
affecting many defendants
in addition to Hercules.

JOSEPH DUQUETTE

On Suffolk County Police

13727

Force with Mike Ryan

J. M. EAGAN

JACK D. EARLY
8024 Lakenheath Way
Potomac, Maryland 20854

WAYNE EDWARD

PLATOON SGT. ELLY

Was with Ewalt in spray
areas.

DONALD ELMORE

DENNIS ELMORE

GEORGE W. & EUNICE EWALT SR. Parents of George Ewalt
731 Penn Pines Blvd. and familiar with
Clifton Heights, Pa. family situation

TEN EYCK

WILLIAM A. FAIRCLOUGH
24871 Via San Fernando
Mission Viejo, California 92692

FRED FALANA

With Danny Ford in sprayed
areas

WILLIAM F. FALSEY
6706 Lakeview Drive
Lake City, Michigan

OTIS E. FANCHER

FARMER, CAPT.

With Danny Ford in sprayed
areas

L. E. FAST

WILLIAM FENNER

J. R. FISCHER
HERCULES, INC.
JACKSONVILLE, ARK.

BETTY FMAYDA
1899 Rapids Road
Hiram, Ohio

Chris Ford's Business
partner and good friend
(See Smayda)

THOMAS FORBES
Monestary Avenue
Philadelphia, Pa.

Friend of George Ewalt who
served in same area in
Vietnam

13728

JOHN J. FORD
15 Winterbury Circle
Wilmington, Delaware

KERRY & JEANETTE FORD
6507 Secore Rd.
Lambertville, Michigan

RAY & ROSE FORD
13478 South County Line
Highway
Ottawa Lake, Mich. 49267

MARGARET FORLANO
First Street
Ft. Dix, N.J.
JOSEPH W. FOWLER

E/4 FRANKS
(in jail)

JOHN P. FRAWLEY

H. G. FREDERICKS

VAL K. GAERTNER

JESSE GERSHBERG

Er. D. Gladney
East St. Louis, Mo.

A. W. GLENN

HAROLD GILL

CHERYL GONDEK
4009 Shawnee Trail
Ft. Worth, TX 76135

CHARLES E. GRANITO

RAYMOND A. GUIDI
420 Essex Place
Memphis, Tennessee

Brother of Danny Ford

Danny Ford's Parents

Sister of George Ewalt

423d Combat Supply,
with Lambiotte in
Vietnam

Chief toxicologist
Hercules, re many
liability and
causation issues

With Ewalt in Vietnam

Dow analytical chemist
who allegedly developed
analytical method for
determination of
2,3,7,8 TCDD in '64.

Danny Jordan's sister

13729

COLONEL HAIG

Was with Ewalt in spray
area

WALTER D. HARRIS
199 ALLERTON RD.
NAUGATUCK, CONN.

E. ROSS HART

DAVID G. HELM
5009 Forest
Kansas City, Kansas

RICHARD HICKMAN
Route 4, No. 10 Yocum Rd.
Rogers, Arkansas

Dow government sales
Mgr. re Dow's attempts
to sell products
including herbicides
to the government

JESSE HILSEN

PAUL E. HOFFMAN
1202 Lake Shore Drive North
Barrington, Illinois

GRAYDON HOLDEMAN

BENJAMIN B. HOLDER
5203 BLOOMFIELD ST.
MIDLAND, MICH.

Dow Medical Director re
health effects in workers,
failure to warn and lack
of minimum effect level.

HARRY HOLLAND

Friend of Lambiotte's

RAY HOLMES

Dow plant supervisor
who contracted
chloracne; re health
effects

G. HOLSING

DONALD HOLT

George Ewalt's Foreman '80

VERNON HOUCK

F. GERARD & VADA HUKILL
220 W. Tyler
Magnum, Okl. 73554

Danny Jordan's In-Laws

THOMAS R. HUNT

RAPHAEL H. HUSTON

13730

PETER INFANTE

GEORGE JACKSON

JOHN JENNINGS
Apt. B
12 Lansdowne Avenue
Lansdowne, Pa.

George Ewalt's Foreman
late '70s to early '80s
High School friend of
George Ewalt who was
in Vietnam at same
time and knows his
medical problems.

DAVID JORDAN

LYNNE KELLER
208 Braeswood
Austin, TX 78704

Friend of Danny Jordan's

R. EMMET KELLY
665 SO. SKINNER
ST. LOUIS, MO.

Monsanto

VAN A. KELLY
Philadelphia, Pa.

With Ewalt in Vietnam

GEORGE C. KEMPSON
143 South Gore
Webster Groves, Missouri

EUGENE E. KENAGA
1291 N. Wagner Road
Essexville, Michigan

Dow employee re
environmental
persistence, toxicity
and liability issues

FRANCIS KENNEDY

WILLIAM KIDD

CARL & CARLA KING
33-42 Romaker
Toledo, Ohio

Closest friends of the
(Danny) Fords; she was
with Chris when they
found out that Danny
Ford's leg was can-
cerous and how much
pain he was in. Address
may also be 3320
Romaker Road

J. M. KIRGIS

A. Y. KISTNER
KANSAS CITY, MO.

FRANK W. KLEMAN
ST. LOUIS, MO.

13731

GEORGE KLINE

J. KLINGMAN

PHILIP LANDRIGAN

JULES LAM

David Lambiotte's Uncle

MICHAEL LAMBIOTTE

Brother of David
Lambiotte

J. K. LEASURE

R. R. No. 2 - Box 157
Makanda, Illinois

FRANK LEMAK

P. R. LITTLE

HAROLD A. LLOY

DR. ANNETTE LYNCH
Schoolhouse Lane
Philadelphia, Pa.

Ewalt's daughter's
psychologist

J. R. MALLET

W. MALONEY

DAVE MANN

Employer of Lambiotte
before and after
Vietnam

THOMAS MARKWOOD
Jeep Corp.
940 N. Coe. Blvd.
Toledo, Ohio

Payroll Records and lost
income re Danny Ford

ROBERT E. MASKILL
41 East 53rd Street
Kansas City, Missouri

T-H Agriculture; liability
issues

RICHARD J. MARRESE

JAMES MASON

JOHN MASON
12 Tanners Dean
Leatherhead, Surrey
England

L. G. MAUREY

PAUL MAYFIELD

13732

M. McCALLEY

WILLIAM J. MCCARVILLE
12 Ridge Crest JCourt
Chesterfield, Missouri

DONALD McCOLLISTER
5522 Whitehall Street
Midland, Michigan

Dow

WILLIAM D. McELROY
9651 BLACK GOLD RD.
CALIFORNIA

JUDY McKINSEY
1899 Rapids Road
Hiram, Ohio

Business partner of Chris
Ford and close friend
(See McKimnley)

SGT. TIMOTHY MEDDOR

served with Jordan in
Vietnam

COL. BRUCE MEYERS
6914 W. MERCER WAY
ST. LOUIS, MO.

ROY MEYERS

CHARLES E. MINARICK

SHERRY MOSHER
184335 Winchester Rd.
Toledo, Ohio

Business manager of the
kennel. Stress and
strain on Chris Ford
Address may also be 1950
Winchester

DEBDAS MUKERJEE

Government expert

BOB NOBER
71 Lempa Road
Holland, Pa

Was with Ewalt in Vietnam

WILLIAM R. NUMMY
711 W. Meadowbrook Drive
Midland, Michigan

JACKIE OCHS
c/o GREEN MOUNTAIN POST FILMS
P. O. BOX 229
TURNER FALLS, MA.

Photographic exhibits
& personal observations
& investigations

BRIAN O'CONNOR
J. F. O'CONNOR

Friend of the Ryans

13733

SGT. THOMAS O'DONNELL

Served with Jordan in
Vietnam

DR. OERTNER

J. E. PALLARD

FRANCIS PANNETON

L. A. PARDEE

PHIL PENN

Amounts - doing away
of herbs - has tapes
to determine exposure
to Veterans II's

REBECCA PEPPER
6718 Silvermine Drive
#1004
Austin, TX 78736

Neighbor of Jordan's

JACK E. PETERSON
664 Forest Grove Circle
Brookfield, Wisconsin

Former Dow employee who
addressed industry
representatives at
March, 1965 meeting
concerning rabbit ear
testing

F. H. PLACET

WILLIAM L. POPHAM

DONALD PURDY
150 Fredericksberg Drive
Avon Lake, Ohio

THOMAS RAFERTY
New York City

With Mike Ryan in
Vietnam

VIRGIL B. ROBINSON
2520 Quail Hill Drive
Upper St. Clair, Pa. 15241

V. K. ROWE

Dow's former Chief
Toxicologist - liability
issues as well as
causation questions; Dow's
knowledge of extreme
toxicity and failure to
warn

ROBERT R. RUMER

13734

CECIL RUSSELL
46 WINGFIELD ROW
GLENDALE, MO.

MAUREEN RYAN

School Principal who
knows Kerry's education

MICHAEL RYAN

Mike Ryan's Father

VICKY RYAN

Kerry's Grandmother

HENRY SADLER
Florida

Boyhood friend of
Lambiotte's who was
with him in Vietnam

UMBERTO SAFFIOTTI

Government causation
witness with factual
testimony re government
contract defense,
liability issues and
issuance of Bionetics
Laboratories Report.

DR. SALTER

Dr. who told Lambiotte
to stop working

ED SAWGRASS

SUSAN SCANLON
Riplen Street
Philadelphia, Pa.

Sister of George Ewalt

WILLIAM R. SCHAMBRA
1411 W. St. Andrews
Midland, Michigan

Dow former employee re
failure to warn and
business of selling
herbicides to the
government

ARTHUR J. SCHLESSINGER

OLGA SCHNELL

Neighbor of the Ryans

W. SCHUBACK

LAPIN O. SCOTT

R. B. SCOTT

RICHARD SCOTT

Drafted with Lambiotte
and saw in Vietnam

SGT. SHARKEY

David Lambiotte's

13735

platoon Sergeant
in Vietnam

DEXTER B. SHARP
13042 Weatherfield Drive
St. Louis, Mo.

A. E. SIDWELL

LARRY SILVERSTEIN

Dow former employee re
March, 1965 meetings at
Dow and other liability
issues and health
effects to Dow employees

BETTY SMAYDA
1999 Rapids Rd.
Hayram, Ohio

Business partners - Chris
Ford's plus good friend.
What Fords went through
and personal strains

J. G. SMERALDI

CAPT. SMITH

With Ewalt in spray areas

PLATOON LT SMITH

With Ewalt in spray areas

TOM K. SMITH

ROBERT SNODGRASS
Huntington, W. Va.

With Danny Ford in Sprayed
areas

HOWARD C. SPENCER
11008 Cameo Drive
Sun City, Arizona 85351

Developed rabbit ear test
in 1941 while a Dow
employee

L.P. SEITZ

A. JOHN SPEZIALE
311 N. Umlerland Avenue
Redwood City, California 94061

JOHN A. STEPHENS
800 N. Lindbergh Blvd.
St. Louis, Missouri

FREDERICK G. STEWARD
173 Woodland Forest, Section 3
Tuscaloosa, Alabama 35405

CHARLES N. STEWART

MICHAEL STRANGE
521 Bomber Road
Ft. Worth Texas

Friend of Danny Jordan

13736

FREDERICK STRANSKY

Mike Ryan's Brother-in-Law

SGT. STRAWBERRY

Was with Ewalt in spray areas

DEIRDRE STRANSKY

Teacher - knows Kerry Ryan - a specialist in learning disabilities

PATRICIAL STRANSKY

Nurse and Family Counseller for Ryan family

JACK STRUM
712 Short Spoon Circle
North Carolina

JOHN S. SULLIVAN

WINFIELD W. SUNDERLAND
5300 Westpath Way
Bethesda, Maryland

DANIEL W. SWEET

MILTON A. TAVES
210 N. Spring Valle Road
Wilmington, Delaware

CLINTON TAYLOR

Business partner of David Lambiotte's

R. D. THOMPSON

WILLIAM THOMPSON
318 GEORGINA AVE.
SANTA MONICA, CAL.

A. L. TREISBECK

DAN TWIFF
Woodland Street
Slyvian, Ohio

Union commission man at Danny Ford's job. Also a friend of Dan's. Has information about union contract (current) and personnel matters. See also Twiss.

DAN TWISS
4910 Woodland
Sylvania, Ohio

Committee man at AMC Jeep
See Twiff above

13737

WILLIAM R. UDELL
60 TEALWOOD
CREVE COEUR, MO.

EDWIN T. UPTON

T-H liability issues

W. VANDERVENOR

JANE WARD
3527 M. 151
Temperance, Mich. 49182

Neighbor of Fords

ROBERT T. WEBBER
4 Media Drive
St. Louis, Missouri 63146

ADAM WENKUS
Route 5 - Box 904
Waupaca, Wisconsin

Supply and distribution,
defendants' failure to
warn; former Defense
Military Supply Office
employee.

BUTCH WESTERLAND

Served with Jordan in
Vietnam

HARTLEY WILDER

SGT. J. WILLIS

Served with Danny Jordan
in Vietnam

MARK G. WILTSE

N. WIRZ

WILBUR WOHLGAMUTH
49-21 Barton Place
Slyvian, Ohio

Union Stewart at Danny
Ford's - knew Dan when
he had the cancer and
the wages at the time
and the changes in Dan

L. K. WOOLFOLK

JOHN WRIGHT

R. WRIGHT

R. T. YATES

YORK HOSPITAL

Former employer of
Lambiotte

MITCHELL ZAVON
KETTERING LABS
CINCINNATI, O.

13738

CHARLES P. ZORSCH
ROUTE 5, BOX 30
PACIFIC, MO.

AGENT ORANGE PLAINTIFFS'
MANAGEMENT COMMITTEE

By Stephen J. Schlapf

March 15, 1984

13739

<u>Date Taken</u>	<u>Witness</u>
June 29, 1982	Bernard J. Jandorf
June 30, 1982	Dr. Van Murray Sim
July 1, 1982	Bernard J. Jandorf
July 8, 1982	Dr. Marcus M. Key
July 13, 1982	Dr. Robert A. Darrow
July 15, 1982	Donald W. Falconer
July 19, 1982	Dr. Van Murray Sim
July 20, 1982	David Henry Groth
July 21, 1982	Richard R. Bates
July 26, 1982	Kent R. Irish
July 27, 1982	Katherine Diane Courtney
July 27, 1982	Charles E. Minarik
July 28, 1982	Charles E. Minarik
July 29, 1982	Charles E. Minarik
July 30, 1982	Dr. Marcus Key
August 3, 1982	Philip C. Kearney
August 4, 1982	William Upholt
August 16, 1982	Philip C. Kearney
August 17, 1982	William C. Shaw
August 26, 1982	Donald Birmingham
August 27, 1982	Donald Birmingham
September 8, 1982	Robert J. Anderson
September 9, 1982	Warren C. Shaw
September 15, 1982	Walter Edward Sultan
September 16, 1982	Garnett R. Higginbotham
September 21, 1982	David Firestone
September 22, 1982	John L. Buckley
September 23, 1982	Sigmund R. Eckhaus
September 29, 1982	Andrew W. Anderson
September 30, 1982	Carleton G. Shead
October 5, 1982	Edward A. Metcalf
October 6, 1982	Sigmund R. Eckhaus
October 14, 1982	David Firestone
October 19, 1982	William B. Ennis, Jr.
October 20, 1982	Joseph D. Avellino
October 21, 1982	Richard G. Horton
November 3, 1982	Frank J. Vocci
November 9, 1982	Lester L. Miller
November 10, 1982	Dr. Benjamin Harris
November 16, 1982	John F. Callahan
November 17, 1982	William W. Dorrell
November 18, 1982	William F. Barthel
November 24, 1982	Keith H. Jacobson
December 1, 1982	Merl Ringenberg
December 2, 1982	James Arthur Hebbeler
October 26, 1982	William W. Stone Jr.

13740

Date Taken

Witness

December 7, 1982
December 8, 1982
December 9, 1982
December 9, 1982
December 9, 1982
December 14, 1982
December 16, 1982
December 15, 1982
December 15, 1982
December 17, 1982
December 21, 1982

Seymour L. Friess
Robert E. Cox
Paul C. Warnke
Theodore C. Byerly
Harry W. Hays
Lawrence Fishbein
Dayton Klingman
Carl Gwin Baker
John S. Foster
Herbert G. Fredericks
Ralph T. Ross

January 3, 1983
January 5, 1983
January 11, 1983
January 11, 1983
January 12, 1983
January 13, 1983
January 17, 1983
January 18, 1983
January 18, 1983
January 18, 1983
January 18, 1983
January 19, 1983
January 20, 1983
January 20, 1983
January 20, 1983
January 21, 1983
January 24, 1983
January 25, 1983
January 27, 1983
January 27, 1983
February 1, 1983
February 2, 1983
February 3, 1983
February 4, 1983
February 7, 1983
February 8, 1983

Paul Aaron Possick
Henry Fischbach
Cyrus Robert Vance
John S. Leary
Lawrence M. Petrucelli
Fred I. Edwards
Herbert E. Stokinger
Joseph A. DiPaolo
Dohrman H. Byers
Douglas H.K. Lee
Boris J. Osheroff
William A. Fenner
Garth Fitzhugh
Harold Brown
Levi T. Burcham
Francis Kennedy
Thomas A. Treglia
Abram Saul Kaplan
George M. Lawton
Eugene Bak
Nicholas S. Cox
Fred J. Delmore
Riley D. Housewright
John L. Traub
Charles E. Granito
Edward Lee Chandler

<u>Date Taken</u>	<u>Witness</u>
February 8, 1983	Donald Whittam
February 9, 1983	Anthony Sinclitio
February 10, 1983	Thomas R. Dashiel
February 10, 1983	Lester Boyer
February 11, 1983	William J. McCarville
February 11, 1983	Frank L. Bauer
February 14, 1983	Charles E. Bushey
February 15, 1983	William J. Crawford
February 15, 1983	Walter W. Melvin, Jr.
February 16, 1983	Robert S. McNamara
February 17, 1983	John H. Gerety, Jr.
February 18, 1983	R. Emmet Kelly
February 22, 1983	John S. Bush, Jr.
February 22, 1983	Lee A. DuBridge
February 23, 1983	Robert L. Andreoli
February 23, 1983	Robert W. Morthland
February 24, 1983	James H. Gardner
February 25, 1983	George M. Lawton
February 25, 1983	Kennard A. Reynard
March 1, 1983	Alan P. Poland
March 1, 1983	Arthur J. Schlesinger
March 2, 1983	Dr. Henry Kissinger
March 2, 1983	Alan P. Poland
March 3, 1983	William Childs Westmoreland
March 8, 1983	John P. Frawley
March 10, 1983	Harold H. Gill
March 10, 1983	Albert E. Hayward
March 16, 1983	V.K. Rowe
March 17, 1983	Jack E. Burton
March 17, 1983	Robert A. Shade
March 22, 1983	Gordon A. Anderson
March 22, 1983	William H. Summerson
March 23, 1983	Benjamin Brace Holder
March 23, 1983	Melvin M. Rabstein
March 24, 1983	William T. Thompson
March 25, 1983	Jerome Wilkenfeld
March 25, 1983	Harold H. Gill
March 28, 1983	Oscar Garth Fitzhugh
March 31, 1983	Etcyl H. Blair
April 1, 1983	Vincent McRae
April 7, 1983	Edwin T. Upton
April 7, 1983	Wayland J. Hayes
April 7, 1983	George M. Lawton
April 8, 1983	George M. Lawton
April 8, 1983	Edwin T. Upton
April 12, 1983	James Henry Wills
April 13, 1983	Harry Heiman
April 14, 1983	Seymour Silver
March 30, 1983	Donald D. McCollister

13741

Date Taken

April 22, 1983
April 27, 1983
April 28, 1983
April 28, 1983
April 29, 1983
April 29, 1983
May 2, 1983
May 2, 1983
May 2, 1983
May 2, 1983
May 3, 1983
May 4, 1983
May 4, 1983
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July 15, 1983
July 18, 1983
July 21, 1983
August 1, 1983
August 3, 1983
August 3, 1983
August 4, 1983
August 5, 1983
August 9, 1983
August 10, 1983
August 11, 1983
August 12, 1983

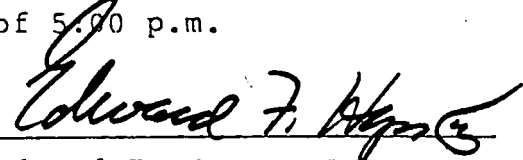
Witness

Gordon J. MacDonald
General Maxwell Taylor
Donald F. Hornig
Charles L. Dunn
Ronald Joseph Kassel
Spurgeon M. Keeney, Jr.
Kenneth M. Endicott
John C. Atkinson
William Horwitz
Cecil H. Russell
Charles P. Zorsch
William R. Udell
Umberto Saffiotti
Nathan Gordon
Gordon J. McDonald
Steve S. Szabo
Albert C. Kolbye
Warren R. Bontoyan
John C. Atkinson
Milton K. Christensen
Dr. Michael Klein
Marshall Stubbs
Robert M. Gastineau
E. Ross Hart
Harold N. McFarland
Ian Alastair Mitchell
Dr. Douglas Lindsey
Daniel W. Sweet
Herschel E. Griffin
William F. Barthel
K. Diane Courtney
Harold J. Magnuson
William D. McElroy
General James A. Hebbeler
Joseph F. Coates
Peter S. Bing
William M. Creasy
John F. O'Leary
Graydon C. Essman, III
Walter Leo Zielinski, Jr.
Herbert F. York
John D. Baldeschwieler
George M. Lawton
Roswell Daniels
Umberto Saffiotti
Robert J. Heaston
Robert H. DuGuid

<u>Date Taken</u>	<u>Witness</u>
August 15, 1983	David M. Cawthorne
August 15, 1983	George W. Connell
August 16, 1983	Marshall Steinberg,
August 17, 1983	John L. Buckley
August 17, 1983	Charles E. Stewart
August 17, 1983	J.G. Smeraldi
August 17, 1983	Wayne Edward
August 18, 1983	John T. Weimer
August 19, 1983	Henry L. Verhulst
August 19, 1983	Dorothy M. Ward
August 22, 1983	Dr. Arthur H. McCreesh
August 22, 1983	Paul D. Harkins
August 23, 1983	Dr. Richard D. Horton
August 24, 1983	Normand E. Olivier
August 24, 1983	Jane Lewis
August 25, 1983	Frank J. Vocci
August 25, 1983	Verne C. Fryklund, Jr.
August 30, 1983	Dr. Thomas C. Simmons
August 30, 1983	Henry N. Doyle
August 30, 1983	Eberhardt Rehtin
August 31, 1983	Laverne A. Parks
August 31, 1983	Brunildo Antoio Herrero
September 7, 1983	Paul Doty
September 8, 1983	Frank H. Westheimer
September 12, 1983	Louis B. Arnoldi
September 13, 1983	John Angel
September 14, 1983	David Jordan
September 15, 1983	Donald W. Norberg
September 16, 1983	William T. Thompson
September 16, 1983	Filiberto Vargas
September 16, 1983	Warren Crummett
October 3, 1983	John Wilder Tukey
October 3, 1983	Willis Hart
October 4, 1983	Donald W. Fuhlage
October 4, 1983	Francis Gene Douglas
October 6, 1983	Jerome D. Wiesner
October 17, 1983	John A. Stephens
October 17, 1983	Jack E. Peterson
October 17, 1983	Robert L. Chonoles
October 19, 1983	Frederick G. Steward
October 19, 1983	Virgil B. Robinson
October 20, 1983	William G. Kratz
October 20, 1983	Dexter B. Sharp
October 21, 1983	Jack A. Borrer
October 21, 1983	Dr. Howard C. Spencer

CERTIFICATE OF SERVICE

The undersigned, Edward F. Hayes, III, does hereby certify that on the 15th day of March, he did serve the enclosed document on all those shown on the attached service list by private messenger service with the following exceptions; Chambers copies were delivered personally by hand to Judge Weinstein and Magistrate Scheindlin, before the hour of 5:00 p.m.


Edward F. Hayes, III

13744

Rivkin, Leff, Sherman & Radler
Attorneys for Dow Chemical Co.
100 Garden City Plaza
Garden City, NY 11530

Townley & Updike
Attorneys for Monsanto Co.
405 Lexington Avenue
New York, NY 10017

Cadwalader, Wickersham & Taft
Attorneys for Diamond Shamrock
One Wall Street
New York, NY 10005

Arthur, Dry & Kalish
Attorneys for Uniroyal, Inc.
1230 Avenue of the Americas
New York, NY 10020

Shea & Gould
Attorneys for Uniroyal, Inc.
330 Madison Avenue
New York, NY 10017

Clark, Gagliardi & Miller
Attorneys for T&H Agriculture
99 Court Street
White Plains, NY 10601

Budd, Larner, Kent, Gross,
Picillio & Rosenthal
Attorneys for Thompson Chemical
33 Washington Street
Newark, NJ 07102

Civil Division
United States Department of Justice
Room 904D
Safeway Building
Washington, DC 25030

Kelley, Drye & Warren
Attorneys for Hercules, Inc.
101 Park Avenue
New York, NY 10178

13745

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

-----X
In re:

"AGENT ORANGE"

Product Liability Litigation
-----X

MDL #381

FILED
IN CLERK'S OFFICE
U. S. DISTRICT COURT E.D. N.Y.
★ MAR 1 1984 ★
TIME A.M. _____
P.M. UP

SUPPLEMENT TO PLAINTIFFS' EXPERT
WITNESSES' EXPANDED SUMMARIES IN
ACCORDANCE WITH F.R.C.P. 26(b)(4)(A)(i)
AND IN ACCORDANCE WITH MAGISTRATE'S
RULINGS OF FEBRUARY 29, 1984

PLAINTIFFS' MANAGEMENT COMMITTEE

By Thomas W. Henderson

Thomas W. Henderson, Esquire
Alison Pettiette, Esquire

13746

2056

A few of these pages
are slightly blurry. This was
the condition of the document
& not the copy machine.

Thank You,
R I S

DEBORAH A. BARSOTTI, Ph.D.

V. GROUNDS FOR EACH OPINION

A. General

Dr. Barsotti will rely upon her review of medical and scientific literature which is cited in her Curriculum Vitae and References previously submitted. In addition, Dr. Barsotti's educational and personal experience are set forth in her Curriculum Vitae.

Dr. Barsotti became involved in research with the Halogenated Aromatic Hydrocarbons (HAH's) in 1973 as a graduate student at the University of Wisconsin. After the completion of her Ph.D. in 1980, Dr. Barsotti continued with the projects at the University of Wisconsin until her leaving to accept a position of Assistant Professor in Toxicology at the Philadelphia College of Pharmacy and Science.

During her tenure at the University of Wisconsin, she was involved with (1) preparation of experimental protocols; (2) the establishment of the clinical and reproductive test parameters; (3) the day to day operation of the Resus monkey colony including sample acquisition and testing, animal husbandry and autopsy procedures and data analyses of Resus monkeys chronically exposed to HAH's as well as their control. This work has culminated in numerous publications as presented in Dr. Barsotti's Curriculum Vitae. In addition, she has been invited to speak or present her work in various atmospheres including community meetings and scientific symposia. The specific chemical toxic compounds that she has worked with are polychlorinated biphenyls (Aroclors 1248 and 1016 products), the polybrominated biphenyls (Fire Master product), and hexa and tetrachlorinated dibenzo-para

dioxins (HCDD's and TCDD's).

Since Dr. Barsotti's acceptance at her new position in January of 1983, she has continued to analyze the data from the studies of Wisconsin for publication purposes. In addition, Dr. Barsotti has biological samples from these studies which are to undergo further analyses. Furthermore, Dr. Barsotti has submitted a National Institute of Health (NIH) grant application to continue research on HAH's.

B. Specific

In addition to all references previously listed in Dr. Barsotti's References and Curriculum Vitae, the following references regarding dioxins and toxins, particularly TCDD, support Dr. Barsotti's Opinion IV A:

- a) Poland and Knutson, 1982.
- b) Allen, et al. 1977.
- c) Allen, et al. 1979.

B. 4. The statement "Recent advances in detection methodology" is hereby deleted. Additional specific references in support of Opinion IV D include the following:

- a) Nature, Vol. 283, p. 772, 1979.

B. 6. With respect to Opinion IV F, the underlying premise of animal toxicity testing is that the effects produced by the compound in laboratory animals are applicable to man:

- a) Casarette and Doull's Text Book: Toxicology, The Basic Science of Poisons, 1980.
- b) Principles of Animal Extrapolation, Edward J. Calabresi, University of Public Health, Amhurst, Mass. 1983, published John Wiley & Sons.

13749

In the case of HAH's, including TCDD, similarities exist in the clinical and reproductive symptoms observed in Rhesus monkeys and that reported in man:

- a) Barsotti, et al. 1976.
- b) Barsotti, 1980.
- c) Schanz, et al. 1970.
- d) Kuratsune, et al. 1972.
- e) Hoshimura, 1974.
- f) EPA, 1979.
- g) Bogen, 1979.

In addition, symptoms in both species appear to be latent or persistent after TCDD exposure has ceased:

- a) Barsotti personal research.
- b) Oliver, 1975.
- c) Pazberoba, et al. 1981.

References:

- J.R. Allen, J.P. Van Miller and D.A. Barsotti, Toxicol. Appl. Pharmacol., 47, 179, 1979.
- G. Bogen, J. Amer. Ed. Assoc., 242, 2391, 1979.
- EPA Report, p. 78, February 28, 1979.
- Kuratsune, M., Yoshimura, T., Matsudaka, J., Yamaguchi, A., Environ. Health Perspec., 1, 119, 1972.
- Nature, Vol. 282, p. 772, 1979.
- R.M. Oliver, Brit. J. Indust. Med., 32, 49, 1975.
- Yoshimura, T., Fukuoka, Acta Medica, 65, 74, 1974.

13750

ARTHUR W. GALSTON, Ph.D.

II. SUMMARY OF TESTIMONY

Dr. Galston personally observed the devastation of the Vietnamese countryside on four separate occasions between 1971 and 1982 and will describe those observations by way of pictorial evidence he has available to him, including his own slides of the defoliation of the countryside of Vietnam. More specifically, Dr. Galston visited South Vietnam during the year 1975 for approximately two weeks. He later visited South Vietnam to attend the Ho Chi Minh Symposium in 1983, which lasted one week. However, Dr. Galston remained in Vietnam for an additional week and made several visits to the Ma Da Forest as well as the surrounding countryside in order to evaluate the permanent defoliation and destruction of the Vietnamese countryside more than ten years after the war in Vietnam had ended. In addition, Dr. Galston will discuss the manufacturing processes of 2,4,5-T and 2,4-D and the necessity of developing further refinements on the processes used by industry in order to significantly reduce the imminent dangers to our society from exposure to dioxins and if these manufacturing processes cannot be so refined to eliminate the manufacturing of these chemicals.

V. GROUNDS FOR EACH OPINION

A. General

The bases for the facts and opinions to which Dr. Galston will testify include a review of the applicable medical and scientific literature which is attached to the Expanded Summary (References) previously submitted

to the Court, as well as all articles and publications cited in Dr. Galston's Curriculum Vitae which has been previously submitted to the Court and which will be supplemented below as to any citations then "in press" (relating to IV (1), (2), (3), (4) and (5)); his educational and professional background specifically include his work experience at E.I. Dupont de Nemours with the individual manufacturing processes, and forty years of experience with plant growth substances. See Curriculum Vitae and publications previously attached to Expanded Summary for experience and educational background. In support of Dr. Galston's Opinions IV (1), (2), (3), (4) and (5) in addition to all references previously listed in Dr. Galston's References and Curriculum Vitae, Dr. Galston specifically makes reference to the following citations in support of his five specific opinions:

- a) Baughman, R. & M. Meselson, 1973.
- b) Isensee, et al. 1971.
- c) Kearney, et al. 1972.
- d) Lang, A. ed. 1974.
- e) Leng, M.L., 1972.
- f) Meselson, M., et al. 1978 (Arlington, VA)
- g) Meselson, M., et al. 1972.
- h) Mrak, 1969.
- i) Shadoff, et al. 1979.
- j) Tung, T.T., et al. 1973.
- k) Westing, A.H., 1973.
- l) Whiteside, T., 1977.
- m) Galston, Green Wisdom, Basic Books, Inc., 1981.
- n) Galston, 1980. Herbicides in Academic American Encyclopedia, Arete Publishing Co., Inc., Princeton, NJ.

13752

- o) Galston, 1979; Herbicides: A Mixed Blessing, BioScience 29: 85-90.
- p) Galston, 1979, Plant, People, Politics; BioScience 20-7: 405-410 illus.
- q) Ho Chi Minh Symposium: submitted article which is being sent and will be produced for the defendants.

In addition, Dr. Galston will rely upon his work in connection with the Ho Chi Minh Symposium (which work, while currently in press, will be provided to the defendants, at least the contributions of Dr. Galston which he has recently obtained to "proof"); his knowledge as to TCDD transmission to humans through the food chain by his review of significant scientific and medical literature (additional references and articles are attached and incorporated by reference to the Expanded Summary and listed under IV entitled "Substance of Opinion".) Further, references attached to the previously submitted Summary are reurged at this time, as well as all articles, publications, and presentations of Dr. Galston which are listed in Dr. Galston's Curriculum Vitae.

B. Specific

In addition to the general substance of opinions listed under IV, Dr. Galston's research has involved the studies of chemical and physical plant growth regulatory systems. These include (a) auxins (related to herbicidal compounds); (b) gibberellins; and (c) polyamines. Physical factors included in his research include (a) red light (perceived by phytochromes); (b) blue light (perceived by flavoproteins). He has also studied growth and differentiation in tissue cultures including regeneration from single cells and protoplasts. In his auxin research (related to herbicides), more specifically Dr. Galston has studied the compounds 2,4-D and 2,4,5-T and related phenols and their effect on the activity of plant

13753

LENNART HARDELL, M.D., Ph.D.

Dr. Hardell's personal experience is set forth in "I. Qualifications". He has seen and treated numerous cancer patients, and in particular, has seen and treated approximately 10-15 cases of soft tissue sarcoma per year since 1976.

Dr. Hardell has completed one additional epidemiological study which investigates the relationship of phenoxy herbicides and liver cancer. Dr. Hardell will forward this immediately.^{1/}

Dr. Hardell will forward the medical records^{1/} of the basal cell carcinoma patient referred to in his Summary, if permitted to do so under Swedish law.

Dr. Hardell will forward the copies of the underlying data^{1/} which formed the basis of his various epidemiological studies.

1/
Copies will be supplied to counsel upon receipt.

MAUREEN C. HATCH, Ph.D.

II. SUBJECT MATTER

Pursuant to order of Magistrate Scheindlin, Dr. Hatch will testify at length to the data collected in Vietnam regarding untoward pregnancy outcomes. The data collected in Vietnam were provided to Dr. Hatch for her review at the Ho Chi Minh City Symposium. She will provide the underlying Vietnamese studies which are currently unavailable to the defendants, and this will be incorporated herein and attached to this Supplement for all purposes.

V. FOUNDATIONS FOR EACH OPINION

A. General

Dr. Hatch's review of applicable medical and scientific literature has been attached and incorporated to Dr. Hatch's Expanded Summary and it entails all of Dr. Hatch's own articles which are cited in her curriculum vitae previously submitted, as well as applicable scientific medical literature by others which is likewise included in Dr. Hatch's curriculum vitae; attendance and/or participation at various seminars (please see the curriculum vitae which was previously submitted with Dr. Hatch's summary, these include her attendance and/or participation at various seminars including her presentations of papers). Dr. Hatch has attached copies of her various presentations at conferences to the Supplement. Although these papers were not published, Dr. Hatch presented these papers at the various seminars listed in the Addendum and curriculum vitae previously submitted.

13755

Dr. Hatch will rely on all of her published and nonpublished articles and presentations.

B. Specific

1. Dr. Hatch has attached a copy of Dr. John Constable's and Dr. Maureen Hatch's article which is referred to and which will be relied upon specifically by Dr. Hatch as to this opinion. In addition, Dr. Hatch has attached the data presented by the Vietnamese investigators and reviewed by Dr. Hatch at the Ho Chi Minh Symposium in 1983.

2 (2). As to the opinion and the factual basis for the opinion as listed in IV (b), Dr. Hatch has listed specifically the articles which she will use to testify as to the opinions. Dr. Hatch has requested the article from Peterson which she heard Dr. Peterson present at a scientific conference. However, his manuscript is not prepared at this time and she will supplement this answer with a copy of the manuscript which she has already requested from Dr. Peterson within two weeks.

References Cited

As far as the references cited, all articles which are in press, including the one from Constable, J. and M. Hatch, edited by Westing, is attached to this supplemental summary. As previously discussed, the reference to R. Peterson, Hormonal changes and "wasting" observed in moderately-high-dose animal experiments, presented at the Symposium on Public Health Risks of the Dioxins, Rockefeller University, October 19-20, 1983, this manuscript is being obtained from Dr. Peterson and will be forwarded to all parties within the next two weeks. At this time Dr. Hatch does not have a copy of this article but has merely heard the presentation.

13756

Curriculum Vitae

Dr. Hatch will rely on all of her articles which she has listed in her curriculum vitae, both published and nonpublished, and she has attached for all parties' convenience a copy of presentations which have been reduced to writing which she presented at various scientific conferences and seminars. In addition, Dr. Hatch will rely on one or more of her articles which are cited in her Addendum and her curriculum vitae for the purposes of her trial testimony.

13757

Industry (ICI) Company in Great Britain. With their permission, he has published his findings and these are published in Chapter 2 entitled "Toxicology" of The Chemical Scythe, Lessons of 2,4,5-T and Dioxin, by Alastair Hay, published by Plenum Press in 1982, New York. More detailed chemical studies which Dr. Hay has participated in will be published in an article produced by the American Chemical Society from a conference which was held in August-September of 1983, Proceeding Conferences on Dioxin. A copy of Dr. Hay's own article is currently in press and is being forwarded to plaintiffs to be distributed to all parties in interest as a supplement to this Summary at this time.

In addition, Dr. Hay's curriculum vitae lists his education background and experience, which form the bases of his facts and opinions. He has in addition reviewed the current scientific and medical literature which has been cited specifically in the bibliography attached to The Chemical Scythe. The Chemical Scythe will be relied upon by Dr. Hay, as will the articles and publications in Dr. Hay's curriculum vitae attached to the Expanded Summary previously filed.

B. Specific

Dr. Hay will testify to the grounds which support the above including his knowledge of the spraying of Agent Orange, especially its effect on the Vietnamese countryside which knowledge he has obtained by carefully reviewing the American Association for Advancement of Science studies conducted by Professor Matthew Meselson in 1970, and the National Academy of Science report conducted by the Department of Defense in 1974 and a review of the pertinent scientific and medical literature describing the spraying activities of Agent Orange in Vietnam which bibliography is listed and cited in The Chemical Scythe, supra, and further his own publications as attached to the curriculum vitae previously submitted.

13759

In addition, Dr. Hay's own personal observation of the Vietnamese countryside on his two trips to Vietnam for that specific purpose and his attendance at the Ho Chi Minh Symposium in 1983; the purpose and the historical tracing of the animal studies by Dr. Hay's review of the medical and scientific literature on animal studies are detailed in Dr. Hay's book, The Chemical Scythe; Dr. Hay's review of pertinent scientific and medical literature for his research in preparation of that book, and also review of the medical and scientific literature, including the new Ranch Hand Study recently released by the U.S. Air Force, which has been supplied to Dr. Hay by the plaintiffs; historical tracing of the human data including the industrial accidents since 1974, Hay, A. The Chemical Scythe, Plenum, New York, pp. 95-146. All references to specific documents including the EPA Dioxin document which has been supplied to the defendants in response to the guidelines provided for the plaintiffs' government causation and in preparation for the depositions of the plaintiffs' government causation witnesses and the exact titles of those four documents are as follows:

1. EPA, Research and Development, Health Assessment Document on Dioxin for the Offices of Air Quality, Planning and Standards, prepared by the Environmental Criteria and Assessment Office, Cincinnati, Ohio 45248 (July, 1983).
2. EPA, Research and Development, Health and Environmental Effects, Profile for: Tetra, Penta and Hexachlorodibenzo-p-dioxins, for the Office of Solid Waste and Emergency Response, by the Environmental Criteria and Assessment Office, Cincinnati, Ohio 45248 (June, 1983).
3. EPA, Research and Development, Ambient Water Quality Criteria for 2,3,7,8-TCDD, prepared for Office of Water Regulations and Standards, by the Environmental Criteria and Assessment Office, Cincinnati, Ohio 45248 (July, 1983).
4. EPA, Research and Development, Dioxin, Industrial Environmental Research, Cincinnati, Ohio (1978).

13780

Additional Papers and Participation in
Various Symposia and Scientific Conferences

Dr. Hay is sending all written documents, whether published or nonpublished, to supplement this Summary, including Nos. 2,3,5 and 7, and these will be attached and incorporated by reference to this Supplemental Summary.

13761

RONALD H. KERMAN, Ph.D.

V. GROUNDS FOR EACH OPINION

A. General

Dr. Kerman has been doing a study in Houston, Texas in connection with his work at the University of Texas Medical School, Houston, Texas, with a study known as the Texas Agent Orange Study, which has reviewed the medical histories and records and done testing on Vietnam veterans who are residents of Texas and who have gone to the VA Hospital for treatment. At this time, Dr. Kerman is unable to send his underlying data since the data has been given to the computer for analysis and for confirmation. The underlying data and the final summary and results should be available within two weeks and will be provided immediately to all parties of interest and to the Court just as soon as plaintiffs receive said information from Dr. Kerman.

noted on his curriculum vitae previously supplied. He will review and rely upon all of the available medical records for both Plaintiff Jordan and Plaintiff Ryan.

In addition, Dr. Legator may rely upon the following references:

Bioaccumulation

Matsumura, F. and H.J. Benzet. 1973. Studies on the bioaccumulation and microbial degeneration of 2,3,7,8-tetrachlorodibenzo-p-dioxin. Environ. Health Perspect. 5: 253.

Carcinogenicity

Berry, D.L. et al. 1973. Studies with chlorinated dibenzo-p-dioxins, polybrominated biphenyls, and polychlorinated biphenyls in a two-stage system of mouse skin tumorigenesis: potent anticarcinogenic effects. Ann. N.Y. Acad. Sci. 320: 405.

DiGiovanni, J., A. Viaje, D.L. Berry, T.J. Slaga and M.R. Juchau. 1977. Tumor-initiating ability of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and Arochlor 1254 in the two-stage system of mouse skin carcinogenesis. Bull. Environ. Contam. Toxicol. 18: 552.

DiGiovanni, J., D.L. Berry, M.R. Juchau and T.J. Slaga. 1979b. 2,3,7,8-Tetrachlorodibenzo-p-dioxin: potent anticarcinogenic activity in CD-1 mice. Biochem. Biophys. Res. Comm. 86: 577.

Pitot, H.C., T. Goldsworthy, H.A. Campbell and A. Poland. 1980. Quantitative evaluation of the promotion by 2,3,7,8-tetrachlorodibenzo-p-dioxin of hepatocarcinogenesis from diet nitrosamine. Can. Res. 40: 3616-3620.

Toth, K., S. Somfai-Relle, J. Sugar and J. Bence. 1979. Carcinogenicity of herbicide 2,4,5-trichloro-phenoxyethanol-containing dioxin and of pure dioxin in Swiss mice. Nature 278: 548.

Enzyme Induction

DiGiovanni, J., D.L. Berry, T.J. Slaga, A.H. Jones and M.R. Juchau. 1979a. Effects of pretreatment with TCDD on the capacity of hepatic and extrahepatic mouse tissues to convert procarcinogens to mutagens for S. typhimurium auxotrophs. *Toxicol. Appl. Pharmacol.* 50: 229.

General Toxicology

Grieg, J.B. and F. DeMatteis. 1973. Effects of 2,3,7,8-tetrachloro-dibenzo-p-dioxin on drug metabolism and hepatic microsomes of rats and mice. *Environ. Health Perspect.* 5: 211.

Jones, G. and J.E. Grieg. 1975. Pathological changes in the liver of mice given 2,3,7,8-tetrachlorodibenzo-p-dioxin. *Experientia* 31(11): 1315-1317.

McConnell, E.E., J.A. Moore, J.K. Haseman and M.W. Harris. 1978b. The comparative toxicity of chlorinated dibenzo-p-dioxins in mice and guinea pigs. *Toxicol. Appl. Pharmacol.* 44: 335.

Genetics

Kouri, R.E. and D.W. Hebert. 1977. Genetic regulation of susceptibility to polycyclic hydrocarbon-induced tumors in the mouse. In: Proc. Symp. Origins of Human Cancer. Cold Spring Harbor, N.Y.

Mechanisms of Action

Neal, R.A., P.W. Beatty and T.A. Gasiewicz. 1979. Studies of the mechanisms of toxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). *Ann. N.Y. Acad. Sci.* 320: 204.

Metabolism

Chhabra, R.S. et al. 1974. Selection of inducers as an importance factor in characterizing genetic differences to induction of aryl hydrocarbon hydroxylase in strains of mice. *Life Sci.* 15: 123.

13765

Metabolism (Cont'd)

Guenther, T.M., J.M. Fysh and G.W. Nebert. 1979. 2,3,7,8-Tetrachlorodibenzo-p-dioxin: covalent binding of reactive metabolic intermediates principally to protein in vitro. Pharmacology (19) 1: 12-22.

Lucier, G.W. et al. 1973. TCDD-induced changes in rat liver microsomal enzymes. Environ. Health Perspect. 5: 199.

Youri, R. 1976. Relationship between levels of aryl hydrocarbon hydroxylase activity and susceptibility to 3-methylcholanthrene and benzo(a)-pyrene-induced cancers in inbred strains of mice. In: R.J. Freudenthal and P.W. Jones (eds.), Polynuclear aromatic hydrocarbons: chemistry, metabolism and carcinogenesis. Vol. 1. Raven Press, N.Y. p. 139.

Poland, A.P. and E. Glover. 1973a. Chlorinated dibenzo-p-dioxins: potent inducers of u-Aminolevulinic acid synthetase and aryl hydrocarbon hydroxylase. II. A study of the structure activity relationship. Molecular Pharmacol. 9: 736.

Poland, A.P. and E. Glover. 1973b. 2,3,7,8-Tetrachlorodibenzo-p-dioxin: a potent inducer of u-Aminolevulinic acid synthetase. Science 179: 476.

Poland, A.P. and E. Glover. 1974. Comparison of 2,3,7,8-tetrachlorodibenzo-p-dioxin a potent inducer of aryl hydrocarbon hydroxylase with 3-methylcholanthrene. Mol. Pharmacol. 10: 349.

Poland, A.P. and E. Glover. 1979. An estimate of the maximum in vivo covalent binding of 2,3,7,8-tetrachlorodibenzo-p-dioxin to rat liver protein, ribosomal RNA, and DNA. Cancer Res. 39: 3341.

Poland, A.P. and A. Kende. 1976. 2,3,7,8-tetrachlorodibenzo-p-dioxin: environmental contaminant and molecular probe. Fed. Proc. 35: 2404.

Poland, A.P., D. Smith, G. Metler and P. Possick. 1971. A health survey of workers in a 2,4-D and 2,4,5-T plant. Arch. Environ. Health 22: 316.

Poland, A.P. et al. 1974. Genetic expression of aryl hydrocarbon hydroxylase activity induction of mono-oxygenase activities and cytochrome P-1-450 formation by 2,3,7,8-TCDD in mice genetically. Jour. Biol. Chem. 249: 5599.

13766

Mutagenicity

Greer, S. and F.S. Moreland. 1975. Cytogenetic evaluation of several dioxins in the rat. *Toxicol. Appl. Pharmacol.* 33: 161.

Hussain, S., L. Ehrenberg, G. Lofroth and T. Gejvall. 1972. Mutagenic effects of TCDD on bacterial systems. *Ambio.* 1: 32.

Seiler, J.P. 1973. A survey on the mutagenicity of various pesticides. *Experientia* 20: 622.

Pharmacokinetics and Distribution

Allen, J.R., D.A. Barsotti, J.P. Van Miller, L.J. Abrahamson and J.J. Lauch. 1977. Morphological changes in monkeys consuming a diet containing low levels of TCDD. *Food Cosmet. Toxicol.* 15: 401.

Teratogenicity

Berry, D.L. et al. 1976. Transplacental induction of carcinogen hydroxylating systems with 2,3,7,8-tetrachlorodibenzo-p-dioxin. *Toxicol. Appl. Pharmacol.* 36: 569.

Khera, K.S. and J.A. Ruddick. 1973. Polychlorodibenzo-p-dioxins: prenatal effects and the dominant lethal test in Wistar rats. In: E.D. Blair (ed.), *Chlorodioxins - origins and fate.* *Adv. Chem. Ser.*, No. 120. Am. Chem. Soc., Washington, D.C. p. 70.

Moore, J.A., B.N. Gupta, J.G. Zinkl, J.G. Vos. 1973. Postnatal effects of maternal exposure to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). *Environ. Health Perspect.* 5: 81.

Smith, F.A., B.A. Schwetz and K.D. Nitschke. 1975. Teratogenicity of TCDD in CF-1 mice. *Toxicol. Appl. Pharmacol.* 38: 517.

Sparschu, G.L., F.L. Dunn and V.K. Rowe. 1971. Study of the teratogenicity of TCDD in the rat. *Food Cosmet. Toxicol.* 9: 405.

Courtney, K.D., D.W. Gaylor, M.D. Hogan and H.L. Falk, 1979. Teratogenic evaluation of 2,4,5-T, *Science* 168: 864.

13767

ALAN SCOTT LEVIN, M.D.

II. SUBJECT MATTER

Dr. Levin will discuss clinically, uses of the epidemiologic approach, i.e. clinical epidemiology. Dr. Levin's article which has been previously submitted and the paragraphs which describe the harmful effects that 2,4-D and 2,3,7,8-TCDD, as well as other dioxins, have on the immune system with reference to (1) representative class plaintiffs whom Dr. Levin has tested; (2) non-representative class plaintiffs or Vietnam veterans; and (3) others. Dr. Levin has performed clinical studies on these three general categories of people within his own practice and the underlying data which will form the basis of these opinions are attached and incorporated herein.

IV. SUBSTANCE OF OPINIONS

C. Dr. Levin will use the clinical data which he has provided in response to this supplement to his Expanded Summary to form his opinions related to the causal relationship of the various Agent Orange/dioxin-related adverse health effects upon the individual representative class plaintiffs themselves whom he has individually tested. These documents are attached to this supplement.

V. FOUNDATIONS FOR EACH OPINION

A. General

The basis for such facts and opinions expressed herein by Dr. Levin include his review of the medical and scientific literature, specifically

13768

those documents which Dr. Levin has attached to his curriculum vitae Addendum and the bibliography attached to Dr. Levin's article, which was previously submitted; his personal research and clinical experiences as outlined under II above and IV above, which clinical data is attached and incorporated herein for all purposes; and his personal knowledge of the defoliation of Vietnam; and his review of all pertinent medical data of the representative plaintiffs, particularly with respect to opinion IV C. In this regard, Dr. Levin will have reviewed all medical records and data of the representative plaintiffs which has been submitted to the defendants and which Dr. Levin has reviewed prior to giving his deposition testimony.

Curriculum Vitae - Bibliography References

The reference to Esposito, N.P., T.O. Tiernan and F.E. Dryden, 1980, Dioxins, prepared for Industrial Pollution Control Division, U.S. EPA, Cincinnati, Ohio, Contract Nos. 68-03-2577, 68-03-2659, and 68-03-2579, EPA 600/2-80-197, is the full the cite on the Esposito document referred to be Dr. Levin.

Dr. Levin's full references and any materials he will use which are not published are attached hereto and incorporated herein for all purposes. A summary of his findings on the individual representative class plaintiffs will be furnished and attached to this supplement, as well as his underlying clinical data for such opinions.

PETER ORRIS, M.D.

I. QUALIFICATIONS

Dr. Orris' testimony will be given as a private citizen and not as a NIOSH Medical Officer. Further, the research he is currently involved with in St. Louis concerns truck drivers potentially exposed at trucking terminals in St. Louis, not Times Beach. This work will be explained in detail below.

V. GROUNDS FOR EACH OPINION

A. General

The projects which are described below are still pending and will not serve as a basis for Dr. Orris' opinions.

Dr. Orris' research activities include looking in a qualitative manner at the veterans that he has seen at Cook County Hospital searching for physical indices that would indicate degree of exposure. He has not done this in a systematized approach yet, but it is being considered.

Through the Division of Occupational Medicine at Cook County Hospital, he is cooperating with Local 600 of the International Brotherhood of Teamsters and the Central States' Pension Fund of the Teamsters' Union to review the morbidity experienced between 1976 and 1983 of teamsters potentially exposed to dioxin in 1972 during their employment in and around three trucking terminals in St. Louis, Missouri. These terminals were sprayed in 1972 with an oil containing dioxins in an effort to reduce dust. He will be utilizing the health insurance claims filed with the Central States' Teamster Fund for this group of teamsters and comparing it with

13770

a suitable control group of teamsters not so exposed.

Again, through the Division of Occupational Medicine at Cook County Hospital, he is cooperating with the Wisconsin Veterans Administration and the Woods VA Hospital in Milwaukee, Wisconsin, as well as several Veterans Associations in Wisconsin to evaluate the possibility of utilizing twin pairs in an investigation of Agent Orange exposure. These approximately 61 twin pairs had one member in Vietnam and the other member not serving in Vietnam. The initial stage of this study is the distribution to these twin pairs of a questionnaire prepared at the Division of Occupational Medicine. This questionnaire attempts to assess whether a history of exposure to Agent Orange can be acquired in this manner. It also is an attempt to see whether there are enough twin pairs in which one member has a clear history of exposure to Agent Orange and the other member has no significant confounding exposures in order to determine whether it is feasible to proceed with more in depth health histories and physical evaluations. To restate, this questionnaire is designed to assess whether an exposure history can be illicit and a differential exposure experience determined for these twin pairs. This questionnaire has been prepared and is currently being sent out. It will go only to the State of Wisconsin.

In the National Institute for Occupational Safety and Health, he has been involved in research into exposures of firefighters and others involved in transformer electrical fires. These fires have engendered a possible exposure to dioxins through the fact that the transformers are bathed in oils containing polychlorinated biphenols and chlorinated benzenes. When these substances are burned above 500°, they may produce furans and dioxins. NIOSH (Hazards and Technical Evaluations Branch for which Dr. Orris works) has looked at many of these fires in various areas of the country. He has been involved in St. Paul, Minnesota and Chicago, Illinois.

13771

These as yet are not published.

When evaluating patients for possible TCDD intoxication, Dr. Orris uses certain indices in attempting to reach a diagnosis. A list of these elements is attached.

B. Specific

Acne - The Veterans Administration review entitled "Review of the Literature on Herbicides Including Phenoxy Herbicides and Associated Dioxins, Vol. 1, prepared by JRB Associates for the Veterans Administration under Contract No. V101(93) P-823, dated October, 1981. Additionally, "Esposito", which is the EPA publication entitled "Dioxins" EPA 600/2-80-197, November, 1980 by Esposito, Tiernan and Dryden.

Archives of Environmental Health; "The Development and Prognosis of Chronic Intoxication by Tetrachlorodibenzo-p-dioxin in Men" by Jana Pazderova-Vejlupkova, M.D., et al., Vol. 36, No. 1, January-February, 1981.

British Journal of Industrial Medicine, "Tetrachlorodibenzo Dioxin: A Survey of Subjects Ten Years After Exposure" by G. May in Vol. 39, pp. 128-135, 1982.

Journal of Occupational Medicine, "Mortality Experienced of Employees Exposed to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)" by Ralph R. Cook, et al., Vol. 22, No. 8, August, 1980.

Journal of Occupational Medicine, "The Mortality Experienced of Workers Exposed to Tetrachlorodibenzo Dioxin in a Trichlorophenol Process Accident" by Judith A. Zach and Raymond R. Suskind, in Vol. 22, No. 1, January, 1980.

"Environmental Chloracne Update and Overview", James S. Taylor, Annals of the New York Academy of Science, 1979. (Volume unknown)

Liver Effects - Veterans' Administration review and the Esposito EPA document, as well as:

"Halogenated Biphenyls, Terphenyls, Napthalenes, Dibenzodioxins and Related Products" edited by Renata D. Kimbrough, published 1980, Elsevier/North Holland Biomedical Press, 1980, Amsterdam, New York and Oxford.

"Chemical Porphyria in Man", edited by Strik, J.J.T.W.A. and Koeman, J.H., also Elsevier/North Holland Biomedical Press, 1979, Amsterdam, New York and Oxford.

"Dioxin, Toxicologic and Chemical Aspects", edited by Cattabeni, Flaminio, Cavallaro, Aldo, Galli and Giovanni, published by SP Medical and Scientific Books, New York, London, 1978.

"Chlorinated dioxins and Related Compounds: Impact on the Environment" Proceedings of a Workshop held at Instituto Superiore Disanita, Rome, Italy, 22-24 October, 1980, edited by O. Hutzinger, R.W. Frey, E. Marian and F. Pocchiari, published by Permagon Press, 1982.

"The Development and Prognosis of Chronic Intoxication by Tetrachlorodibenzo-p-dioxin in Men" by Pazderova-Vejlupkova; Archives of Environmental Health, 1981.

"Hepatic Porphyria Induced by 2,3,7,8-tetrachlorodibenzo-p-dioxin in the Mouse" by J.A. Goldstein, et al. in Research Communications in Chemical Pathology and Pharmacology, Vol. 6, No. 3, November, 1973.

Personal communication from Dr. J.J.T.W.A. Strik concerning patients seen at Cook County Hospital, Section of Occupational Medicine, on July 17, 1981 (attached hereto).

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13773

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of Persons Exposed to Dioxin

In the Dioxin Esposito Book and the review of the literature from the Veterans Administration, as well as articles by Dr. Ton That Tung, entitled "The Mutagenicity of Dioxin and its Affects on Reproduction Among Exposed War Veterans" (no date).

"Effets Del'utilisation Massive Et Continue De Defoliantes Sur Lapopulation Civile", Tung, T.T., unpublished work releases by the authors in Hanoi in July 20, 1969; Additionally, Le Probleme Des Effets Mutagenes Sur La Second Generation Apres L'Exposition Aux Herbicides", 1979, and a translation by J. Davidson.

13775

Metabolism of TCDD

Kimbrough's book: Halogenated Biphenyls, Terphenyls, Napthalenes,
Dibenzodioxins and Related Products".

The VA study and Esposito's work.

Lipid Abnormalities

VA review and Esposito

Increased Breaks and Gaps in Other Chromosomal
Abnormalities.

Reference to Esposito, p. 229.

13776

Your reference -
Your letter of -
Our reference 737/81 JH/MV
Date 17 July 1981
Enclosure(s) sev.

Dr. Peter Orris
Section of Occupational
Medicine
Cook County Hospital
1835 W. Harrison Street
Chicago, Ill. 60612
USA

Subject

Dear Dr. Orris,

I appreciate it very much to be contacted on interpretation of urinary porphyrin patterns. In your appendix you mentioned normal values of copro- and uroporphyrin within the mg range. I think this have to be µg. Looking to your data I like to make the following remarks:

Patient no	Total porphyrins (our normal range: 0-200 µg)	COPRO/URO ratio > ~3.5-4.0
1	increased	decreased
2	increased	decreased
5	normal	decreased
9	increased	normal
10	normal	decreased
13	normal	decreased
14	normal	decreased

Important would be to determine the urinary porphyrins seperately e.g. uroporphyrin, heptacarboxylic, hexacarboxylic, pentacarboxylic- and coproporphyrin to establish any increase in the uro- and heptacarboxylic porphyrin. These two porphyrins are indicative for liverdamage caused by porphyrinogenic chemicals. A small increase means a first indication not a real disease state. Therefore I hope you may have the possibility to assess the porphyrin pattern. Because there also might be a possibility of genetically determined porphyria, a family anamnese could be important too. Enclosed you will find some reprints. One is of special value to you. It is on Vietnam veterans from Australia suffering mental disease. In cooperation with the medical doctor we start research on brain effects. Maybe you can comment on this subject?

Kind regards,


Dr. J.J.T.N.A. Strik

13777

June 3, 1981

Dr. J.J.T.W.A. Strick
Department of Toxicology
Agriculture University
Wageningen, Netherlands

Dear Dr. Strick:

I have taken the liberty of writing you today concerning your work on Chronic Hepatic Porphyrria and its relationship with chlorinated polycyclics. During the past year, we have seen a number of Viet Nam veterans here at the Section of Occupational Medicine at Cook County Hospital. Cook County Hospital is a large public hospital situated in Chicago with 1400 beds and 750,000 out-patient visits a year. The Section of Occupational Medicine provides Occupational Consultative Services to patients in the hospital and on an Out-patient bases. Additionally, we have a joint Internal/Occupational Medicine Residency Training program that is currently affiliated with Northwestern University Medical School.

The Viet Nam veterans that we have seen over the past year have come to us with multiple systemic complaints that they believe have been caused by their exposure to 2,3, 7, 8 tetra chloro-dibenzo-para-dioxin, as an impurity in the Herbicide Agent Orange. In the process of researching the literature concerning these toxic exposures, we discovered your book "Chemical Prophyria in Man" published in 1979, and your article in the Annals of the New York Academy of Sciences, Volume 230, June, 1979. On the basis of this information and discussion with others in the field, we decided to secure 24-hour urinary quantitative porphyrins on some of these patients. Our laboratory could only supply us with values for uro-porphyrins and copro-porphyrins. The results are listed in Appendix I.

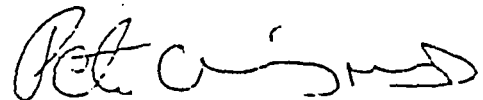
This, of course, is a small cohort, that is self selected, whose exposure is not documented, and whose other exposures are uncontrolled. Despite this we found these results interesting, but wonder what is the range within the normal population. Further, we were unclear as to how much weight can be placed upon abnormal rations with normal quantitative results. We would be interested in your comments on this situation. And further, if you could direct us to the publishing house in the

13778

Dr. J.J.T.W.A. Strick
Department of Toxicology
Agriculture University
Wageningen, Netherlands

United States that carries your book, "Chemical Porphyria
in Man", we should like to order a copy. Thank you very
much for your consideration of this matter. We are looking
forward to your thoughts.

Sincerely,



Peter Orris, M.D., M.P.H.
Attending Physician
Section of Occupational
Medicine
Cook County Hospital

PO:jw

13779

IDENT	QUANTITATIVE PORPHYRINS	URO.	SYMPTOMS	ALCOHOL CONSUMPTION	OTHER CLINICAL ABNORMALITIES
	C-ALA = 2.40 Porpho = 0.3 Copro = 161 Uro = 185	161/185 = .87	Arthralgia Myalgia Malaise Paresthesia	3+	memory loss H/O paranoid schiz. decrease libido HBP rash developed after exp.
	Copro = 84 Uro = 185	84/54 = 1.55	Arthralgia Myalgia Malaise Paresthesia	-	memory loss increase chromosomal damage
	Copro = 128 Uro = 38	128/38 = 3.6	Arthralgia Myalgia Malaise Paresthesia	2+	hospital for mental health infertility polycystic kidney & testies
	DALA = 1.90 PBG = 0.4 Copro = 76 Uro = 18	76/18 = 4.2	Myalgia Malaise Paresthesia	0	anxiety nausea, vomiting polycystic kidneys rash
	DALA = 2.70 Porpho = 0.3 Copro = 46 Uro = 17	46/17 = 2.7	Arthralgia Myalgia Paresthesia	1+	decrease libido tempermental, nervous skin pain, crackling, increase pigment
	DALA = 8.31 PBG = 0.5 Copro = 80 Uro = 7	80/7 = 11.4	Arthralgia Myalgia Paresthesia	0	unable to have children X 2 yrs. vomiting rash
	DALA = 4.77 PBG = 0.8 Copro = 27 Uro = 2	27/2 = 13.5	Arthralgia Malaise	0	S.O.B. (H/O T/B) cystic skin lesions Decrease memory decrease hearing & rash (thigh) turnitis
	DALA = 3.80 PBG = 0.7 Copro = 141 Uro = 8	141/8 = 17.6	Malaise Paresthesia	0	rash ataxia decrease memory

13780

PATIENT NO.	QUANTITATIVE PORPHYRINS	COPRO/URO.	SYMPTOMS	ALCOHOL CONSUMPTION	OTHER CLINICAL ABNORMALITIES
9.	DALA = 3.30 PBG = 0.2 Copro = 379 Uro = 30	379/30 = 12.6	Arthralgia Myalgia Malaise Paresthesia	0	anxiety depression rash photophobia insomnia decrease libido
10.	DALA = 5.50 PBG = 1.1 Copro = 34 Uro = 51	34/51 = .66	Malaise Paresthesia	3+	increase SGOT Liver scan - parenchymatous rash Disc.
11.	DALA = 4.1 PBG = 0.3 Copro = 52 Uro = 11	52/11 = 4.7	Arthralgia Paresthesia Malaise Myalgia	1+	depression skin rash headaches decrease libido anxiety focal prol. glomeru- lonephritis
12.	DALA = 6.00 PBG = 0.6 Copro = 149 Uro = 40	149/40 = 3.7	Arthralgia Myalgia Malaise Paresthesia	3+ 1974; since 0	depression temporal headaches H/O drug O.B. 1969 (several/week)
13.	DALA = 4.50 PBG = 0.6 Copro = 101 Uro = 50	101/50 = 2.0	Malaise	0	lower back pain decrease libido congenital defects in child. hematuria decrease memory
14.	DALA = 11.30 PBG = 1.2 Copro = 104 Uro = 87	104/87 = 1.19	Paresthesia	1+	seizure disorders personality change memory loss headaches depression anxiety rash (scrotal) weight loss

DALA in mg/24 hr. (Normal: 0-7.00)
 Porphobilinogen in mg/24 hr. (Normal: 0.9 - 4.)
 Coproporphyrin in mg/24 hr. (Normal: 50-300)
 Uroporphyrin in mg/24 hr. (Normal: 0-40)

13781

EFFETS CLINIQUES DE L'UTILISATION MASSIVE ET CONTINUE DE

DEFOLIANTS SUR LA POPULATION CIVILE

(ETUDE LIMINAIRE)

(TON THAT TUNG, TRINH KEM ANH, BACH QUOC TUYEN, DAO XUAN TRA, NGUYEN XUAN HUYEN

(HANOI)

Chargés par l'Association Générale des Médecins de la République Démocratique du Vietnam d'enquêter sur les effets cliniques de l'emploi d'herbicides et de défolants sur la population civile, nous avons étudié un groupe d'habitants du Sud Vietnam en exode dans le Nord. De cette liminaire, semblent se dégager certains faits d'une gravité particulière : l'utilisation massive et prolongée d'herbicides et de défolants peut amener des altérations chromosomiques sur la population vivant dans les zones d'épandage, et peut même provoquer des aberrations chromosomiques avec malformations congénitales.

MATÉRIEL D'ETUDE ET METHODES D'EXAMEN

Sur un total de 903 personnes composées d'habitants du Sud Vietnam en exode au Nord et groupés dans les hôpitaux ou dans les centres d'hébergement de Hanoi, nous avons pu isoler un lot de 179 personnes qui ont vécu sur les lieux d'épandage de 2 mois à 5 ans ou qui ont été directement victimes de l'épandage, se répartissant en :

- 90 hommes adultes
- 19 femmes adultes dont 4 mères
- 70 enfants entre 6 et 14 ans

179

L'interrogatoire consiste à recueillir le témoignage visuel d'un épandage par avion, à évaluer le nombre d'épandages sur la région, à préciser les premiers signes cliniques observés par les malades sur eux-mêmes et à estimer les dégâts causés aux hommes et aux animaux. Puis on procède à l'examen général de ces personnes lequel est parfois suivi d'un examen spécialisé (examen oculaire, neurologique, pédiatrique ou génétique).

Bien entendu, avant d'être interrogées, toutes ces personnes ont subi au préalable un examen psychosomatique.

RESULTATS DE L'ENQUETE

On peut distinguer :

1. un tableau clinique des premières heures
2. des effets secondaires

1. Tableau clinique des premières heures

Dès que le brouillard chimique tombe sur le paysage, le malade éprouve des picotements dans les yeux avec larmoiements et rhinorrhée intenses ; une âpre odeur de chlore ou de DDT le saisit à la gorge, pendant qu'une forte sensation de chaleur, semblable à celle du piment monte aux narines. Le patient éternue sans cesse, se met à vomir, tout en se plaignant de céphalée et d'asthénie intense : cette dernière sensation revient très souvent dans les interrogatoires. Tous ces symptômes commencent à s'amender après 24 heures, mais ce n'est seulement qu'après 3 à 4 jours que le malade éprouve une sensation de mieux-être.

D'autres malades accusent un gonflement oedémateux des paupières, des vertiges, des sensations de brûlure sur la peau avec phlyctène.

13782

Voici le tableau des symptômes :

TABLEAU I

Symptômes accusés par les malades au moment de l'épandage	Malades se plaignant de ces symptômes	Pourcentage
Sensation de chaleur, dans le nez, rhinorrhée, éternuement	163	91%
Vomissements, parfois avec diarrhée	130	73%
Sensation de brûlure aux yeux, larmoiements parfois avec œdème des paupières	130	73%
Céphalée, asthénie	125	70%
Sensation de brûlure sur la poitrine, avec parfois érythème et phlyctène	73	41%
Tachycardie avec parfois vertige et syncope	68	38%

En somme , les premiers signes cliniques sont constitués par des signes oculo-nasaux suivis de céphalée , de vomissements accompagnés d'une sensation de malaise, d'asthénie intense laquelle peut se prolonger pendant 3 ou 4 mois avec des larmoiements continuels. Cette asthénie peut rester comme signe dominant dans les mois qui suivent l'agression.

2. Effets secondaires

Les effets secondaires se groupent en 3 syndromes :

- a) un syndrome d'asthénie prolongée
- B) un syndrome oculaire
- c) un syndrome génétique

13783

a) syndrome d'asthénie prolongée : 31 sur 109 adultes, c'est à dire 29,45% des personnes se plaignent d'asthénie généralisée : certaines se sont confinées au lit pendant 2 à 3 mois, mais restent après, incapables d'un effort durable. A cette asthénie, s'ajoutent de l'insomnie, de la céphalée, de l'impuissance sexuelle souvent et des troubles de la menstruation chez la femme.

Une forme atténuée de cette asthénie, c'est l'asthénie visuelle qui affecte 81,3% des victimes de l'épandage. L'épreuve de la lecture est très intéressante. Au début, la lecture semble aisée, mais rapidement le patient se plaint de voir flou puis de fatigue dans les yeux : il abandonne aussitôt la lecture. Sur 43 personnes qui subissent cette épreuve, 23 lisent en moins de 5 minutes, 9 jusqu'à 15 minutes, 7 seulement arrivent jusqu'à 30 minutes. Lorsque la fatigue oculaire survient, les lettres s'élargissent, les lignes se superposent : si le patient persiste dans ses efforts, des larmoiements, de la tension dans la les yeux et de la céphalée apparaissent. Un repos de 5 à 10 minutes lui permet de continuer la lecture toujours dans les mêmes limites.

Dans sa forme la plus grave, elle prend le tableau clinique d'une véritable maladie d'Addison : l'examen clinique ne révèle absolument rien, si ce n'est une extrême adynamie. Seul, l'examen des chromosomes a permis de l'attribuer à une grave intoxication par les défoliants.

Observation 1 Asthénie profonde sur une malade ayant vécu 3 ans dans une zone d'épandage : anomalies marquées des chromosomes à la culture des leucocytes.

TRAN THI TR... 47 ans, soignée à l'Hôpital E pour neurasthénie profonde.

Antécédents : rien à signaler au point de vue familial, mais a séjourné de 1966 à 1968 dans une région qui a été soumise à des épandages quotidiens de défoliants ; de plus, elle a été 3 fois gravement intoxiquée par des gaz (CS probablement) alors qu'elle s'était réfugiée dans un abri souterrain pour échapper aux opérations de ratissage.

Paludisme chronique.

A l'examen, état extrêmement adynamique ; la malade parle peu, à voix basse, ses mouvements sont lents, elle reste depuis de longs mois couchée sur son lit. Elle répond clairement et exactement aux questions.

Tension artérielle : 110/80 ; pouls : 80/m ; respiration : 25/m

Rien à signaler à l'examen du coeur, des poumons et de l'abdomen.

La malade remue très peu les membres du côté droit, mais pas d'atrophie musculaire. Réflexes : normaux. Examen du système nerveux : strictement négatif.

Examens de laboratoire :

Dosage des 17-cétostéroïdes : 4,31 ng/24 heures (20/2/70)

Urée sanguine : 0,40 g/L

N.G. : 3.800.000 GR, 7000 G B

Hémoglobine : 70%

F.L. neutro 59

eosino 3

lympho 36

mono 2

Bordet Wassermann : négatif

Culture des leucocytes (72 h) : taux d'anomalies chromosomiques 7,6% (par rapport au taux 1,14% des témoins).

b) syndrome oculaire : nous avons observé les lésions suivantes :

- asthénie visuelle (vide supra)

- diminution de l'acuité visuelle : l'acuité visuelle est abaissée au-dessous de 10/10 chez 51 malades sur 60 examinés, (78,4%) alors que le groupe témoin des sudvietnamiens ne présente que 26,4% de personnes dont l'acuité visuelle est au-dessous de la normale.

- lésions oculaires : l'examen de la cornée au biomicroscope a révélé des lésions cicatricielles de la cornée dans une très grosse proportion : 24,6% des yeux examinés de 65 personnes. On a détecté :

- des cicatrices superficielles dans la région limbique, surtout dans les secteurs inférieurs et latéraux de la cornée (10 cas)

- des cicatrices sur la zone centrale de la cornée (10 cas)

- 7 pseudo-ptérygions

- 1 ectasie de la cornée

13784

L'examen ophtalmologique a permis de découvrir les aspects suivants :

- névrite optique 1 cas

- névrite optique rétrobulbaire 1 cas

- cataracte 2 cas

- opacification de l'humeur vitrée 2 cas

- dégénérescence maculaire

c) syndrome génétique.

Il consiste en :

- 1/ altérations chromosomiques chez les enfants gravement atteints
- 2/ malformations congénitales revêtant un type connu, pratiquement la trisomie 21
- 3/ malformations congénitales multiples non rattachables avec altérations chromosomiques multiples.

1/ Altérations chromosomiques chez les enfants gravement atteints

Voici l'observation première qui nous a permis de la voie des altérations chromosomiques : sur une fillette née avec des malformations multiples (v.i. observation 4) non rattachables à aucun type connu, la culture des leucocytes nous a révélé ni polyploïdie, ni aneuploïdie, mais des altérations chromosomiques très graves, qu'on retrouve d'ailleurs sur la culture des leucocytes de la mère. Nous avons alors recueilli le sang de 16 personnes :

- un lot de 6 personnes atteintes d'altérations chromosomiques ayant vécu de 2 à 3 ans dans les zones d'épandage pour comparer leurs anomalies à ceux de 2 autres lots ;
- un lot de 5 nordvietnamiens normaux ;
- un lot de 5 sudvietnamiens normaux ;

Ces 16 personnes ont été étudiées soigneusement au point de vue des antécédents hématologique, métabolique, médicamenteux et oncogénologique, pour exclure toute autre cause d'altération chromosomique.

Voici le compte-rendu général de la recherche des anomalies chromosomiques :

Méthodes d'examen :

La culture du sang périphérique a été faite suivant la microtechnique de Lejeune. Incubation : 72 h à 37° C. Blocage des cellules en métaphase avec de la Colchicine à 0,04%. Les mitoses ont été sélectionnées du petit grossissement (x 100). Toute anomalie est réparée et contrôlée par deux spécialistes. Les anomalies sont comptées et photographiées sous immersion (x 1000). Les études caryotypiques ont été faites sur documents photographiques. Pour chaque malade, dont le diagnostic est complètement caché, on a compté 100 mitoses et analysé 300 cellules. 1600 cellules des témoins ont été analysées.

Les caryotypes sont dressés suivant la classification de Denver (1960). Les anomalies sont classées en anomalies chromatidiennes et anomalies chromosomiques. Sont comptées aussi comme cassures chromosomiques les images en ring, les dicentriques, les fragments et les translocations. Les anomalies : ring, échange, translocation sont multipliées par deux. Nous ne mentionnons pas les anomalies suspectes comme les fusions télomériques ou les images non identifiables.

Résultats

Voici les résultats : sur 1500 cellules observées des témoins, nous relevons un taux d'anomalies de 1,14 pour 100 cellules ; pour 1500 cellules des témoins, il n'existe aucune cassure chromosomique et seulement 0,4 pour 100 cellules de cassures chromatidiennes ; pour 1600 cellules des victimes de l'épandage, nous comptons un taux d'anomalies de 5,88 pour 100 cellules. La différence du taux d'anomalies chez les témoins et chez les victimes des épandages a été trouvée très significative, $t > 2,58$ avec $p < 0,01$

(cf. tableau II)

13785

2) anomalies chromosomiques du type connu avec malformations congénitales

Les anomalies chromosomiques relèvent du type connu sous le nom de Trisomie 21. En plus de cette trisomie, il existe encore des altérations structurales atteignant le taux de 11,66% pour la première observation et de 19% pour la 2ème observation. Parmi ces altérations, la cassure chromosomique a été de 3,33 pour 100 cellules dans les 2 cas, ce qui est, comme nous le savons, un signe très sûr d'altérations chromosomiques d'après Dubinin (1) (1962), Bender et Gooch (2) (1962), Wong Ai Chi et Chou Shing Ting (3) (1964)

Examen neuropsychique : (3 Novembre 1970) par le Dr DANG DINH HUAN.

Retard de croissance (81 cm à 34 mois). Malformations du massif crânio-facial : crâne élargi en arrière, bosses pariétales proéminentes, fontanelle bréguimatique encore existante à 34 mois.

Bras et doigts relativement courts, surtout le 5ème doigt des deux côtés.

Hypotonie musculaire très prononcée : peut toucher sa tête avec ses pieds. Laxité

exagérée des articulations : on peut étendre les pieds jusqu'à faire toucher

la crête tibiale avec les orteils. Strabisme interne à gauche. Mouvements nystagmoïdes horizontaux vers la droite. Ne peut marcher seule : fait des pas en horizontal en s'appuyant le long du lit.

Au point de vue psychique : retard général, degré prononcé d'oligophrénie.

Exécute avec lenteur certains ordres simples et habituels. : ouvrir la bouche, tirer la langue, lever les bras, etc... mais ne peut exécuter un ordre plus compliqué comme tendre un objet à sa mère. Tendance aux mouvements d'imitation et à la persévération. Faculté de langage extrêmement limitée.

Culture des lymphocytes (Dr BACH QUOC TUYEN) : trisomie 21. Altérations chromosomiques : 19% (cf. tableau III)

3) Malformations congénitales multiples avec altérations chromosomiques sur l'enfant et sur la mère

L'observation suivante est extrêmement intéressante : une fillette âgée de 17 mois est porteuse de malformations multiples : bosses frontales accentuées méplat occipital, rétrécissement bilatéral des canaux lacrymo-nasaux, pouce en spatule, pied valgus, orteil surnuméraire et en syndactylie avec le 5ème orteil gauche. La culture des leucocytes nous a révélé des altérations structurales importantes qu'on retrouve sur la mère, mais non sur le frère et la soeur de l'enfant qui sont nés avant l'épandage et qui ont toujours vécu loin de cette zone.

Observation 4 : Malformations multiples et anomalies chromosomiques

L'enfant HOANG THI H..., de sexe féminin et âgée de 17 mois, a été examinée le 20 Octobre 1970 pour déformations multiples : bosses frontales exagérées, méplat occipital, malformation des pavillons ; aux 2 pouces, la 2ème phalange est aplatie en spatule, les pieds sont en valgus avec des orteils relativement longs, le 2ème orteil écourté et le 5ème orteil gauche épaissi et bifide.

L'apparition d'une dacryocystite suppurée 15 jours et 3 mois après la naissance a permis de découvrir encore un rétrécissement congénital bilatéral des canaux lacrymo-nasaux.

Antécédents : La mère âgée de 38 ans est mariée jeune à 19 ans: elle a eu, avant, 2 enfants normaux et bien portants : un garçon actuellement âgé de 15 ans et une fille âgée de 17 ans. Elle a vécu pendant un an dans une zone frontalière de la province de QUANG TRI (au nord de CAM LO) : cette région a été soumise tout d'abord à un épandage sporadique de défoliants, une fois tous les deux mois environ, mais dès la seconde moitié de l'année, l'épandage s'est intensifié au rythme de 1 à 3 épandages par jour. Elle a été directement atteinte par l'épandage deux fois, avec les symptômes d'irritation oculo-nasale déjà signalés ; elle a noté même la perte d'une partie de sa chevelure après chaque atteinte. Elle buvait de l'eau de source de la région durant toute l'année. Elle n'a pas eu de rubéole au cours de sa 3ème grossesse.

Dermatoglyphes : rien d'anormal

radiographie du pied gauche (Dr HOANG SU) : 6ème orteil surnuméraire et en syndactylie avec le 5ème.

Examen neurologique (Dr NGUYEN QUOC ANH) : à 17 mois, le retard du développement psychomoteur est considérable. Léger ptosis. Limitation du regard vers le haut avec tendance à l'aspect dit en "coucher de soleil".

13786

Observation 2 : Microcéphalie avec état décérébré et trisomie 21

L'enfant NGUYEN THI T... de sexe féminin, âgé de 10 mois, présente une microcéphalie avec, depuis sa naissance des accès de contracture en extension.

Antécédents : La mère TRAN THI C... âgée de 23 ans et mariée à 22 ans a vécu pendant 2 mois, de Mars 1969 à Mai 1969 dans une région montagneuse de la province de Quang Tri-Thua Thien qui a été soumise à des épandages quotidiens par l'aviation américaine. Un matin, à 9 heures, elle fut le témoin d'un épandage direct sur sa région. Au moment où un trouillard blanc tombait sur les arbres, elle ressentit des irritations dans les yeux et dans le nez, avec des larmoiements et rhinorrhée intenses : elle se mit à vomir et ressentit une vive lassitude. Ces symptômes diminuèrent dans la soirée et elle se trouva bien portant 3 à 4 jours après. La région où elle habitait avait été déjà soumise à un épandage intensif depuis 3 à 4 mois, mais à partir de ce matin-là, l'épandage devint journalier. Elle se servait de l'eau de la source qui était près de sa maison, mais ne touchait pas aux tubercules de la région.

En Mai 1969, elle s'enfuit au Nord Vietnam et le 9 Décembre 1969, accoucha avant terme d'une enfant pesant 2,300 kg à la naissance.

A l'examen, l'enfant de sexe féminin âgée de 10 mois présente une microcéphalie typique, un front court et des oreilles implantées normalement, mais avec une conque hypertrophiée et un conduit auditif externe plutôt large. Main gauche : pli palmaire transverse unique, boucles digitales normales, triradius axial en position t' sur les deux mains (intermédiaire entre le centre de la main et la position T);

Examen neurologique (25 Octobre 1970) par le Dr NGUYEN QUOC ANH. Microcéphalie manifeste. Attitude de décérébration : opisthotonos, extension des 4 membres, membres inférieurs en ciseaux. Activité spontanée et réactivité presque nulles. Vie uniquement végétative, d'ailleurs mal assurée : respiration bruyante avec tirage sus-sternal. Pas de signes typiques de la maladie de Down.

Culture des leucocytes (Dr BACH QUOC TUYEN) pendant 72 heures suivant la technique de Lejeune. Trisomie 21 caractéristique avec mosaïque 46,47 ; prédominance 47.

Anomalies chromosomiques : 11,66% des cellules (cf. tableau III)

Observation III : Trisomie 21 typique chez une enfant de 3 ans née dans la zone d'épandage

L'enfant HOANG THI THU TH... 3 ans a été examinée par nous le 2 Novembre 1970 : son profil est typique d'une trisomie 21 (épicanthus bilatéral, écartement des yeux, écrasement de la racine du nez, bouche entr'ouverte en V inversé, langue en saillie hors de la bouche).

Père né en 1922, mère en 1930 : le père est l'aîné d'une lignée de 5 garçons et 4 filles, la mère est sa soeur cadette d'une lignée de 2 filles.

Pas d'altérations dans les dermatoglyphes, sauf un pli palmaire transverse unique à gauche avec le triradius axial en t' ; les boucles digitales sont normales. L'examen révèle une laxité ligamentaire avec hypotonie musculaire très marquée aux membres. Retard psychomoteur important. Phonation défectueuse.

L'anamnèse révèle que les parents ont vécu dans une zone de la province de QUANG NAM de 1964 à 1970. Cette région a été soumise à des épandages continus de défoliants presque quotidiens, de 1966 à 1970 : personnellement, elle n'a pas accusé de syndrome ocula-nasal par attaque directe, mais elle s'est nourrie de tubercules détérrés après chaque épandage et même de riz atteint par les défoliants pendant une période assez longue : 4 ans. L'enfant est née dans cette zone le 7 Décembre 1967. 1378

Culture des leucocytes (Dr BACH QUOC TUYEN) Nombreuses anomalies chromosomiques : 13 % (cf. Tableau III)

La culture des leucocytes de la mère révèle les mêmes altérations chromosomiques : 7,33% (cf. Tableau III)

Le caryotype du frère et de la soeur de cette enfant, nés avant l'épandage et vivant loin de la zone d'épandage est absolument normal.

D I S C U S S I O N

Nous avons à répondre à ces 4 questions :

1. Les défolants en l'espèce le 2,4,5-T peuvent-ils provoquer des lésions oculaires ?
2. Les défolants peuvent-ils provoquer un syndrome d'asthénie prolongée ?
3. Les défolants peuvent-ils provoquer des anomalies congénitales ?
4. Les défolants peuvent-ils provoquer des altérations chromosomiques ?

DEFOLIANTS ET LESIONS OCULAIRES

Cliniquement les lésions du segment antérieur de l'oeil (lésions cornéennes) sont constatées sur les personnes examinées dans une proportion anormalement élevée ; toutes ces dernières ont signalé le tableau oculo-nasal des premières heures de l'épandage. Comme ces lésions paraissent être dues aux gouttelettes de défolants condensées sur la conjonctive et la cornée, nous avons procédé aux instillations oculaires sur les animaux. Expérimentalement, sur l'oeil des lapins, l'un de nous (4) a reproduit les lésions cliniques observées sur l'homme, par instillations de Selest (Mélange de 2,4-D et de 2,4,5-T) et de Tordon 22 K (4, amine 3,5,6 acide picolinique) :

a) le Selest provoque sur la cornée et la conjonctive des brûlures du 2ème et du 3ème degré qui peuvent guérir ; mais elles peuvent aussi provoquer des brûlures du 3ème et du 4ème degré (classification de Poliak) avec, comme conséquences des opacifications de la cornée, des perforations cornéennes ou des atrophies oculaires.

b) Le Tordon 22 K provoque sur la cornée et la conjonctive du lapin des brûlures du 2ème et du 3ème degré de moindre gravité mais sur une plus large étendue.

DEFOLIANTS ET SYNDROME ASTHENIQUE

Ce syndrome asthénique bizarre si prolongé qui nous a tant intrigués, peut-il être attribué à l'usage de défolants ?

Rappelons d'abord que cette asthénie a été signalée sur les travailleurs des usines fabriquant le 2,4,5-T (5) . Vers 1960, la Compagnie Dow a été obligée de fermer ses succursales à Michigan parce que 60 ouvriers contractèrent une maladie caractérisée par des éruptions cutanées et des désordres du système nerveux central : fatigue chronique, lassitude et dépression. Les ouvriers d'une autre Compagnie à New Jersey présentèrent les mêmes symptômes, mais cette asthénie s'observait encore chez quelques-uns 6 ans après. Depuis 1960, les médecins de la RFA ont signalé la même maladie chez des ouvriers travaillant le 2,4,5 T avec atteinte du foie, désordres mentaux et nerveux, dépression, perte du poids et de l'appétit et impuissance sexuelle.

Rappelons encore que la dose létale LD50 Rat (dose en kg/poids capable de tuer la moitié des rats d'expérimentation) est d'environ 400 mg pour le 2,4,5-T. D'après Drill et Hiratzka (6) (1953), l'absorption de fortes doses de ce produit provoque chez le chien des lésions musculaires.

Nous pouvons conclure : plutôt qu'une intoxication massive, une intoxication lente de l'organisme par l'absorption de la boisson contenant le 2,4,5-T provenant des épandages continus peut entraîner une asthénie prolongée. Chez de tels malades, on peut détecter le stigmate permettant de retrouver la maladie causale : ce sont les anomalies chromosomiques à la culture des leucocytes (cf. table 112).

DEFOLIANTS ET AGENTS TYPATOGENES

1) 2,4,5-T ET DIOXINES

Les défoliants et herbicides utilisés au Vietnam sont variés : mais l'attention du monde médical est attirée en particulier sur le 2,4,5-T qui a été épandu, d'après Jackie Verratt (7) au moins sur 5 millions d'acres en 9 ans.

Le 2,4,5-T ou acide acétique 2,4,5-trichloro-benzoyde se différencie du 2,4-D auquel il est très souvent associé par la présence de chlore supplémentaire : la plupart du temps, ces deux produits sont mélangés dans des formules ayant pour base le pétrole ou l'huile Diésel. Les parties actives du 2,4-D et du 2,4,5-T sont les parties actives de l'agent-orange utilisé au Vietnam.

Le premier rapport connu sur les effets du 2,4,5-T est celui de Bionetics Research Laboratories (8). Voici les résultats :

Le 2,4,5-T est donné par la voie orale aux souris BL6 aux doses de 46,6 et 113 mg/kg et aux souris AKR à la dose de 46,6 mg/kg ; il a été aussi administré aux souris BL6 aux doses de 21,5 mg/kg par voie orale et aux AKR souris, de même qu'aux hybrides BL6AK à la dose de 113 mg/kg par la voie sous-cutanée, en injections. L'administration de la drogue a été effectuée pendant 3 jours dans la plupart des cas (du 6ème jour au 8ème jour de la gestation) ; pendant 9 jours, dans quelques cas (du 6ème au 14ème jour) et pendant 5 jours (du 10ème au 14ème jour) dans un cas. La voie sous-cutanée utilise comme véhicule le DMSO : pour la voie orale, c'est le miel.

A l'exception de la dose la plus basse (21,5 mg/kg aux souris BL6 par voie sous-cutanée) toutes les autres doses, quelle que soit la voie utilisée, ont provoqué une incidence élevée de foetus anormaux. L'apparition d'une fivision palatine est très fréquente, à la dose de 113 mg/kg elle est nulle à des doses plus faibles. Le taux d'apparition des reins kystiques est aussi élevé, exception faite pour les souches AKR et les souris BL6 recevant 46,4 mg/kg par voie orale. La mortalité foetale est augmentée dans tous les groupes recevant 113 mg/kg pendant 3 à 9 jours, sauf pour la souris BL6 recevant cette même dose, mais une dose plus faible (46,4 mg/kg par voie orale et 21,5 mg/kg par voie sous-cutanée).

Une étude similaire a été faite sur le rat de souche Sprague-Dawley. Avec des doses de 21,5 et 46,4 mg/kg en suspension dans 50% de miel, et administrées par la voie orale, du 6ème jour au 15ème jour de la gestation, on a observé un taux excessif de mortalité foetale et une incidence élevée de malformations chez les survivants. Fait digne de remarque, avec la plus faible dose (4,6 mg/kg) et avec la plus courte durée des injections, l'incidence des foetus anormaux a été trois fois plus grande chez les animaux d'expérience que chez les témoins.

Comme le 2,4,5-T est mélangé à des impuretés, comme les dioxines, on a étudié aussi ces dernières. A la Conférence FDA (24 Février 1970) on a trouvé qu'avec 1 dose de dioxines de 9,1 µg/kg/jour, sur les hamsters en gestation, la mortalité foetale a été de 82% et les anomalies foetales de 82% à la dose de 0,5 µg/kg, l'incidence des anomalies a été de 5% (9).

13789

D'autre part, avec le 2,4,5 T purifié, ses effets tératogènes ont été confirmés sur la souris Swiss-Webster et sur le hamster par les NIEHS Studies et les FDA Studies.

II) VOIE DE CONTAMINATION ET DOSE MINIMALE TÉRATOGENE

Par quelle voie a pu se faire la contamination de la femme gestante et à quelle dose les effets tératogènes peuvent-ils se manifester ?

Il ne semble pas que ce soit par une voie directe (voie lacrymo-nasale, voie respiratoire) ; il semble plutôt que ce soit par l'eau des sources polluée par les épandages continus qui soit le véhicule de l'intoxication.

D'autre part, il faut signaler que le 2,4,5-T peut persister dans le sol pendant un certain temps : Miller et Berg (11) affirment qu'à la dose de 0,25 à 8 livres par acre, il peut persister pendant 4 à 6 mois ; De Rose (12) donne un maximum de 6 mois.

Whiteside (13) a calculé qu'en tenant compte des doses employées par acre au Vietnam, une vietnamienne de 40 kg buvant 2 litres d'eau contaminée, absorbe 120 mg de 2,4,5-T par jour soit 3 mg par kg de poids. Avec le 2,4,5-T pollué de dioxines, ce qui est la règle, le taux de dioxines absorbées est de 1/10 de microgramme par jour.

Une telle dose peut-elle être tératogène ? Il est difficile de transposer les doses observées chez les animaux d'expérimentation à l'homme. Heureusement l'expérience de la thalidomide nous a permis de comparer la sensibilité de la race humaine à celle des animaux. Avec la thalidomide, la dose tératogène la plus basse a été estimée à 0,5 mg/kg/jour. Pour la même action, cette dose a été estimée à :

30 mg chez la souris
50 mg chez le rat
100 mg chez le chien
350 mg chez le hamster (hamster) (14)

On peut donc dire que la femme est sensible à l'effet tératogène :

60 fois plus que la souris
100 fois plus que le rat
200 fois plus que le chien
700 fois plus que le hamster

En supposant que la femme soit aussi sensible au 2,4,5-T qu'à la Thalidomide (ce qui est très possible), on peut chercher à calculer la dose minimale tératogène chez la femme sachant que celle-ci est sensible à cet effet 100 fois plus que le rat : en nous reportant aux expériences sur le rat de la souche Sprague-Dowley, la dose tératogène la plus faible étant de 4,6 mg/kg, la dose minimale tératogène chez la femme serait de l'ordre de $\frac{4,6}{100} = 0,046$ mg/kg.

D'après Whiteside, la dose absorbée par une vietnamienne de 40 kg e, buvant de l'eau polluée est de 3 mg/kg, c'est à dire 60 fois supérieure à la dose présumée tératogène. Si les épandages sont quotidiens sur une région, les chances pour une jeune femme gestante de concevoir un fœtus anormal ont extrêmement fortes.

Supposons maintenant que l'effet tératogène soit du aux dioxines : comme la femme doit en absorber par jour 1/10 de microgramme par l'eau polluée (Whiteside) ; ce médicament s'accumulerait dans l'organisme comme tous les hydrocarbures chlorinés et finirait par atteindre le seuil tératogène ; et comme les épandages sont quotidiens, les chances pour elle de concevoir un enfant anormal sont également très fortes.

Donc pour que la dose de d'effliant soit tératogène, il faut qu'elle atteigne un seuil qui n'a pu être précisé comme avec la thalidomide, mais ce seuil peut être franchi :

- soit par sensibilité marquée de l'organisme humain au 2,4,5-T ou aux dioxines
- soit par utilisation de dose massive
- soit par accumulation dans l'organisme.

13790

III) VALEUR DES EXPERIENCES ANIMALES ET LES TESTS TERATOGENES-

Une des plus grosses difficultés d'appréhension réside dans la sensibilité variable d'une espèce à l'autre vis à vis d'un médicament tératogène : par exemple, la thalidomide dangereuse pour le lapin ne provoque aucune malformation chez le rat. Néanmoins, si l'expérimentation est positive sur plusieurs espèces, au moins sur trois, il faut lui accorder une extrême attention, surtout si ces espèces sont des rongeurs. On sait qu'il n'existe pas de différences fondamentales entre les réactions de l'embryon humain et celui des rongeurs (15).

IV) ACTION FOETICIDE CHEZ LA FEMME

Ici, l'épreuve clinique peut être décisive. On a pu relever :

1) une action abortive : de l'interrogatoire des victimes de l'épandage, nous avons dégagé des faits assez troublants pour attirer l'attention médicale sur la susceptibilité du matériel génétique humaine aux défoliants :

a/ après les épandages dans les jours qui suivent, il y a eu un nombre anormal d'avortements humains : par exemple, dans les districts de LONG DIEN et d'AN TRACH (5ème zone), sur 73 femmes ayant manifesté des signes d'atteinte oculonasale, il y a eu 22 avortements (épandage du mois de Mai 1966).

b/ on a observé aussi des avortements sur les animaux domestiques :

- dans le district d'AN NGHIA (5ème zone) après l'épandage (Mars 1966) 7 vaches ont avorté (dans ce même district on a signalé aussi que toutes les poules après l'épandage ont cessé de pondre)

- dans les districts de LONG DIEN et d'AN TRACH, après l'épandage du mois de Mai 1966, 63 bufflonnes et 92 truies ont avorté.

2) une fréquence accrue des avortements molaires : dans les zones d'épandage, il a été signalé une fréquence anormale d'avortements molaire. Ce fait doit nous inquiéter si l'on se rappelle que le placenta de triploïdie montre même macroscopiquement, dans la majorité des cas, un aspect vésiculaire, submolaire, intéressant une partie ou la totalité des villosités (Philippe et Boue) (16). Une aberration chromosomique par ingestion de 2,4,5-T au début de la gestation peut être à l'origine de ces avortements molaire.

DEFOLIANTS ET TRISOMIE 21

Nous avons observé deux cas de trisomie 21 sur 2 sudvietnamiennes ayant vécu dans les zones d'épandage : l'une d'elles a même accusé des signes immédiats d'agression oculonasale à la suite de l'un de ces épandages.

On sait que la Trisomie 21 est la conséquence d'une erreur dans la séparation des chromosomes homologues, erreur qui a été attribuée au vieillissement maternel. Mais cette trisomie peut se voir aussi dans les suites de radiation ou de prise de médicaments toxiques et l'on sait que le produit nocif peut agir sur l'organogénèse entre la 2ème et la 7ème semaine de la gestation.

Voici les anomalies que nous avons constatées sur l'examen de nos trisomiques :

1) la jeunesse de la mère dans le 1er cas : on sait que la trisomie 21 survient surtout chez les derniers-nés d'une famille nombreuse, par conséquent le plus souvent chez la mère âgée. D'après Carter (17) et Penrose (18), Turpin et Lejeune (19) ceux-ci estiment qu'avant l'âge de 30 ans, le risque est de l'ordre de 1/2000 ; à 35 ans, il s'élève à 4/1000 pour atteindre une valeur de l'ordre de 2% passé l'âge de 45 ans. Les deux mères de nos trisomiques ont respectivement, au moment de la naissance de leur enfant : 22 ans (Observation 1) et 37 ans (Observation 3).

2) La trisomie 21 dans le premier cas n'est pas pure : elle est encore associée à une microcéphalie.

13791

3) Les 2 trisémiques ne présentent aucune altération des dermatoglyphes sur les doigts ; seul, le pli palmaire transverse unique a été constaté sur l'une des mains, dans les deux cas.

4) la trop grande fréquence de cette trisémie sur une si faible population de mères. On sait que la trisomie 21 survient avec une fréquence située entre 1/600 et 1/700 naissances, alors que sur notre faible lot, elle a été de 2/4 naissances.

5) enfin, ce qui permet d'affirmer que ces trisémies 21 relèvent d'une intoxication médicamenteuse, c'est qu'à côté de cette trisémie, nous avons relevé des anomalies chromosomiques structurales d'une haute gravité :

- chez la première enfant, il y a 3,33/100 cellules de cassures chromosomiques.
- chez la seconde enfant, il y a 3,33/100 cellules de cassures chromosomiques

C'est à dire près de 6 fois de plus que chez les survivants d'Hiroshima (0,55/100 cellules de cassure chromosomique, d'après Bloom et Al (20).

DEFOLIANTS ET AUTRES MALFORMATIONS CONGENITALES

L'observation 4 révèle l'existence de multiples anomalies (crâne, canal lacrymal, membres) sur une enfant associée à des anomalies structurales des chromosomes qu'on retrouve d'ailleurs sur la mère (13% chez l'enfant et 7,33% chez la mère). Ceci nous permet de supposer que la mère et l'enfant probablement ont été soumises à de multiples agressions par des substances chimiques au moment de la gestation, l'embryon s'étant révélé comme plus sensible que l'adulte aux altérations chromosomiques.

DEFOLIANTS ET ALTERATIONS CHROMOSOMIQUES

On sait que les substances chimiques peuvent provoquer des aberrations chromosomiques. Darlington et Keller (21) (1947) ont, les premiers décrit les altérations chromosomiques provoquées par les moutardes à l'azote sur Tradescantia, ce qui ouvrit la voie aux études sur les altérations chromosomiques provoquées par les médicaments anticancéreux (22,23,24) et par les substances chimiques dont la liste a été établie par Stahl et Luciani (25) . Puis ce fut la tragédie de la thalidomide et les révélations sur le LSD 25 (26,27,28).

Nous croyons que nous sommes les premiers à signaler les aberrations chromosomiques par les déficients.

Nous pouvons soutenir que l'altération des chromosomes a joué un rôle néfaste au cours de la gestation :

1) ce sont les altérations chromosomiques qui ont été responsables des avortements multiples chez la femme et l'animal, d'après les travaux de Carr (29), repris récemment par les auteurs français (Boué et Boué) (30), Philippe et Boué (16), Roux (31).

2) ce sont les altérations chromosomiques de l'embryon au début de son développement qui ont créé les anomalies congénitales, du type rapporté dans l'observation 4.

3) Les défolants (du type 2,4,5-T) ou dioxines) sont inducteurs à la fois d'altérations chromosomiques et de tératogénèse , et ces faits ont été amplement prouvés par l'expérimentation et nos observations cliniques.

13792

Quel sera l'avenir d'une population dont la vie a été remaniée par de tels bouleversements écologiques, qui n'épargnent même pas, tout comme dans la guerre atomique, le patrimoine chromosomique humain ? Le cancer, en particulier

les leucémies et les monstruosités (13) seront certainement les dangers les plus graves à attendre. A l'heure actuelle, par l'altération de leurs chromosomes, il existe deux populations qui semblent partager le même sort tragique : la population survivante d'Hiroshima et de Nagasaki et les victimes des zones d'épandage de défoliants au Sud-Vietnam.

En conclusion,

l'utilisation massive et prolongée des défoliants, en dehors des lésions oculaires permanentes peut amener des altérations chromosomiques de toute une population obligée de s'accrocher au sol ancestral, et ces altérations peuvent provoquer dans sa descendance des malformations congénitales dont l'importance reste à préciser.

Dans l'histoire abominable des guerres, n'a-t-on jamais vu sort aussi inhumain réservé aux survivants sinon avec la guerre atomique ?

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FREQUENCES PSYCHOPATHOLOGES CHRONIQUES CHEZ LES DIVERS GROUPES EXAMINES

TABLEAU II

GROUPE S.	Description	NOMBRE DE Sujets	NOMBRE DE CHRONIQUES					
			< 44	45	46	47	48 <	
I	Témoins normaux	100	2	3	95			
II	Témoins ayant vécu au Sud-Vietnam mais pas encore victimes d'épandages	HOANG THI S.	100	3	1	96		
		HOANG THI LO.	100	4	2	94		
		HOANG THUC A.	100	1	6	93		
III	Victimes d'épandages sans séquelles apparentes.	VO THI QUANG H.	100	3	6	91		
		PHAM XUAN P.	100	11	12	77		
		HOANG THI L.	100	7	8	84	1	
IV	Victimes d'épandages avec séquelles importantes : asthénie, lésions oculaires	TRAN THI TR.	100	3	8	89	1	
		DINH HONG M.	100	3	5	92		
		NGUYEN VAN O.	100	3	8	87	2	
V	Enfants nés de mères victimes d'épandages	DOANG THI THU T.	100	4	6	21	69	
		NGUYEN THI T.	100	3		5	89	1
		HOANG THI H.	100	3		93	2	

PROTOCOLE D'EXAMEN CHIMIQUE

Le 15 Juillet 1969 à 9 heures du matin, trois avions C 123 ont répandu des toxiques chimiques sur la partie occidentale du district de HUONG THUY, Province de THUA THIEN.

Les produits toxiques ont détruit 300 hectares de terres cultivées (céréales, légumes, arbres fruitiers ...)

Près de 100 personnes ont été intoxiquées avec les symptômes : céphalée, fièvre, vomissements...

- les produits toxiques, de couleur brune pâle, tombent en fines gouttelettes et recouvrent entièrement les feuilles et la surface de la terre

- nous avons prélevé sur les feuilles ces gouttelettes à des fins analytiques

Divers essais chimiques ont été effectués :

1. avec le réactif au bromure mercurique ($HgBr_2$) : résultat négatif
2. avec le réactif à l'acide chromotropique en milieu sulfurique : résultat positif (apparition d'une coloration rose violette).
3. avec le réactif au Rhodamine B : résultat positif (apparition d'une coloration rouge).
4. par chromatographie sur couches minces :
 - sur couche de silicagel G
 - avec le système de solvants : chloroforme, acide acétique (dans le rapport 19 : 1)
 - les substances de référence : n. butyl ester du 2,4 D
n. butyl ester du 2,4,5 T
 - révélateur : vapeur d'iode

RESULTATS

- apparition de taches violettes
- les échantillons et les substances de référence ont le même Rf (rapport frontal)

CONCLUSIONS

Nous basant sur l'action nocive sur les arbres cultivés, et sur les résultats des examens de laboratoire, nous concluons que les produits chimiques répandus par les avions américains sur HUONG THUY sont les esters n. butyliniques du 2,4 D et du 2,4,5 T.

20 Juillet 1969

L'expert chimiste responsable,

HUYNH VAN BA

13795

HISTORY

Characteristic

Definitive History of exposure to a known quantity of TCDD

Definite History of exposure to a substance containing TCDD but quantity unknown.

Definite History of exposure to a substance possibly containing contamination.

History of possible exposure to a substance with TCDD present.

CLINICAL

Acne beginning within three months of exposure and no prior history of acne.

Acne beginning within six months of exposure and no prior history of acne.

Acne beginning within six months of exposure with a prior history of acne within the last ten years.

Hepatitis occurring within three months of exposure without other probable etiology.

Porphyria Cutanea Tarda occurring within three months of exposure without other probable etiology.

Chronic hepatic porphyria occurring within three months of exposure without other probable etiology.

Peripheral neuropathy occurring within three months of exposure without other probable etiology.

Acute neuropsychiatric disorder within 30 days of exposure.

Soft tissue sarcoma

Lymphoma

Gastric carcinoma

Cancer of any organ system in the absence of significant confounding carcinogenic risk factors.

Multiple spontaneous abortions in female exposed

Congenital defects in multiple offsprings of male or female exposed without other probable etiology or chromosomal abnormality.

Characteristic

Multiple spontaneous abortions in female partner of male exposed.

High levels of TCDD found in Fat or Blood.

Abnormal nerve conduction velocities within three months of exposure without other probable etiology.

Elevated liver enzymes within three months of exposure without other probable etiology.

Elevated serum cholesterol or Triglycerides within three months of exposure without other probable etiology.

Elevated urine Uroporphyrin within three months of exposure without other probable etiology.

Abnormal composition of urinary porphyrins within three months of exposure without other probable etiology.

Increased frequency of breaks and gaps on chromosomal analysis.

MARVIN A. SCHNEIDERMAN, Ph.D.

As a further supplement to Dr. Schneiderman's Summary of testimony, and by way of further description of his subject matter, substance of opinion and bases for those opinions, Plaintiffs state as follows:

The multi-stage model of cancer derives from as was stimulated by the observation in humans that cancer incidence (and mortality) rates increase very rapidly with age. Overall, in a basically stable situation, with no important changes in exposure (either increases or decreases) the rates for (many) adult cancers increase with about the fourth to sixth power of age. Armitage and Doll in 1961 (P. Armitage and R. Doll, Stochastic Models for Carcinogenesis in Proceedings of the 4th Berkeley Symposium on Mathematical Statistics and Probability, Ed. J. Neyman, Vol. 4, pp. 19-38, University of California Press, Berkeley, 1961 laid out this concept in a mathematical form. Their mathematics is an expression of the concept that a single cell becomes malignant after it has gone through some finite number, say j ., heritable changes, or steps, the probability of each step being related to a "background" effect (some of which could clearly be a genetic predisposition) plus an effect contributed by exposure to some exogenous agent, i.e. some external chemical or physical agent. In their formulation they recognize that not all stages or steps need be affected by the external factor or agent.

The mathematical statement of the process takes the form

$$P = 1 - e^{-\sum_{i=1}^j (a_i + b_i d)}$$

where P = probability of cancer
 e = the nature constant, base of the natural logarithms

e = the nature constant, base of the natural logarithms

j = number of steps or stages

i = the i^{th} stage among the j

a_i = background effect at the i^{th} stage $a_i \geq 0$

b_i = dose effect at the i^{th} stage $b_i \geq 0$

d = dose

Multiplying out the product term in this equator gives:

$$Q = a_0 + q_1 d + q_2 d^2 + q_3 d^3 + \dots$$

The q_i now are the results of the appropriate products of the a_i and b_i (some of the b_i could equal zero). a_0 is the product of the a_i

The term e^{-Q}

can be written in an "expanded" form as

$$1 - Q + \frac{Q^2}{2!} - \frac{Q^3}{3!} + \frac{Q^4}{4!} \dots$$

where $N! = N(N-1)(N-2) \dots 1$

writing this term this way leads to

$$P = 1 - (1 - \bar{1} Q + \frac{Q^2}{2!} + \dots)$$

$$= \bar{Q} \frac{Q^2}{2!} + \frac{Q^3}{3!} - \dots$$

$$(a_0 + q_1 d + q_2 d^2 + \dots) - \frac{(a_0 - q_1 d + q_2 d^2 + \dots)^2}{2!}$$

Where the dose, d , is relatively small,

The higher degree terms used are even smaller in comparison with d (i.e. the so-called linear term q_1d dominates) leaving, as a first approximation at low doses of d

$$P = a_0 + q_1d,$$

which is

The general form for the so-called "linear, no-threshold" dose response curve.

Further developments of the multi-stage model have led to at least five additional concepts:

1. In extrapolating from animal results to possible disease incidence in humans a safety-factor is sometimes introduced by using the upper 95% confidence limit on the estimate for q_1 (this is usually labelled q_1^*). Under those circumstances in which the linear term (q_1 above) does not dominate, so that the probability equation may be of the form

$$P = a_0 + q_1d + q_2d^2 + \dots$$

it has been shown that the upper confidence limit form for this curve nonetheless usually takes a linear form, i.e.

$$P = a_0 + q_1^*d.$$

However, the more intended form of the equation can be used for extrapolation.

2. The stage at which a carcinogen affects the cell (or the carcinogenic process) modifies the time course of the appearance of the cancer in the affected population. Both the level and duration of exposure are of consequence. For persons whose exposure has ended, Brown and Chu (Brown, C.C. and K.C. Chu, Approaches to Epidemiologic Analysis of Prospective and Retrospective Studies: Example of Lung Cancer and Exposure to Arsenic in Environmental Epidemiology: Risk Assessment, Proceedings of a SIMS Conference, Siam Institute for Mathematics in Society) have shown that by looking at both relative risks, and absolute excess risks for a substantial population whose exposures have ceased it should be possible to determine whether dioxin behaves

in humans as an early stage or as a late stage carcinogen -- or perhaps as both, as the animal data seem to imply. A short "latent period" (time from first exposure to the carcinogen to the appearance of the disease) could indicate either a very potent carcinogen, or a carcinogen acting as a late stage in the process (or, of course, both). The appearance of cancer in relatively young persons is consistent with a short latent period.

Immunologic Effects - and possible consequences

Joseph K. Prince (Chapter 5, Immuno-toxicology and Chemical Carcinogenesis in: Environmental Toxicology Principles and Practices, S. Somani, and F. Cavendar, ed., Charles C. Thomas, Springfield, Ill. (1981) has written that "TCDD has the capability of causing immunosuppression . . ." (following the dosing of nursing females). As support of the immunotoxicity of dioxin he cites the work of Faith and Luster ("Investigations on the effects of 2,4,7,8 tetrachlorodibenzodioxin (TCDD) on parameters of various immune functions, Annals, N.Y. Acad. Sci. 1979). Prince also cites several other authors and their studies on the effects of TCDD on immune function.

What is of substantial consequence with respect to possible immunologic effects in persons exposed to TCDD (Moody, et al., 1984 "The Chronic Health Effects of Occupational Exposure to Dioxin: Unanswered Questions, Am. Jour. of Industrial Med. 5: 157-160, cite several "scattered reports" listing a range of toxic responses in workers including "immunologic alterations") is the reported increases in cancer in persons who were immune suppressed as part of various medical treatments. Irving Penn, deriving his data from a registry of patients on immunosuppressive therapy (Penn, I., 1979, Cancer Associated with immunosuppression. Sec F CRC Handbook: series in clinical laboratory science, Cleveland, CRC publishing Co., see also Hoover, R. and V.F. Fraumini, Jr. (1973) Risk of Cancer in Renal Transplant

Cancer patients, Lancet 2: 55-57) reported excessive incidence of reticulum cell sarcomas, Kaposi's sarcoma, and other lymphomas and leukemias. In addition, an excess in skin cancer was also reported.

Recent reports of increases in Kaposi's sarcoma in persons with Acquired Immune Deficiency Syndrome (AIDS) (H.W. Jaffee, Keewhau Choi, et al. (1983), National Case-Control Study of Kaposi's Sarcoma and Pneumocystis Carinii Pneumonia in Homosexual Men: Part 1 Epidemiological Results. Annals of External Medicine 199 #2, pp. 145-151) has reactivated concern about the alteration of immune function and the development of unusual forms of cancer. The preliminary report by the Air Force on the "Ranch Hand" study reports both excessive non-melanotic skin cancers (not adjusted for sunlight exposure) and "no group differences (in immune functions) . . . after adjustment" for age and smoking habits. However, this statement is essentially negated in the text of the report (page iii) where it states "The assessment of the immune system by laboratory testing was compromised by excessive test variability." A discussion then follows that mentions the unexpected finding of age and smoking effects--and adjustments for these.

Statistics on Cancer in Humans

Two sets of statistics on cancer in humans are of consequence. The National Cancer Institute has published data from its own incidence collection system (SEER, Surveillance, Epidemiology and End Results) and from the mortality data collected by the National Center for Health Statistics. Many of these data are assembled in NCI Monograph 57 "Surveillance, Epidemiology, End Results: Incidence and Mortality Data: 1973-77, NIH Publication No. 81-2330 US DHHS, NIH, NCI, Bethesda, Maryland) Particularly pertinent are Table 10 B (p. 68) "Number of Malignant and In Seta cases diagnosed 1973-77 as primary site, age group, and median age,

13802

all races, males, all areas (including Puerto Rico), Table 10 E which gives incidence rates per 100,000 by five year age groups, Table 10 H which corresponds to Table 10 E, reporting death rates, rather than incidence cases. Monograph 57 also gives data separately by whites and non-whites, males and females.

Because skin cancers (other than melanomas) are inadequately reported through the usual channels for which data on other cancers are reported, the National Cancer Institute has undertaken special sampling studies of skin cancer. A (preliminary) report on the "incidences of non-melanoma skin Cancer in the United States, 1977-78" (Scotto, J., Fears, T., et al.) was published in 1980 as DHEW publication No (NIH) 80-2154, and covered 8 geographic areas, ranging from Minneapolis-St. Paul in the North to New Mexico in the Southwest.

An attempt is made in this report to account for the sunlight effect (in whites) by relating age-adjusted rates to an index of ultra-violet B radiation levels (which were about twice as high in New Mexico as in Minneapolis.) The age adjusted rates in Minneapolis were somewhat more than half those in New Mexico. Highest rates were reported in New Orleans and Atlanta, and lowest rates in Detroit. The correlation between UV-B and skin cancer rates is quite good--but not absolutely 1 to 1. Age adjustment is essential, because rates rise very rapidly with age. For example, the "all areas" rate for white men ages 35-44 were 156.8 per 100,000 compared to a rate of 1971.9 per 100,000 for white men aged 75-84, a 12 fold difference.

Dioxin as a Highly Potent Carcinogen

The Environmental Protection Agency's Carcinogenesis Assessment Group as part of its review of materials suspected of being possible human carcinogens, has reviewed and tabulated the data on 54 materials.

13803

Potency was defined in two ways, first, as the (linear) slope of the dose response curve (q_1^* , upper 95% confidence limit) in units of milligrams per kilogram per day, and second, in units of millimoles per kilogram per day - the latter being an attempt to take into account the different molecular weights of the different materials examined. Among these 54 materials, the chemical identified by EPA as tetrachlorodioxin had a slope (in mg/kg/day) of 4.25×10^5 . The next highest slope recorded (about 1/7th as steep) was for hexachlorodibenzo dioxin, 5.7×10^4 . On contrast, the slope for aflatoxin B₁, considered by some persons to be the most carcinogenic of the non man-made materials was 2.9×10^3 , approximately 140-fold less steep than TCDD. Another highly potent material by this criterion was bis(chloromethyle)ether, 9.3×10^3 . Benzene (based on human data) is reported to have a slope of 5.2×10^{-2} , making TCDD 10 million times more potent.

On a molar basis, these same materials had the following "potency" values in Mm/kg/day

TCDD	1×10^8
H(6)CDD	2×10^7
Aflatoxin B ₁	9×10^5
BiscME	1×10^6
Benzene	4

Other highly carcinogenic materials on a molar basis were

Aldrin	4×10^3
Benzicline	4×10^4
Dieldrin	1×10^4
Diethylnitrosaurine	4×10^3
N-Nitroso-N ethyl urea	4×10^3
N-nitroso-N methyl urea	3×10^4

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Cancer bio-assays of TCDD

At least a half dozen long-term laboratory studies have been conducted to evaluate the carcinogenic potential of TCDD. Among the first was a relatively small study by Van Miller (Van Miller, J.T., J.J. Lalich, J.R. Allen (1977) Increased incidence of neoplasms in rats exposed to low levels of 2,4,7,8 tetrachlorodibenzo-p-dioxin. Chemosphere 6 (9, 10) pp. 537-544, and 625-632).

<u>Dose of TCDD in diet mg/kg/week</u>	<u>ppb</u>	<u>Dead by Week 95</u>	<u>Number of male rats With tumors</u>
0 (controls)	0	6/10	0
0.001	.001	2/10	0
0.003	.005	4/10	5
0.01	.05	4/10	3
0.1	.5	5/10	4
0.4	1.0	*	4
2.4	5.0	*	7
240	500	*	
500	1000	*	

* all died within 4 weeks

The tumors included a wide range involving the testes, the liver, skin, kidney, muscles, brain, etc.

Richard Kociba of Dow conducted a larger study, also in rats, and in both sexes which was subject to later detailed review of the pathology (Kociba, R.J., D.G. Keyes, and J.E. Beyer, 1978, Results of a two year chronic toxicity acid oncogenicity study of 2,4,7,8 tetrachlorodibenzo-p-dioxin in rats, Toxicology and Applied Pharmacology 46(2), 279-303. See also a more expanded report in the Annals of the New York Academy of

Science 320: 379-404).

The results of the Kociba study in male animals are:

<u>Dose</u> <u>(mg/kg/day)</u>	<u>Number of animals with tumors</u>	
	<u>Tongue</u>	<u>Hard Palate</u>
0 (controls)	0/76	0/51
0.001	1/49	1/34
0.01	1/50	0/27
0.1	3/42	4/30 (6/30 Squire)

in female animals

<u>Dose</u>	<u>Animals with tumors</u>			
	Liver (Hepatocellular carcinomas)	Liver HC & hyper- plastic nodules	Hard Palate	Lung Squamous Cell Carcinomas
Controls	1/86	9/86 (16/86 ^S)	1/54 (0/54 ^S)	0/86
0.001 (22 ppt)	0/50	3/50 (8/50 ^S)	0/30	0/50
0.01 (220 ppt)	2/50	18/50 (27/50 ^S)	1/27	0/50
0.1 (2.2 ppb)	11/49	34/98 (33/47 ^S)	5/24	7/49 (8/47 ^S)

There was little difference, except for the classification of hyperplastic liver nodules between Squire and Kociba.

The National Toxicology Program (NCI) commissioned a study of TCDD in rats and mice which was carried out by the Illinois Institute of Technology. The chemical was administered by stomach tube (gavage).

These are the report results in male rats:

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Dose mg/kg/wk	Type of tumor (including hyperplastic nodules, and adenomas)				
	<u>Subcutaneous tissue fibrosis</u>	<u>Liver</u>	<u>Adrenal Cortex</u>	<u>Thyroid Adenomas</u>	<u>Adenomas and Carcinomas</u>
Control (vehicle)	3/75	0/74	6/72	1/69	1/69
0.01	1/50	0/50	9/50	5/48	5/48
0.05	3/50	0/50	12/49	6/50	8/50
0.5	7/50	3/50	9/49	8/50	11/50

In female rats, significant increases in tumor incidence was found (comparing controls with the high dose animals in subcutaneous tissue fibrosarcomas, liver (neoplastic nodules above and also neoplastic nodules plus carcinomas) and adrenal cortical adenomas. Pituitary adenomas were increased for all doses, and this increase was statistically significant for the low dose group (1/66 vs 5/47).

Among the mice (B6C3F1) there was a significant excess of liver carcinomas among the males when the high dose animals were contrasted with the controls. Among the females, there were statistically significant excesses in subcutaneous tissue fibrosarcomas, lymphomas (and leukemias and lymphomas combined) of the hematopoietic system, liver neoplasms (in total) and follicular cell adenomas of the thyroid.

Several skin painting studies were also conducted on mice, one under contract to the NTP (NCI) at the Illinois Institute of Technology. There was an increase of 3 to 6 fold in fibrosarcomas of the integumentary system of both males and females. In females these increases were statistically significant for both TCDD administered alone, and also following a single dose of 50/mg of Dimethylbenzanthracene. Other skin painting studies

included work by Berry (Berry, D.L., T.J. Glaga, J. DiGiovanni, and M.R. Juchau (1979), Studies with chlorinated dibenzo-p-dioxins, polybrominated biphenyls, and polychlorinated biphenyls in a two stage system of mouse skin tumorigenesis: Potent anti carcinogenic effects, Ann N.Y. Acad. Sci 320: 405-415) showed that the timing of the administration of carcinogens could strongly affect suppress tumorigenesis. Similar work has been reported by Cohen and colleagues. (Cohen, G.M., W.M. Bracken, R.P. Iyer, D.L. Berry, J.K. Selkirk, and T.J. Slaga, 1979. Anticarcinogenic effects of 2,3,7,8 tetrachlorodibenzo-p-dioxin on benzo(a)pyrenic and 7,12 dimethylbenz(a) anthracene tumor initiation and its relationship to DNA binding, Cancer Research 39(10) 4027-4033).

Pitot (Pitot, H.G., T. Goldsworthy and H. Poland, 1980. Promotion by 2,3,7,8 tetrachlorodibenzo-p-dioxin of hepatocarcinogenesis from diethylnitrosamini. Cancer Research 40: 3616-3620) reported that in a small two-stage carcinogenesis experiment that 5 of 7 rats treated with TCDD in addition to DEN had hepatocellular carcinomas in contrast to none in the comparable control groups.

The EPA has reported that a dose of 1×10^{-5} mg/kg/day, based on the studies by Kociba, that the one hit and the multi-stage model estimated that there would be an increased lifetime risk of 1.1×10^{-6} with an upper 95% confidence limit of 1.5×10^{-6} or 1.6×10^{-6} whether based on the data from the female or male animals.

ELLEN KOVNER SILBERGELD, Ph.D.

As a further supplement to Dr. Silbergeld's Summary, Plaintiffs state as follows:

TCDD and 2,4,5-T can cause male mediated transmittable damage manifested by birth defects, miscarriages, and other untoward pregnancy outcomes when certain circumstances occur. These circumstances are when the amount of exposure to TCDD and to 2,4,5-T, either alone or together (this amount being measured by intensity and duration) is appropriately paired with the timing of that exposure in relationship to spermatogenesis and the participation of the male in reproduction.

Dr. Silbergeld's opinions are in four categories as delineated in Section IV of her Expanded Summary. Opinion IV A relates to animal data and animal toxicity. The grounds for her opinion are specified on the two pages of citations headed "Silbergeld - Animal Toxicology" and beginning with "Bleiberg, et al., 1964; Archives of Dermatology, Volume 89, p. 793" and ending with "Tukey, et al., 1982; Cell, Volume 31, p. 275."

Opinion IV B relates to receptors and TCDD. The grounds for this opinion are specified in the two pages headed "Silbergeld - Receptors/TCDD" and beginning with "Vos, et al., 1973; Environmental Health Perspectives, Volume 5, p. 149" and ending with "Okey, et al., 1980; Journal of Biological Chemistry."

Opinion IV C relates to reproductive toxicology. The grounds for this opinion are specified on the two pages headed "Silbergeld - Reproductive Toxicology" beginning with "Courtney, et al., 1970, Teratogenic Evaluation of 2,4,5-T; Science, Volume 168, p. 864" and ending with "Lamb, et al., 1981; Journal of Toxicology and Environmental

Health, Volume 8, p. 825."

Opinion IV D relates to the neurotoxic effects of 2,4-D, TCDD, and 2,4,5-T. The grounds for this opinion are specified on the page headed "Silbergeld - Neurotoxicology" beginning with "Bleiberg, et al., 1964; Archives of Dermatology, Volume 89, p. 793" and ending with Pazderova, et al., 1981; Archives of Environmental Health, Volume 36, p. 5."

In addition to the publications listed on these seven pages, Dr. Silbergeld's attendance and participation in the educational and scientific conferences and symposia listed on these pages have contributed to her knowledge and therefore are the bases of her opinion.

Her personal and professional experiences in these fields are fully delineated in her curriculum vitae.

3. The Bisanti, et al. article is attached hereto and incorporated herein for all purposes.

V. C(2). The first two references cited refer to the International Symposium on Herbicides prepared by Vietnamese investigators and the relevant portions are cited in Dr. Sterling and Dr. Arundal's new article attached hereto and incorporated herein for all purposes. The third reference to Report to Ministers Veterans Affairs, Case-Control Study of Congenital Anomalies, published by the Australian Publishing Service, Canberra, January, 1983, is a two volume, published document put out by the Australian government and available for the defendants to obtain from the Australian government. This document includes 300-400 pages and it would be too voluminous to reproduce here.

V. C. It should be emphasized that in the Expanded Summary of Dr. Sterling, a typographical error occurred and the sentence should read: In addition, Dr. Sterling will testify that there is ample evidence that exposure to 2,4,5-T is teratogenic in humans when the mother is exposed, and convincing evidence is now extant . . . (it should not read "not" extant).

Further References

Items 2 through 7 under "Further References" are being attached hereto and incorporated herein for all purposes.

2. Dr. Sterling's analysis of Kociba, et al. is provided.

3. The studies cited below, the first two of the items are cited in relevant portion in Arundal and Sterling's new article which is attached hereto for all purposes.

(3) Attached hereto for all purposes.

4. The underlying data from which Dr. Sterling will form his opinions were taken from computer tapes between the years 1969 to 1975 from the National Center for Health Statistics. A true and correct copy of this computer tape material is provided for all parties and attached to this Supplemental Summary. In addition, Dr. Sterling's analysis from this data, or a summary of that analysis, will be provided and supplemented within two weeks.

FILED
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U. S. DISTRICT COURT E.D. N.Y.

★ 29/1984 ★
TIME A.M. ✓ 11
P.M. _____

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

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In Re

AGENT ORANGE

Product Liability Litigation

MDL 381
(All Cases)

----- X

PLAINTIFFS AMENDED LIST OF FACT
WITNESSES IN SUPPORT OF CLAIMS

MARCH 27, 1984

PLAINTIFFS' MANAGEMENT COMMITTEE
26 Court Street
Brooklyn, New York 11242
(212) 330 - 0900

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13814

PLAINTIFFS' AMENDED LIST OF FACT WITNESSES
IN SUPPORT OF CLAIMS

Plaintiffs submit the following list of potential witnesses to be called at trial pursuant to the Magistrate's Pretrial Order No. 18, dated March 26, 1984, reserving the right to supplement this list with additional names and addresses from time to time as additional information and witnesses are discovered.

Those witnesses designated with an asterick "*" have been deposed in these proceedings. Their addresses and the nature of relevant portions of their testimony are as equally well-known to the defendants as to the plaintiffs.

The witnesses not covered by the above reservations, are, as follows:

DR. THOMAS ABOUD
Toledo Clinic
Toledo, Ohio

Cardiologist for Mrs. Ford
Treated Danny Ford for
hypertension.

EDWARD E ADAMS

GORDON A. ANDERSON*
102 Hickory Lane
Naugatuck, Connecticut

IRENE ANTONIK
812 Sussex
Austin, TX 78745

Texas Disability Officer
and friend of Jordans'

ARNOLDI, LOUIS B.*

EUGENE BAK*

DONALD K. BALLMAN*
7722 Revelle Drive
La Jolla, California

DONALD BARNES

13816

E. D. BAUMGARTNER

R. E. BAYNARD

JEANNIE BEAVERS
Flower Hospital
Personnel Department
Sylawia, Ohio

Knows the hospital and
business strain re
Danny Ford

BILLIE MARIE BELL
4404 Bonnie Drive
Ft. Worth, TX 76116

Danny Jordan's mother

CLOYCI G. BELL
4404 Bonnie Drive
Ft. Worth, TX 76116

Danny Jordan's Step-
Father

BELL TELEPHONE OF PA.
1 Park Way
Philadelphia, Pa. 19101

Personnel records of
George Ewalt

W. B. BELLS
Attempting to locate

BING, PETER S.*

ETCYL H. BLAIR*

Dow Employee
Deposed twice

JOHN BLISH
Attempting to locate

A. A. BLOCK
Attempting to locate
KANSAS CITY, MO.

WILLIAM BLUMENAUER
Attempting to locate

JOSEPH L. BOLTON
Attempting to locate

Gov't Contracting
Officer Particularly
re; Hercules

JACK BORRER*
12920 Wellswood Trail
Chesterfield, Ohio 44026

AL BOTHWELL
Attempting to locate

High School friend of
Lambiotte's who was with
him in Vietnam

13817

JAMES E. BOWERS
Attempting to locate
ST. LOUIS, MO.

DANIEL BRAXTON
Attempting to locate

George Ewalt's Foreman,
1975

BOB BROWN
Attempting to locate

Served with Dan. Jordan
in Vietnam

BROWN, SGT.
Attempting to locate

With Danny Ford in
sprayed areas

DAVE BUNIN
Will supply address
with expert summary
materials

Economist

JOHN S. BUSH, Jr.*

WILLIAM CALLAHAN
Attempting to locate
West Virginia

Was with Ewalt in Vietnam

MELVIN CALVIN*
2683 Buena Vista Way
Berkeley, California

Former member of PSAC
and director of Dow
Chemical re government
knowledge vs. Dow's
knowledge and failure
to warn.

RICHARD CASEY
Attempting to locate
Cincinnati, Ohio

Testimony from point of
view of "Ranchhander"
concerning facts of
spraying and defoliation

ELLIS CASH
Attempting to locate

Government Contracting
officer

EDWARD LEE CHANDLER*

EDWARD E. CHAPMAN*
6748 N. Euclid
Gladstone, Missouri

J. G. CHARLTON

ROBERT L. CHONOLES*
23 Carmella Drive
Edison, New Jersey

13818

EMIL CHRISTOFANO*	Re Hercules' liability
GEORGE F. COLLINS	Director of procurement Production, Richmond, Va. (Procurement, supply and failure to warn issues)
J. G. COPELAND, Jr. Attempting to locate; Not yet deposed	Asst. Gen. Manager, '64 Gen. Mgr. Synthetics, 65-72 (Re Hercules)
DIANE COURTNEY*	Government expert witness on causation
GEORGE & MARGE CRAWFAS 49 Heck Rd. Kennessaw, Ga.	Saw changes in Danny Ford Chris's Brother and Sister in Law
JOHN CRAWFAS Beach Valley Rd. Atlanta, Georgia	Chris' Brother
OWEN & BETTY CRAWFIS 61-83 Whiteford Center Rd. Toledo, Ohio	Mother and dad of Chris. Used to take Danny for treatment (6138?)
ROBERT CROCKER Attempting to locate	Amounts - doing away of herbs - has tapes to determine exposure to Veterans II's
EUGENE D. CRITTENDEN, Jr.*	Dir. Sales, 66-67 Asst. Gen. Mgr. Synthetics 67-68 908 DuPont Road Wilmington, Del.19807
ROBERT CROCKER Attempting to locate	
WARREN CRUMMETT* 808 Crescent Drive Midland, Michigan	Dow scientist; evidence concerning Dow liability issues.
GENE CUMMINGS Attempting to locate	Served with Jordan in Vietnam
BILL CURTIS c/o CBS News 524 West 57th Street New York, New York 10019	Evidence concerning eyewitness observations as to the condition of the country of Vietnam, extent of residual defoliation and

13819

possible photographic
exhibits; investigation
continues.

THOMAS P. DALBY
Attempting to locate

Gov't contracting
Officer

S. S. DANIELS

L. L. DANIELSON
Attempting to locate

U.S.D.A. Liason NACA

EDWARD DEBOLT
Attempting to locate

DIAZ, STAFF SGT.
Attempting to locate

With Ewalt in Vietnam

CHARLES DILLEY
Attempting to locate
KANSAS CITY, MO.

LINDA DIMOLA
Attempting to locate
Nesconsett, New York

Kerry Ryan's Babysitter

CHARLES DISHNER

M. DOJNY

OWEN DOLIN*
5225 Sun Valley Drive
Charleston, West Virginia

LAWRENCE E. DOTSON*

WILLIAM DUFFIELD

CHARLES L. DUNN*

Chairman, NACA; evidence
re liability issues
affecting many defendants
in addition to Hercules.

JOSEPH DUQUETTE
Attempting to locate
Rocky Point, N.Y.

On Suffolk County Police

Force with Mike Ryan

J. M. EAGAN
Attempting to locate
(Scheduled to be deposed
on March 31, 1984)

13820

JACK D. EARLY*
8024 Lakenheath Way
Potomac, Maryland 20854

WAYNE EDWARD*

PLATOON SGT. ELLY
Attempting to locate

Was with Ewalt in spray
areas.

DENNIS ELMORE
Attempting to Locate

Gov't Contracting
Officer

GEORGE W. & EUNICE EWALT SR.
731 Penn Pines Blvd.
Clifton Heights, Pa.

Parents of George Ewalt
and familiar with
family situation

TEN EYCK

WILLIAM A. FAIRCLOUGH*
24871 Via San Fernando
Mission Viejo, California 92692

FRED FALANA
Attempting to locate

With Danny Ford in sprayed
areas

WILLIAM F. FALSEY*
6706 Lakeview Drive
Lake City, Michigan

OTIS E. FANCHER
Attempting to locate

BIO-TEST LABS

FARMER, CAPT.
Attempting to locate

With Danny Ford in sprayed
areas

L. E. FAST

WILLIAM FENNER*
HERCULES, INC.
JACKSONVILLE, ARK.

BETTY FMAYDA
1899 Rapids Road
Hiram, Ohio

Chris Ford's Business
partner and good friend
(See Smayda)

THOMAS FORBES
Monetary Avenue
Philadelphia, Pa.

Friend of George Ewalt who
served in same area in
Vietnam

JOHN J. FORD*
15 Winterbury Circle
Wilmington, Delaware

13821

KERRY & JEANETTE FORD
6507 Secore Rd.
Lambertville, Michigan

Brother of Danny Ford

RAY & ROSE FORD
13478 South County Line
Highway
Ottawa Lake, Mich. 49267

Danny Ford's Parents

MARGARET FORLANO
First Street
Ft. Dix, N.J.

Sister of George Ewalt

JOSEPH W. FOWLER

E/4 FRANKS
(in jail)

423d Combat Supply,
with Lambiotte in
Vietnam

JOHN P. FRAWLEY*

Chief toxicologist
Hercules, re many
liability and
causation issues

H. G. FREDERICKS*

VAL K. GAERTNER

JESSE GERSHBERG

Er. D. Gladney
Attempting to locate
With Ewalt in Vietnam
East St. Louis, Mo.

A. W. GLENN

HAROLD GILL*

Dow analytical chemist
who allegedly developed
analytical method for
determination of
2,3,7,8 TCDD in '64.

CHERYL GONDEK
4009 Shawnee Trail
Ft. Worth, TX 76135

Danny Jordan's sister

CHARLES E. GRANITO*

RAYMOND A. GUIDI*
420 Essex Place
Memphis, Tennessee

13822

COLONEL HAIG
Attempting to locate

Was with Ewalt in spray
area

WALTER D. HARRIS*
199 ALLERTON RD.
NAUGATUCK, CONN.

DAVID G. HELM*
5009 Forest
Kansas City, Kansas

RICHARD HICKMAN*
Route 4, No. 10 Yocum Rd.
Rogers, Arkansas

Dow government sales
Mgr. re Dow's attempts
to sell products
including herbicides
to the government

JESSE HILSEN

PAUL E. HOFFMAN*
1202 Lake Shore Drive North
Barrington, Illinois

GRAYDON HOLDEMAN*

BENJAMIN B. HOLDER*
5203 BLOOMFIELD ST.

Dow Medical Director re
health effects in workers,

MIDLAND, MICH.

failure to warn and lack
of minimum effect level.

HARRY HOLLAND
Attempting to locate

Friend of Lambiotte's

RAY HOLMES*

Dow plant supervisor
who contracted
chloracne; re health
effects and failure to
warn of Dow knowledge of
Dioxin in end products in
1964

G. HOLSING

DONALD HOLT
Attempting to locate

George Ewalt's Foreman '80

VERNON HOUCK

F. GERARD & VADA HUKILL
220 W. Tyler

Danny Jordan's In-Laws

13823

Magnum, Okl. 73554

THOMAS R. HUNT

RAPHAEL H. HUSTON
Attempting to locate

Hercules ex-employee
Jacksonville, Arkansas

PETER INFANTE

GEORGE JACKSON
Attempting to locate

George Ewalt's Foreman
late '70s to early '80s

JOHN JENNINGS
Apt. B
12 Lansdowne Avenue
Lansdowne, Pa.

High School friend of
George Ewalt who was
in Vietnam at same
time and knows his
medical problems.

DAVID JORDAN*

LYNNE KELLER
208 Braeswood
Austin, TX 78704

Friend of Danny Jordan's

R. EMMET KELLY*
665 SO. SKINNER
ST. LOUIS, MO.

Monsanto

VAN A. KELLY
Attempting to locate
Philadelphia, Pa.

With Ewalt in Vietnam

GEORGE C. KEMPSON*
143 South Gore
Webster Groves, Missouri

EUGENE E. KENAGA*
1281 N. Wagner Road
Essexville, Michigan

Dow employee re
environmental
persistence, toxicity
and liability issues

FRANCIS KENNEDY*

WILLIAM KIDD

CARL & CARLA KING
33-42 Romaker
Toledo, Ohio

Closest friends of the
(Danny) Fords; she was
with Chris when they
found out that Danny
Ford's leg was can-
cerous and how much
pain he was in. Address
may also be 3320
Romaker Road

13824

J. M. KIRGIS

A. Y. KISTNER
Attempting to locate
KANSAS CITY, MO.

FRANK W. KLEMAN
Attempting to locate
ST. LOUIS, MO.

GEORGE KLINE

J. KLINGMAN

PHILIP LANDRIGAN
To be deposed

JULES LAM
Address to come

David Lambiotte's Uncle

MICHAEL LAMBIOTTE
Address coming

Brother of David
Lambiotte

J. K. LEASURE*
R. R. No. 2 - Box 157
Makanda, Illinois

FRANK LEMAK
To be deposed

P. R. LITTLE

HAROLD A. LLOY

DR. ANNETTE LYNCH
Schoolhouse Lane
Philadelphia, Pa.

Ewalt's daughter's
psychologist

J. R. MALLETT

W. MALONEY

DAVE MANN
Attempting to locate

Employer of Lambiotte
before and after
Vietnam

THOMAS MARKWOOD*
Jeep Corp.
940 N. Coe. Blvd.
Toledo, Ohio

Payroll Records and lost
income re Danny Ford

ROBERT E. MASKILL*
41 East 53rd Street

T-H Agriculture; liability
issues

Kansas City, Missouri

RICHARD J. MARRESE*

JOHN MASON*
12 Tanners Dean
Leatherhead, Surrey
England

L. G. MAUREY
In process of locating

PAUL MAYFIELD
Attempting to locate

M. McCALLEY
Attempting to locate

WILLIAM J. McCARVILLE*
12 Ridge Crest Court
Chesterfield, Missouri

DONALD McCOLLISTER*
5522 Whitehall Street
Midland, Michigan

WILLIAM D. McELROY*
9651 BLACK GOLD RD.
CALIFORNIA

JUDY McKINSEY
1899 Rapids Road
Hiram, Ohio

Business partner of Chris
Ford and close friend
(See McKimnley)

SGT. TIMOTHY MEDDOR

served with Jordan in
Vietnam

COL. BRUCE MEYERS
6914 W. MERCER WAY
ST. LOUIS, MO.

ROY MEYERS

CHARLES E. MINARICK

Deposed July 27-29, 1983.

SHERRY MOSHER
184335 Winchester Rd.
Toledo, Ohio

Business manager of the
kennel. Stress and
strain on Chris Ford
Address may also be 1950
Winchester

DEBDAS MUKERJEE

Government expert. Deposed

13825

BOB NOBER 71 Lempa Road Holland, Pa	Was with Ewalt in Vietnam
WILLIAM R. NUMMY 711 W. Meadowbrook Drive Midland, Michigan	Deposed October 28, 1983
JACKIE OCHS c/o GREEN MOUNTAIN POST FILMS P. O. BOX 229 TURNER FALLS, MA.	Photographic exhibits & personal observations & investigations
BRIAN O'CONNOR 5545 Netherland Ave. Bronx, N.Y.	Friend of the Ryans
J. F. O'CONNOR	
SGT. THOMAS O'DONNELL	Served with Jordan in Vietnam
DR. OERTNER	
J. E. PALLARD	
FRANCIS PANNETON	
L. A. PARDEE	
PHIL PENN	Amounts - doing away of herbs - has tapes to determine exposure to Veterans II's
REBECCA PEPPER 6718 Silvermine Drive #1004 Austin, TX 78736	Neighbor of Jordan's
JACK E. PETERSON 664 Forest Grove Circle Brookfield, Wisconsin	Former Dow employee who addressed industry representatives at March, 1965 meeting concerning rabbit ear testing
F. H. PLACET	
WILLIAM L. POPHAM	Consultant to NACA
DONALD PURDY 160 Fredericksberg Drive	Deposed January 5, 1984

13826

Avon Lake, Ohio

THOMAS RAFERTY
New York City

With Mike Ryan in
Vietnam

VIRGIL B. ROBINSON
2620 Quail Hill Drive
Upper St. Clair, Pa. 15241

Deposed October 19, 1983

V. K. ROWE

Dow's former Chief
Toxicologist - liability
issues as well as
causation questions; Dow's
knowledge of extreme
toxicity and failure to
warn. Deposed March 16,
1983.

ROBERT R. RUMER

Deposed November 18, 1983

CECIL RUSSELL
46 WINGFIELD ROW
GLENDALE, MO.

Deposed May 2, 1983

MAUREEN RYAN
Kings Park, N.Y.

School Principal who
knows Kerry's education

MICHAEL RYAN
54 Woodsdale Ave.
Kings Park, N.Y.

Mike Ryan's Father

VICKY RYAN
54 Woodsdale Ave.
Kings Park, N.Y.

Kerry's Grandmother

HENRY SADLER
Florida

Boyhood friend of
Lambiotte's who was
with him in Vietnam

UMBERTO SAFFIOTTI

Government causation
witness with factual
testimony re government
contract defense,
liability issues and
issuance of Bionetics
Laboratories Report.
Deposed March, 1984

DR. SALTER

Dr. who told Lambiotte
to stop working.

ED SAWGRASS

SUSAN SCANLON

Sister of George Ewalt

13827

Riplen Street
Philadelphia, Pa.

WILLIAM R. SCHAMBRA
1411 W. St. Andrews
Midland, Michigan

Dow former employee re
failure to warn and
business of selling
herbicides to the
government. Deposed
November 16, 1983

ARTHUR J. SCHLESSINGER

OLGA SCHNELL
University Heights Dr.
Stony Brook, N.Y.

Neighbor of the Ryans

W. SCHUBACK

LAPIN O. SCOTT

R. B. SCOTT

Hercules employee. Deposed.
ed.

RICHARD SCOTT

Drafted with Lambiotte
and saw in Vietnam

SGT. SHARKEY

David Lambiotte's
platoon Sergeant
in Vietnam

DEXTER B. SHARP
13042 Weatherfield Drive
St. Louis, Mo.

Deposed October 20, 1983

A. E. SIDWELL

Hercules employee. Deposed.
ed.

LARRY SILVERSTEIN

Dow former employee re
March, 1965 meetings at
Dow and other liability
issues and health
effects to Dow employees.
Deposed March, 1984.

BETTY SMAYDA
1899 Rapids Rd.
Hayram, Ohio

Business partners - Chris
Ford's, plus good friend.
What Fords went through
and personal strains

J. G. SMERALDI

Deposed August 17, 1983.

CAPT. SMITH

With Ewalt in spray areas

PLATOON LT. SMITH

With Ewalt in spray areas

13828

TOM K. SMITH

ROBERT SNODGRASS
Huntington, W. Va.

With Danny Ford in Sprayed
areas

HOWARD C. SPENCER
11008 Cameo Drive
Sun City, Arizona 85351

Developed rabbit ear test
in 1941 while a Dow
employee. Deposed October
21, 1983

L. P. SEITZ

A. JOHN SPEZIALE
311 N. Umberland Avenue
Redwood City, California 94061

Deposed October 26, 1983

JOHN A. STEPHENS
800 N. Lindbergh Blvd.
St. Louis, Missouri

Deposed October 17, 1983

FREDERICK G. STEWARD
173 Woodland Forest, Section 3
Tuscaloosa, Alabama 35405

Deposed October 19, 1983

CHARLES N. STEWART

Deposed August 17, 1983

MICHAEL STRANGE
521 Bomber Road
Ft. Worth Texas

Friend of Danny Jordan

FREDERICK STRANSKY
53 S. Mallard
Selden, N.Y.

Mike Ryan's Brother-in-
Law

SGT. STRAWBERRY

Was with Ewalt in spray
areas

DEIRDRE STRANSKY
24 Alma Ave.
Selden, N.Y.

Teacher - knows Kerry Ryan
- a specialist in learning
disabilities

PATRICIA STRANSKY
53 S. Mallard
Selden, N.Y.

Nurse and Family
Counsellor for Ryan
family

JACK STRUM
712 Short Spoon Circle
North Carolina

Deposed December 16, 1983

JOHN S. SULLIVAN

WINFIELD W. SUNDERLAND
5300 Westpath Way

Deposed November 2, 1983

13829

Bethesda, Maryland

DANIEL W. SWEET

Deposed July 6, 1983

MILTON A. TAVES
210 N. Spring Valle Road
Wilmington, Delaware

Hercules employee. Depos-
ed.

CLINTON TAYLOR

Business partner of
David Lambiotte's

R. D. THOMPSON

WILLIAM THOMPSON
318 GEORGINA AVE.
SANTA MONICA, CAL.

Deposed March 24, and
September 16, 1983

A. L. TREISBECK

Hercules employee. Depos-
ed.

DAN TWISS
Woodland Street
Slyvian, Ohio

Union commission man at
Danny Ford's job. Also
a friend of Dan's. Has
information about union
contract (current) and
personnel matters. See
also Twiss.

DAN TWIFF
4910 Woodland
Sylvania, Ohio

Committee man at AMC Jeep
See Twiff above

WILLIAM R. UDELL
60 TEALWOOD
CREVE COEUR, MO.

EDWIN T. UPTON

T-H liability issues
Deposed April 7, and
April 8, 1983

W. VANDERVENTER

Deposed June 3, 1983

JANE WARD
3527 M. 151
Temperance, Mich. 48182

Neighbor of Fords

ROBERT T. WEBBER
4 Media Drive
St. Louis, Missouri 63146

Deposed October 31, 1983

ADAM WENKUS
Route 5 - Box 904
Waupaca, Wisconsin

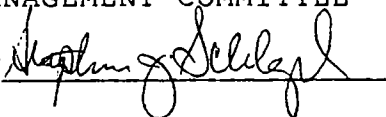
Supply and distribution,
defendants' failure to
warn; former Defense
Military Supply Office

13830

BUTCH WESTERLAND	employee. Served with Jordan in Vietnam
HARTLEY WILDER	
SGT. J. WILLIS	Served with Danny Jordan in Vietnam
MARK G. WILTSE	Deposed December 2, 1983
N. WIRZ	
WILBUR WOHLGAMUTH 49-21 Barton Place Slyvian, Ohio	Union Stewart at Danny Ford's - knew Dan when he had the cancer and the wages at the time and the changes in Dan
L. K. WOOLFOLK	
JOHN WRIGHT	
R. WRIGHT	
R. T. YATES	
YORK HOSPITAL	Former employer of Lambiotte
MITCHELL ZARON KETTERING LABS CINCINNATI, O.	
CHARLES P. ZORSCH ROUTE 5, BOX 30 PACIFIC, MO.	Deposed May 3, 1983

The names above without identifying information are listed on the parties' priority lists and will be deposed at future dates. It is the plaintiffs' understanding that these lists may be supplemented as the depositions are taken.

AGENT ORANGE PLAINTIFFS'
MANAGEMENT COMMITTEE

By 

March 27, 1984

13831

AGENT ORANGE PLAINTIFFS' MANAGEMENT COMMITTEE
26 COURT STREET - SUITE 905
BROOKLYN, NEW YORK 11242
212-330-0900

March 27, 1984

Hon. Shira A. Scheindlin
U.S. Magistrate
U. S. District Court
Eastern District of New York
225 Cadman Plaza West
Brooklyn, New York 11201

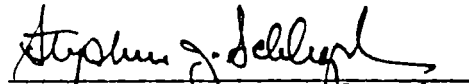
In re "Agent Orange"
Product Liability Lit-
igation - MDL No.381

Dear Magistrate Scheindlin;

You will find enclosed Chambers copy of Plaintiffs' Amended List of Fact Witnesses, per your Pretrial Order No. 18, the original of which has been filed with the Clerk of the Court today.

I will hand deliver copies to defense counsel at the time of the hearing before you tomorrow morning.

Yours very truly,



Stephen J. Schlegel

By Hand
cc; All Counsel

13832

Law Offices of Benton Musslewhite, Inc.

Counselors at Law

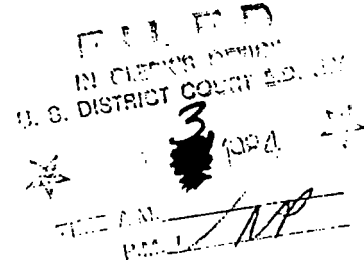
(713) 222-2288

609 Fannin
Suite 517
Houston, Texas 77002

Telex: 775-446
Telex Call Back: LOBM HOU

April 1, 1984

Mrs. Shira Scheindlin
Magistrate
United States District Court
Eastern District of New York
225 Cadman Plaza East
Room 285
Brooklyn, New York 11201



Re: Expanded and Revised Summaries of
Non-Causation Experts

Dear Mrs. Scheindlin:

Pursuant to your recent rulings that the summaries should be expanded and given in more detail I am enclosing expanded summaries in connection with the following:

1. Dr. R. Kenneth Godwin, an expert on environmental policy and relationships between bureaucratic rules and organization and public policies.
2. Dr. James O. Rasmuson, specialist in analytical chemistry, instrumentation and general investigative chemistry and environmental chemistry.
3. Dr. William B. Retallick, expert in chemical process engineering.
4. Dr. Rupert C. Burtan, expert in industrial and environmental medicine.
5. Dr. Clifton C. Crutchfield, industrial hygienist.
6. Dr. Gary Bakken, human factors and safety engineering.
7. Dr. Daniel Teitelbaum, clinical toxicologist with emphasis on environmental medicine.
8. Dr. Douglas Muster, mechanical and safety engineer.
9. Dr. Jay Young, chemist and chemical labeling expert.

13833

370

Mrs. Shira Scheindlin
April 1, 1984
Page Two

10. Dr. Dennis George Haack, statistican and epidemiologist.
11. An additional copy of the opinions of Dr. Arthur W. Galston, Ph.D. The reason that this one is included is that he will give his opinion on the alternative and substitute herbicides which do not contain dioxin.

We have not expanded on the summary of Dr. Steven Wyatt, the economist, inasmuch as your Pre-Trail Order No. 17 seems to indicate that it will be anticipated that the economic summaries will be provided at a later time. In any event, that summary should be completed in the next few days, inasmuch as the economic data has now been transmitted to Dr. Wyatt for the completion of his expanded summary. With respect to the summary of Dr. Jay Young we are hoping that that summary will be completed this week. We hereby advise you that we do not intend to call as a witness William S. Wood, chemcial safety consultant. In addition, please be notified that we are seeking an expert in the field of agricultural herbicide products, that is someone in the field who has knowledge of how the various herbicides that have been on the market since the early 1960's work with respect to different types of plants. This witness would compliment the testimony of Dr. Galston in that area of concern. There is still some hope that we will be able to get the summary of Dr. Theodore Goldfarb of the Chemistry Department of the State University of Stonnibrook and Dr. Conrad Berenson, economist at Baruch College in New York.

Mrs. Scheindlin I understand that you are upset by the delay in getting these summaries expanded and by the form the summaries have taken. I understand your concern and I appreciate and admire the manner in which you are trying to push this case to early preparation for trial. I recognize this as an unusual case and requires more stringent compliance with the usual discovery rules. However, I do want to reiterate some of the arguments we have made previously and in addition to cite a couple of cases which indicate that perhaps the hypertechncality of the defendants has gotten out of hand. You have indicated on several occasions you recognize that this situation is much different than the causation expert witnesses-that is a situation dealing with a non-causation expert witness. This stems from the fact that most of the evidence these people need to really express detailed opinions is in the hands of the defendants and while some

Mrs. Shira Scheindlin
April 1, 1984
Page Three

of it is available much of it has not yet been made available and we are seeking through additional discovery. In any event these people have given, I submit, more than is necessarily required by Rule 26(b)(4)(A)(1). In Hockley vs. Zent Incorporated, 31 FRS2d 1225 (D.C. Maryland, 1980) the Court expressly held that all that is required under Rule 26(b)(4)(A)(1) is a general summary and enough within the summary to place the opposing party on notice of the general nature of the testimony of the expert witness. That case reveals that we have clearly complied with the spirit and the terms of Rule 26(b)(4)(A)(1). We also ask that you note the dicta in Dow Chemical Company vs. Taylor, 20 FRS2d 673 (D.C. E.D. Michigan, 1976). The dicta in that case further indicates that we are in complete compliance with both the terms and spirit of the rules. I need not remind the defendants of the terms and provisions of Rule 1 of the Federal Rules of Civil Procedure and that the entire concept of the Federal Rules is to deal with each party within the spirit of fairness and reasonableness. It is quite obvious that the defendants have become totally unreasonable. The rules, as we all know, eschew hypertechnicality. Obviously it is to the defendants benefit to have the court impose strict time limits, very technical requirements with respect to discovery matters and to load the case up with unnecessary technicality. I do not mean to imply that any of the requirements that you have imposed to date are unnecessary or not appropriate. I simply say that I would hope that nobody's right to their day in court is going to be prejudiced by adhering to the course desired by the defendants which is one of hypertechnicality and overly burdensome requirements. In summary, the cases and the rules clearly indicate that we have given the defendants fair notice of what these experts will testify about and that is all that is required by the rules, particularly Rule 26(b)(4)(A)(1).

Mrs. Scheindlin, I want to take this opportunity to apologize for any delays that you feel have been unreasonable. We have done our best to deal with this difficult matter and it has been particularly difficult for me in view of the fact that I have been in back-to-back trials first in a maritime case involving a sinking of a ship where I represent the families of two people who lost their lives in that catastrophe and then this week I have been in trial in a helicopter case involving the death of eight families, whose survivors I represent. I have arranged my schedule so that these are the last trials I will participate in prior to the Agent Orange case going to trial.

13835

Mrs. Shira Scheindlin
April 1, 1984
Page Four

While I have delegated a portion of the work with respect to the non-causation experts, these are experts that I have used to some extent; I am familiar with them, and they are relying upon me to work with them in the completion of these summaries. In summary, I do believe we have complied with the rules and I respectfully submit that these witnesses certainly should not be precluded.

Sincerely,

LAW OFFICES OF BENTON MUSSLEWHITE, INC.

BY: Benton Musslewhite
Benton Musslewhite (F.T.F.)

BM:th
Enclosures

cc: ALL COUNSEL OF RECORD
(SEE ATTACHED SERVICE LIST)

13836

SERVICE LIST

Morton B. Silberman, Esq.
CLARK, GAGLIARDI & MILLER
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White Plains, New York 10601

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CADWALADER, WICKERSHAM & TAFT
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New York, New York 10005

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TOWNLEY & UPDIKE
405 Lexington Avenue
New York, New York 10174

William Krohley, Esq.
KELLEY, DRYE & WARREN
101 Park Avenue
New York, New York 10178

David R. Gross, Esq.
BUDD, LARNER, KENT, GROSS,
PICILLO & ROSENBAUM
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Newark, New Jersey 07102

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New York, New York 10020

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DEPARTMENT OF JUSTICE
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SHEA & GOULD
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New York, New York 10017

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LEWIS, OVERBECK & FURMAN
135 South La Salle Street
Suite 1060
Chicago, Illinois 60603

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LESTER, SCHWAB, KATZ & DWYER
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New York, New York 10271

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Garden City, New York 11530

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BASKIN & SEARS
Frick Building, 10th Floor
Pittsburgh, Pennsylvania 15219

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13838

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

FILED
IN CLERK'S OFFICE
U. S. DISTRICT COURT E.D. N.Y.

★ 3/26 1984
TIME A.M. _____
P.M. VMP

----- x

In re

"AGENT ORANGE"

MDL 381
(All Cases)

PRODUCT LIABILITY LITIGATION

----- x

PLAINTIFFS' SUMMARY PURSUANT TO RULE 26 OF
THE FEDERAL RULES OF CIVIL PROCEDURE OF DOCTOR
ALLISTER HAY, AN EXPERT WITNESS TO BE CALLED
BY PLAINTIFFS CONCERNING NON-CAUSATION MATTERS

DATED: MARCH 26, 1984

PLAINTIFFS' MANAGEMENT COMMITTEE
26 Court Street
Brooklyn, New York 11242
(212) 330-0900

13839

2219

SUMMARY PURSUANT TO RULE 26 OF THE FEDERAL RULES OF CIVIL
PROCEDURE OF DOCTOR ALLISTER HAY, EXPERT WITNESS TO BE
CALLED BY THE PLAINTIFFS CONCERNING NON-CAUSATION MATTERS

I.

QUALIFICATIONS

Dr. Hay's curriculum vitae was attached to his summary with respect to the causation questions. Reference is now made to that curriculum vitae and is incorporated herein by reference.

II.

SUMMARY OF SUBJECT MATTER OF WITNESS TESTIMONY

Dr. Hay's testimony with respect to non-causation matters relates to governmental authority and the decision making authority within the United States Government, with respect to the use of herbicides in Vietnam. He will be basing his opinions upon the extensive research done by him in preparation of his book, "The Chemical Scythe, Lessons of 2,4,5-T and Dioxin"; upon his scientific knowledge; and upon other documents and relevant authority with respect to the workings of the United States Government in connection with the use of herbicides in

13840

Vietnam and with respect to the lines of authority relative to the exercise of such authority.

III.

FACTS UPON WHICH WITNESS WILL BASE OPINIONS

The facts upon which Dr. Hay will base his opinions are those factual matters elicited by him during his investigation and research in preparation for the writing of the above referred to book, *The Chemical Scythe*, and on the basis of other research and investigation and first hand contact with scientistist and other people related to or involved in the use of herbicides in Vietnam during the 1960's. The factual basis for most of the opinions expressed by Dr. Hay are specifically stated in the above referred to book.

IV. & V.

OPINIONS AND THE BASES THEREFOR

1. It is the opinion of Dr. Hay that the decisions to use herbicides in Vietnam, to expand the use thereof, and to continue to use such herbicides were made at the highest levels of government; specifically, the initial decision was made at a level no lower than Deputy Secretary of defense Rowell Gilpatrick and included Secretary of State Dean Rusk, Secretary of Defense Robert MacNamara, and President Kennedy himself. It is his opinion that in subsequent administrations the decision making was the same.

2. It is the opinion of Dr. Hay that there is nothing in the statutes, regulations, executive orders, directives, customs, practices, policies or prior modus operandi which would permit or suggest that the decisions referred to in (1) above could be, have been, or even should be, delegated below the highest levels

13841

of the government.

3. It is the opinion of Dr. Hay that all subsequent decisions to expand the program specifically required presidential approval. This would involve, of course, Presidents Kennedy, Johnson and Nixon.

4. It is Dr. Hay's opinion that the day-to-day decisions as to where the spraying of the herbicides would take place, and as to the specific times for the use of the herbicides, was delegated to the United States Ambassador in Saigon and to the United States M.A.C.V. (Military Assistance Command, Vietnam). However, these persons and entities did not have any responsibility for, or power to make, the ultimate decision of whether to use or to continue to use the herbicides in Vietnam.

5. It is the opinion of Dr. Hay that the spraying of crops with the herbicides required a request from the South Vietnamese authorities before such crops could be sprayed.

6. It is the opinion of Dr. Hay that the Bionetics study was the first indication to persons at a high enough level of authority to have any impact upon ultimate decision making that the Agent Orange being used in Vietnam might have a contaminant in it which could pose a danger to health. This study was placed in the hands of Deputy Secretary of Defense David Packard in October, 1969. He almost immediately instructed the Joint Chiefs of Staff to limit the spraying of the Agent Orange to areas remote from population areas and remote from camp areas, pending further study and decisions about 2,4,5T in the United States domestic market.

7. It is the opinion of Dr. Hay that in June of 1970 Dr. Kissinger, after gaining knowledge of the Bionetics report, persuaded Dr. Lee DuBridge of the President's Science Advisory Committee to recommend to President Nixon that the spraying

program be stopped altogether. President Nixon then asked the Deputy Secretary of Defense for an evaluation of the effectiveness of the program and the dangers involved. Though there was some effort on the part of the Joint Chiefs of Staff to have the spraying continued on a limited basis, President Nixon continued the restrictions in effect at that time and ruled that the use of the herbicides must conform to all the evolving restrictions on their use in the domestic United States. In this connection, it is Dr. Hay's opinion that in January 1970, the Department of Agriculture said that in the future 2,4,5T should contain less than one part per million dioxin.

8. It is further the opinion of Dr. Hay that in March of 1971 the President's Science Advisory Committee advised the President and Secretaries of Defense that the minimum allowable level of dioxin should be reduced from 1 part per million to 0.1 part per million.

9. It is the opinion of Dr. Hay that, on April 13, 1971, after further investigation had continued and revealed the probability of severe adverse health effects from dioxin, Secretary of Defense Melvin Laird ordered all residual stocks of Agent Orange with less than 1 part per million be returned to the United States and with regard to those stocks containing any higher degree of dioxin, he ordered that they be incinerated.

10. It is the opinion of Dr. Hay that the President's Science Advisory Committee had no decision making power, only "advisory" power, and its function was to make recommendations to the President with respect to matters of scientific interest.

11. It is the opinion of Dr. Hay that the relevant members of the President's Science Advisory Committee had no knowledge of the potential health hazards of the herbicides being used in Vietnam until August - October of 1969. It is Dr. Hay's opinion that had the United States government had been

13843

advised of the danger of Agent Orange, it could have used Agent White instead of Agent Orange, although Agent White was a slower acting defoliant.

12. It is the opinion of Dr. Hay that even though the Bionetics Report was released in May or June of 1968 to some government officials, while the President's Science Advisory Commission did not receive the report until 1969, there had been substantial spraying of Agent Orange in Veitnam and, as a result, considerable quantities of TCDD had been deposited. That TCDD would persist in the environment and still be a danger (i.e., subject to exposure to those in proximity to the TCDD) through 1969. It is the opinion of Dr. Hay that no agency of the United States government at the decision-making level was aware of the health risks in 2,4,5-T until August - October, 1969. no agency of the United States government at the decision making level was aware of the health risks in 2,4, 5T until August - October, 1969.

13. It is the further opinion of Dr. Hay that, on the other hand since before 1965, the Defendants' possessed a far greater and vaster knowledge about the presence of dioxin in the 2,4,5T; the severe health risks to those who were involved in the manufacture of the 2,4,5T; the severe risks of adverse health affects to those who were exposed to the use of the 2,4,5T; and the processes through which the dioxin contaminant in the 2,4,5T could be substantially reduced.

14. It is Dr. Hay's opinion that none of the defendants made a bona fide effort to share the knowledge referred to in (13) above until Dow wrote the Secretary of Defense in March, 1970, after it was too little, too late.

15. It is Dr. Hay's summary opinion that those who had the responsibility for making the decisions touse, or to continue to use, or expand the use of, herbicides in Vietnam conflict, did

not until October, 1969 to April, 1971 know, or have reason to suspect, that the contaminant posed a danger to human health, and that there were means for reducing the amount of the contaminant in the end product.

Respectfully submitted:

A handwritten signature in cursive script that reads "Thomas Henderson". The signature is written in dark ink and includes a circular flourish at the end of the name.

Thomas Henderson

13845

CERTIFICATE OF SERVICE

I, EDWARD F. HAYES, III do hereby certify that the foregoing Rule 26 Summary was served upon the defendants by Federal Express by delivering true copies thereof directed to them at the following addresses:

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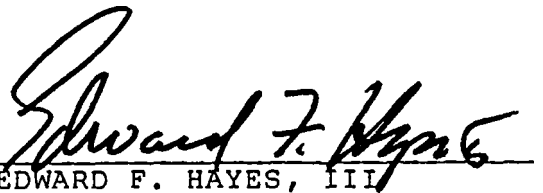
Dated: March 26, 1984

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EDWARD F. HAYES, III

13846

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

FILED
IN CLERK'S OFFICE
U. S. DISTRICT COURT E.D. N.Y.
★ MAR 23 1984 ★
TIME A.M. _____
P.M. _____
VAD

In re)
"AGENT ORANGE")
Product Liability Litigation)

MDL No. 381
(All cases)

PLAINTIFFS' INTERROGATORIES TO DEFENDANTS

MARCH 23, 1984

13847

2203

k. Ansul

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

In re)	
"AGENT ORANGE")	
Product Liability Litigation)	MDL No. 381 (All cases)

PLAINTIFFS' INTERROGATORIES TO DEFENDANTS
MARCH 23, 1984

1. Did you ever supply 2,4,5-T (in acid, salt, ester or other form) to any of the following companies (please respond or no for each company listed):

- a. Dow Chemical Company
- b. Monsanto Company
- c. Diamond-Shamrock
- d. Uniroyal, Inc.
- e. T&H Agriculture
- f. Hercules, Inc.
- g. Thompson Chemical Company
- h. Hooker Chemical Company
- i. Riverdale Chemical Company
- j. Hoffman-Taft

13848

- a. Dow Chemical Company
- b. Monsanto Company
- c. Diamond-Shamrock
- d. Uniroyal, Inc.
- e. T&H Agriculture
- f. Hercules, Inc.
- g. Thompson Chemical Company
- h. Hooker Chemical Company
- i. Riverdale Chemical Company
- j. Hoffman-Taft
- k. Ansul

4. If your answer to any of interrogatory number 3 (a through k) is anything other than an unqualified "no", please state for each such party the following:

- a. Describe the writings relating to the (1) negotiations leading up to, (2) the finalization of and (3) dealing pertaining to said receipt;

- b. For each such receipt occurrence, state

- (1) Was any of the 2,4,5-T received obtained from some other source and, if so, please describe the source and the date thereof;

- (2) The identification of your employee who was in charge of the receiving procedure;

- (3) The identification of the employee of the supplier who was in charge of the supply;

- (4) The date(s) of each such receipt;

- (5) The amount received on each occasion of receipt;

- (6) Whether there was any effort made by any person to

determine the existence of and/or the amount of a dioxin content and, if so, the results obtained and the identity of all persons possessing the records pertaining thereto.

c. For each such receipt occurrence, please attach all writings relating to or referred to in 4.(a) and 4.(b) above and all writings relating to notice to any government entity concerning any dioxin content therein.

5. Did you ever supply 2,4,5-TCP (in acid, salt, ester or other form) to any of the following companies (please respond yes or no for each company listed): and list each of the defendants

- a. Dow Chemical Company
- b. Monsanto Company
- c. Diamond-Shamrock
- d. Uniroyal, Inc.
- e. T&H Agriculture
- f. Hercules, Inc.
- g. Thompson Chemical Company.
- h. Hooker Chemical Company
- i. Riverdale Chemical Company
- j. Hoffman-Taft
- k. Ansul

6. If your answer to any of interrogatory number 5 (a through k) is anything other than an unqualified "no", please state for each such party the following:

a. Describe the writings relating to the (1) negotiations leading up to, (2) the finalization of and (3) dealings pertaining to said supplying;

b. For each such supply occurrence, state

(1) Was any of the 2,4,5-TCP supplied obtained from some other source and, if so, please describe the source and the date thereof;

(2) The identification of your employee who was in charge of the supply procedure;

(3) The identification of the employee of the recipient who was in charge of the receipt;

(4) The date(s) of each such supply;

(5) The amount supplied on each occasion of supply;

(6) Whether there was any effort made by any person to determine the existence of and/or the amount of a dioxin content and, if so, the results obtained and the identity of all persons possessing the records pertaining thereto.

c. For each such supply occurrence, please attach all writings relating to or referred to in 6.(a) and 6.(b) above and all writings relating to notice to any government entity concerning any dioxin content therein.

7. Did you ever receive 2,4,5-TCP from any of the following chemical companies (please respond yes or no for each party listed):

- a. Dow Chemical Company
- b. Monsanto Company
- c. Diamond-Shamrock
- d. Uniroyal, Inc.
- e. T&H Agriculture
- f. Hercules, Inc.
- g. Thompson Chemical Company
- h. Hooker Chemical Company

- i. Riverdale Chemical Company
- j. Hoffman-Taft
- k. Ansul

8. If your answer to any of interrogatory number 7 (a through k) is anything other than an unqualified "no", please state for each such party the following:

a. Describe the writings relating to the (1) negotiations leading up to, (2) the finalization of and (3) dealings pertaining to said receipt;

b. For each such receipt occurrence, state

(1) Was any of the 2,4,5-TCP received obtained from some other source and, if so, please describe the source and the date thereof;

(2) The identification of your employee who was in charge of the receiving procedure;

(3) The identification of the employee of the supplier who was in charge of the supply;

(4) The date(s) of each such receipt;

(5) The amount received on each occasion of receipt;

(6) Whether there was any effort made by any person to determine the existence of and/or the amount of a dioxin content and, if so, the results obtained and the identity of all persons possessing the records pertaining thereto.

c. For each such receipt occurrence, please attach all writings relating to or referred to in 8.(a) and 8.(b) above and all writings relating to notice to any government entity concerning any dioxin content therein.

9. Did you ever supply Agent Orange (in acid, salt, ester or

other form) to any of the following companies (please respond yes or no for each company listed):

- a. Dow Chemical Company
- b. Monsanto Company
- c. Diamond-Shamrock
- d. Uniroyal, Inc.
- e. T&H Agriculture
- f. Hercules, Inc.
- g. Thompson Chemical Company
- h. Hooker Chemical Company
- i. Riverdale Chemical Company
- j. Hoffman-Taft
- k. Ansul

10. If your answer to any of interrogatory number 13 (a through k) is anything other than an unqualified "no", please state for each such party the following:

a. Describe the writings relating to the (1) negotiations leading up to, (2) the finalization of and (3) dealings pertaining to said supplying;

b. For each such supply occurrence, state

(1) Was any of the Agent Orange supplied obtained from some other source and, if so, please describe the source and the date thereof;

(2) The identification of your employee who was in charge of the supply procedure;

(3) The identification of the employee of the recipient who was in charge of the receipt;

(4) The date(s) of each such supply;

(5) The amount supplied on each occasion of supply;

(6) Whether there was any effort made by any person to determine the existence of and/or the amount of a dioxin content and, if so, the results obtained and the identity of all persons possessing the records pertaining thereto.

c. For each such supply occurrence, please attach all writings relating to or referred to in 14.(a) and 14.(b) above and all writings relating to notice to any government entity concerning any dioxin content therein.

11. Did you ever receive Agent Orange from any of the following chemical companies (please respond yes or no for each party listed):

- a. Dow Chemical Company
- b. Monsanto Company
- c. Diamond-Shamrock
- d. Uniroyal, Inc.
- e. T&H Agriculture
- f. Hercules, Inc.
- g. Thompson Chemical Company
- h. Hooker Chemical Company
- i. Riverdale Chemical Company
- j. Hoffman-Taft
- k. Ansul

12. If your answer to any of interrogatory number 15 (a through k) is anything other than an unqualified "no", please state for each such party the following:

a. Describe the writings relating to the (1) negotiations leading up to, (2) the finalization of and (3) dealings

pertaining to said receipt;

b. For each such receipt occurrence, state

(1) Was any of the Agent Orange received obtained from some other source and, if so, please describe the source and the date thereof;

(2) The identification of your employee who was in charge of the receipt procedure;

(3) The identification of the employee of the supplier who was in charge of the supply;

(4) The date(s) of each such receipt;

(5) The amount received on each occasion of receipt;

(6) Whether there was any effort made by any person to determine the existence of and/or the amount of a dioxin content and, if so, the results obtained and the identity of all persons possessing the records pertaining thereto.

c. For each such receipt occurrence, please attach all writings relating to or referred to in 16.(a) and 16.(b) above and all writings relating to notice to any government entity concerning any dioxin content therein.

13. Were any of the aforementioned products (2,4,5-T; 2,4,5-TCP; Agent Orange) ever supplied to the United States Government? If so, for each incident of supply above described, state the following:

a. Describe which of the above products were so supplied;

b. Who supplied the product to the United States Government;

c. When was the product supplied to the United States

Government;

d. In what quantity was the produce supplied;

e. Was the origin of the product in any way described to the United States;

f. From whom did the supplier receive the material ultimately shipped to the United States.

CERTIFICATE OF SERVICE

The undersigned, Edward F. Hayes, III, does hereby certify that on the 23d day of March, 1984 he served the enclosed Interrogatories on all those shown on the attached service list by delivery to Federal Express with the following exceptions; Chambers copies were delivered personally by hand to Judge Weinstein and Magistrate Scheindlin, before the hour of 5:00 p.m.

Edward F. Hayes

13857

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13059

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

FILED
IN CLERK'S OFFICE
U. S. DISTRICT COURT E.D. N.Y.
★
1964
★
TIME A.M.
P.M. VMP

-----X

IN RE :

"AGENT ORANGE" :

MDL No. 381
(All Cases)

PRODUCT LIABILITY LITIGATION :

-----X

SUPPLEMENTAL ANSWERS OF
DEFENDANT MONSANTO COMPANY
TO PLAINTIFFS' INTERROGA-
TORIES TO DEFENDANTS

TOWNLEY & UPDIKE

CHRYSLER BUILDING
405 LEXINGTON AVENUE
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TELEPHONE
(212) 682-4567

13859

1951

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

-----X
IN RE

: MDL No. 381
: (All Cases)

"AGENT ORANGE"

: SUPPLEMENTAL ANSWERS OF
: DEFENDANT MONSANTO COMPANY
: TO PLAINTIFFS' INTERROGA-
: TORIES TO DEFENDANTS

PRODUCT LIABILITY LITIGATION :
-----X

Defendant Monsanto Company ("Monsanto"), pursuant to Magistrate's Pretrial Order No. 2, dated February 10, 1984 and as modified at a hearing that day before Magistrate Scheindlin, supplements its answers to certain of Plaintiffs' Interrogatories to Defendants, dated December 22, 1983, as follows:

INTERROGATORY NO. 3

Did any herbicide containing 2,4,5-T manufactured and or sold by you contain any caution, warning, caveat or other statement or explanation on the product or its packaging?

- a) If so, when did the warning or statement first appear?
- b) What was the precise wording of the warning or other statement when it first appeared?
- c) Has the warning or statement been altered, amended or changed in any manner? If so, how and when was it amended?
- d) Where was the warning or statement located on each product or packaging?

13860

Answer to Interrogatory No. 3

The information in Monsanto's possession that is responsive to this interrogatory is found on the labels that were affixed to the various herbicides containing 2,4,5-T marketed by Monsanto. The burden of deriving the precise information sought in this interrogatory from those labels is substantially the same for the interrogating plaintiffs as it is for Monsanto. Accordingly, pursuant to Fed. R. Civ. P. 33(c), specified below are the numbers of the documents from which the answer to this interrogatory may be derived or ascertained:

0074525-0074526
0074515-0074516
0023203
0074506-0074507
0074297
0074296
0074658
0074611
0074772
0008369
0055143
0074399
0074396
0074597-0074598
0074793-0074797
0074569-0074572
0074683-0074684
0046973-0046974
0075199
0084205
0075130
0074697-0074698
0084280-0084281
0023204-0023206
0075105
0007097
0075063-0075064

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0074642
0074624
0074622
0075118
0074738
0074409
0074114
0074103
0023214
0074310-0074311
0074677-0074678
0054465-0054466
0074865-0074866
0074359-0074360
0075075
0074675-0074676
0074333-0074334
0007092
0074320-0074321
0074925-0074926
0074826-0074827
0074719
0008238-0008239
0046969-0046970
0074770-0074771
0074718
0084210
0074679-0074680
0046965-0046966
0074717
0074280-0074281
0074278-0074279
0074099-0075623
0102064-0102065
0102066-0102067
0102068-0102069

INTERROGATORY NO. 7

Please list all scientific and medical periodical and journals, both American and foreign, in which you claim the toxic effects of dioxin were reported from 1945 to the present; and, give the specific references to such reports for each such periodical or journal.

13862

Answer to Interrogatory No. 7

The information sought by this interrogatory is presently being compiled by or for Monsanto in preparation for trial. The bibliographic references listed below -- all of which are publicly available -- are thus not exhaustive. In listing them Monsanto does not waive, and hereby expressly reserves, its right to offer as evidence at trial any information concerning the toxicity of dioxin, regardless of whether such information is contained in the references listed below.

1. "UK Ministry Gives Green Light to 2,4,5-T," Nature, 2708 (5703), 3/29/79.
2. "Sponsors of Science Inc. on the Safety of 2,4,5-T and Dioxin," Clinical Toxicology, 7, 1974.
3. "National Health and Medical Research Council; Statements Adopted at 85th Session, Adelaide, June 1978," Medical Journal of Australia, 2/Suppl. 3, 10/21/78.
4. "Chlorinated Dioxins and Related Compounds: Proceedings of the Third International Sumposium Held at Salzburg, Austria, 12-14 October 1982," Chemosphere, 12 (4-5) 1983.
5. "Epidemiologic Evidence Shows No Longterm Threat Following Exposure to Dioxin," American Industrial Hygiene Association Journal, 41(3), 1980.
6. "No Excess in Cancer Deaths Found in Largest Group Ever Studied for Long-Term Effects of Dioxin Exposure," American Industrial Hygiene Association Journal, 41(1), 10/80.
7. "ACSH Notes Report Dioxin, DDT May Inhibit Cancer," Food Chemical News, 38, 11/28/83
8. "Malformation at Birth Increased in Seveso Last Year," Nature, 280, 7/79

13863

9. "Dioxin Traces Found in Soldiers Exposed to Defoliant," Nature, 282 (5742), 12/27/79.
10. "Dioxin and the Heart," Lancet, 1 (8183), 6/28/80.
11. "Resolution Conference Examines 2,4,5-T Safety," Farm Chem, 142(12), 12/79.
12. "2,4,5-T and TCDD," Naturwissenschaften, 63(10), 10/76.
13. "Simmering 2,4,5-T Dispute Boiling Over," Chemical Week, 126(15), 1980.
14. "TCDD: A Potent Inducer," Drug Metab Dispositions, 3(4), 1975.
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In addition, Monsanto refers plaintiffs to the following compendia of references responsive to this interrogatory, both of which have been produced in this litigation by the United States.

National Agricultural Library, The Toxicity of Herbicides to Mammals, Aquatic Life, Soil Microorganisms, Beneficial Insects and Cultivated Plants, 1950-65: A List of Selected References, U.S. Dep't of Agriculture, April, 1968 (1695 references).

Veterans Administration, Review of Literature on Herbicides, Including Phenoxy Herbicides and Associated Dioxins, Veterans Administration, October, 1981 (1116 references).

INTERROGATORY NO. 8

State whether you knew health hazards, physical disorders, injuries, irritations or diseases were associated with exposure to, or use of herbicides containing 2,4,5-T. If your answer is affirmative, state or identify:

- a) the date you acquired such knowledge, belief or suspicion;
- b) the manner in which you gained such knowledge, belief or suspicion;
- c) the type of health hazards, physical disorders, injuries, irritations or diseases;

Departments of Agriculture, the Interior, and Health,
Education, and Welfare of the immediate suspension by USDA of
certain registered uses of 2,4,5-T.

Dated: New York, New York
February 17, 1984

13914

VERIFICATION

STATE OF MISSOURI)
) ss.:
COUNTY OF ST. LOUIS)

J. R. BLEY, JR., being duly sworn, deposes and says that he is an assistant secretary of defendant Monsanto Company, a corporation; that he has read the foregoing Supplemental Answers of Defendant Monsanto Company to Plaintiffs' Interrogatories to Defendants and is familiar with the contents thereof; that deponent is without personal knowledge of the matters stated in the foregoing Supplemental Answers and is informed and believes that no officer or employee of Monsanto Company has personal knowledge of all such matters; that the foregoing Supplemental Answers have been assembled by authorized employees and counsel of Monsanto Company, who have informed deponent that the foregoing Supplemental Answers are true; and that to the best of deponent's knowledge those Supplemental Answers are true.

J. R. Bley, Jr.

Sworn to before me this
28th day of February, 1984.

Virginia Schroeder
Notary Public
VIRGINIA SCHROEDER
NOTARY PUBLIC, STATE OF MISSOURI
MY COMMISSION EXPIRES 8/29/87
ST. LOUIS COUNTY

13915

CERTIFICATE OF SERVICE

I HEREBY AFFIRM THAT I am an attorney duly admitted to practice in the State of New York and in the Eastern District of New York. I HEREBY CERTIFY that on February 17, 1984 I caused to be served a true and correct copy of the Supplemental Answers of Defendant Monsanto Company to Plaintiffs' Interrogatories to Defendants by courier on all counsel on the attached service list.


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GENERAL ORANGE

Product Development Investigation

DIAMOND SHAMROCK'S INDEX OF
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00031370A- 00031391	Registration Correspondence Files of Registration Department, Ag Chem Division	Line Rider 22 Brushkiller (677-95)
00031391A- 00031414	Registration Correspondence Files of Registration Department, Ag Chem Division	Line Rider 4T Brushkiller (677-97)
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00031605A- 00031623	Registration Correspondence Files of Registration Department, Ag Chem Division	Invert D/T Concentrate (677-174)
00031623A- 00031657	Registration Correspondence Files of Registration Department, Ag Chem Division	Dacamine 4T Brush- killer (677-195)
00031657A- 00031722	Registration Correspondence Files of Registration Department, Ag Chem Division	Dacamine 2D/2T (677-196)

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DOCUMENT NUMBERS	SOURCE	FOLDER TITLE (OR OTHER FILE DESCRIPTION)
00031722A 00031795	Registration Correspondence Files of Registration Department, Ag Chem Division	Trailway 2D/2T Diamine Salt of 2,4-D and 2,4,5-T (677-238)
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00031959- 00032306	Ag Chem Registration Room	Phenoxy Miscellaneous
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Re: In re "Agent Orange"
Product Liability Litigation,
MDL No. 381

Dear Stephen:

I enclose Diamond Shamrock's Index of Additional Documents Available for Inspection and Copying in Post-Phase I Discovery, Dated March 6, 1984. The documents referenced by the Supplemental Index are available for microfilming or, as plaintiffs have done in the past, for review at our offices to identify those documents you would like to order.

The documents included in Diamond Shamrock's post-Phase I production consist almost entirely of two categories of material. First, over half the documents (Doc. Nos. 00033335-36221) are files from Diamond Shamrock Agrochemicals Ltd. which were forwarded to us from the United Kingdom. As explained in the Responses of Defendant Diamond Shamrock Chemicals Company to Plaintiffs' Interrogatories to Defendants, served on January 16, 1984, Agrochemicals' plant never manufactured trichlorophenol, but did produce some herbicides containing 2,4,5-T, using 2,4,5-T acid purchased from another party. However, Agrochemicals' operations were only acquired by a subsidiary of Diamond Shamrock on December 1, 1977. Accordingly, while the Agrochemicals documents may arguably be responsive to

13928

Stephen J. Schlegel, Esq.

-2-

March 6, 1984

one of plaintiffs' earlier document requests in this litigation, you may wish to review the Agrochemicals documents at our offices before ordering copies of them.

Virtually all of the remaining documents referenced by the Index are from the second category, which consists of post-1970 materials that might otherwise be responsive to plaintiffs' Interrogatories to Defendants (First Wave), dated April 19, 1983. Since these documents did not pertain to the relevant time period for the government contract defense, they were not produced as part of Phase I discovery.

Pursuant to the Court's protective order dated February 6, 1981, we will serve within the next several days a Notice of Confidentiality and Updated Index of Confidential Documents that identifies the documents referenced by the enclosed Index which Diamond Shamrock has designated as "Confidential".

If you have any questions concerning the documents referenced by the Index, please contact me at your earliest convenience.

Very truly yours,



Michael M. Gordon

MMG/man
Enclosure

BY COURIER

cc(w/encl.): Clerk of the Court
Magistrate Shira A. Scheindlin
Service List
Victor Don Russo, Jr., Esq.

13929

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

-----X
In Re
"AGENT ORANGE"
Product Liability Litigation
-----X

MDL No. 381
(All Cases) FILED
CLERK'S OFFICE
U. S. DISTRICT COURT ED. N.Y.
★
FEB 10 1984
TIME A.M. P.M. VAP
★

Defendant The Dow Chemical Company's
Amended Answers to Plaintiffs'
Interrogatories to Defendants

In accordance with Magistrate's Pretrial Order No. 2 dated February 10, 1984, defendant The Dow Chemical Company ("Dow") hereby amends its Answers and Objections to Plaintiffs' Interrogatories to Defendants dated January 16, 1984. Dow reserves its right to supplement or to amend further its answers as Dow acquires additional information in the course of its continuing preparations for trial. Dow also reserves all objections to the admission in evidence of its answer or the subject matter thereof in any proceeding or trial in this or any other action.

Schedules of documents produced in response to Interrogatories 2, 3, 4, 5, 9, and 10 are attached as Exhibits A, B, C, D, E, and F, respectively.

In addition, the answers to Interrogatories 8 and 11 are amended as follows:

Interrogatory 8

State whether you knew health hazards, physical disorders, injuries, irritations or diseases were associated with exposure to, or use of herbicides containing 2,4,5-T. If your answer is affirmative, state or identify:

13930

1989

- a) the date you acquired such knowledge, belief or suspicion;
- b) the manner in which you gained such knowledge belief or suspicion;
- c) the type of health hazards, physical disorders, injuries, irritations or diseases;
- d) all documents and communications which refer, reflect, relate to, or embody the information sought by this interrogatory.

Answer

Dow knows of no health hazards, physical disorders, injuries, irritations, or diseases associated with exposure to or use of its herbicides containing 2,4,5-T when used as directed.

Interrogatory 11

Did you at any time between 1961 and 1973 recommend to the government that any herbicide containing 2,4,5-T be replaced because of possible health problems associated with its use?

Answer

No.

Dated: Garden City, New York
February 17, 1984

RIVKIN, LEFF, SHERMAN & RADLER
for the Dow Chemical Company

By: Leslie R. Bennett
(A Member of the Firm)
100 Garden City Plaza
Garden City, New York 11530
(516) 746-7500

13931

Dow Documents Responsive to Causation Interrogatory 2

DOW0022120

DOW0023058-0023060

DOW0035973

DOW0038002-0038003

DOW0038004

DOW0038347-0038348

DOW0040310-0040311

DOW0040324

DOW0045028

DOW0045665

DOW0045667-0045668

DOW0229696

DOW0333791-0333836

DOW0382816

DOW0446119-0446120

DOW0446121

DOW0446122

DOW0446123

DOW0587486-0587489

DOW0587502

DOW0587550

DOW0587690

DOW0775003-0775007

DOW0775008-0775014

DOW0901792

DOW1162289

13932

DOW1474553-1474555

DOW1552165-1552173

DOW1601589-1601593

DOW1601862

DOW1601864-1601865

DOW1601872-1601873

DOW1716325

DOW1749939-1749940

13933

Dow Documents Responsive to Causation Interrogatory 3

DOW0183335-0183336

DOW0312587

DOW0363666

DOW0363668

DOW0363676

DOW0363678

DOW0363689

DOW0363691

DOW0363699

DOW0363707

DOW0363709-0363710

DOW0363827-0363840

DOW0377397

DOW0377398

DOW0377399

DOW0377400

DOW0377401

DOW0377402

DOW0378502-0378505

DOW0428299-0428302

DOW0438023-0438024

DOW0438042-0438054

DOW0438163

DOW0438261-0438262

DOW0438281-0438294

DOW0439197

13934

DOW0439200
DOW0439206
DOW0439251
DOW0439254
DOW0439309
DOW0439311
DOW0439344
DOW0439346
DOW0439348
DOW0439355
DOW0439357
DOW0439359
DOW0439361
DOW0439369
DOW0439372
DOW0439382
DOW0439384
DOW0439392
DOW0439396
DOW0439399-0439400
DOW0439407-0439408
DOW0439410
DOW0500580-0500584
DOW0521676-0521678
DOW0521934-0521936
DOW0521971-0521973
DOW0523812
DOW0524022
DOW0525786

13935

DOW525791
DOW0525822-0525823
DOW0525825-0525826
DOW0525908-0525909
DOW0525911-0525912
DOW0525963-0525964
DOW0525966-0525967
DOW0525999-0526000
DOW0526020-0526029
DOW0526032-0526041
DOW0534687-0534688
DOW0535945-0535946
DOW0535949
DOW0536591
DOW0536665-0536666
DOW0536797
DOW0536806-0536807
DOW0536849-0536850
DOW0536861
DOW0536894-0536895
DOW0618734-0618736
DOW0720171-0720174
DOW0721744-0721753
DOW0721755-0721756
DOW0817344-0817350
DOW0820386-0820392
DOW0820969
DOW820976-820977
DOW821214-0821216

13936

DOW0821224-0821233

DOW0821252-0821259

DOW0821281

DOW0821292-0821294

DOW0853510-0853511

DOW0853513-0853514

DOW0930305-0930307

DOW0930798-0930800

DOW0937219-0937220

DOW1171625

DOW1171626-1171627

DOW1171633

DOW1171634

DOW1171635

DOW1171637-1171639

DOW1171640

DOW1406308

DOW1406312

DOW1406342

DOW1962461

DOW1992285

DOW2022546-2022547

13937

DOW DOCUMENTS RESPONSIVE TO CAUSATION INTERROGATORY 4

DOW0011959

DOW0032302-0032324

DOW0032707-0032713

DOW0282117

DOW0556228-0556230

DOW DOCUMENTS RESPONSIVE TO CAUSATION INTERROGATORY 5

DOW0171108-0171111
DOW0171112-0171115
DOW0274515-0274517
DOW0441623-0441624
DOW0731412-0731414
DOW1320042-1320044
DOW0345368-1345370
DOW1421577-1421583
DOW1520974-1520978
DOW1587601-1587609

Dow Documents Responsive to Causation Interrogatory 9

DOW0091999

DOW0037484-0037485

DOW0101686-0101694

DOW0105153-0105167

DOW0120640-0120663

DOW0121686-0121688

DOW0203438-0203446

DOW0271733-0203757

DOW0273187-0273200

DOW0274755-0274757

DOW0280618-0280632

DOW0341469

DOW0379469

DOW0363570-0363575

DOW0376087

DOW0383682-0393685

DOW0390506-0390507

DOW0396891

DOW0442260-0442261

DOW0442329-00442333

DOW0445868-00445877

DOW0804169-0804183

DOW0947878-0947885

DOW1155346-1155350

DOW1172151-1172159

DOW1172171-1172185

DOW1172160-1172170

DOW1172854-1172855

DOW1172857

DOW1172871

DOW1172872

DOW1172883

DOW1172886

DOW1377253-1377331

DOW1519607-1519616

DOW1544160-1544161

DOW0023737-0023762

DOW0023948-0023963

DOW0273805-0273809

DOW0281777-0281778

DOW0384279-0384291

DOW0397546-0397573

DOW0397627-0397629

DOW0414141-0414145

DOW0856323-0856324

DOW0914690-0914692

DOW0992595-0992517

DOW1603607-1603608

DOW1603609

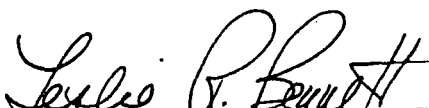
DOW1613599-1613641

VERIFICATION

LESLIE R. BENNETT, being duly sworn, deposes and says:

1. I am a member of the firm of RIVKIN, LEFF, SHERMAN & RADLER, attorneys for The Dow Chemical Company, a defendant in the above-entitled action, and I am the agent of that corporation for the purpose of answering the interrogatories served upon the corporation by plaintiffs on December 22, 1983 and for making this verification.

2. I have read the said interrogatories and the foregoing answers thereto are true according to the best of my knowledge, information and belief.



LESLIE R. BENNETT

Sworn to before me this
17th day of February, 1984.



Notary Public

THERESA A. MENNA
NOTARY PUBLIC, State of New York
No. 30-4696765
Qualified in Nassau County
Term Expires March 30, 1985

STATE OF NEW YORK)
)
COUNTY OF NASSAU)

Sharon A. Vento, being duly sworn, deposes and says:
deponent is not a party to the action, is over 18 years of age and
resides at Oceanside, N.Y.

On February 17, 1984, deponent served the within
Defendant The Dow Chemical Company's Amended Answers to Plaintiffs'
Interrogatories to Defendants upon the attorneys below set forth represent-
ing the parties, as indicated, at the addresses shown, said addresses
being designated by said attorney for that purpose.

ATTORNEY:

SEE ATTACHED SERVICE LIST

by depositing a true copy of same enclosed in a postpaid properly
addressed wrapper in an official depository under the exclusive care
and custody of the United States Post Office Department within the
State of New York.

Sharon A. Vento

Sworn to before me this
17TH day of FEBRUARY, 1984.

Theresa A. Menna

Notary

Theresa A. MENNA
NOTARY PUBLIC, State of New York
No. 30-4696765
Qualified in Nassau County
Term Expires March 30, 1985

13944

RIVKIN, LEFF, SHERMAN & RADLER

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Judicial Panel on Multidistrict
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Washington, DC 20005

Magistrate Shira A. Scheindlin
United States District Court
Eastern District of New York
225 Cadman Plaza East
Brooklyn, NY 11201

Agent Orange Plaintiffs'
Management Committee
Suite 905
Brooklyn, NY 11242

13945

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CHICAGO, ILLINOIS 60602 • (312) 782-5680

WRITERS DIRECT DIAL: (516) 228-4291

March 2, 1984

Clerk
United States District Court
Eastern District of New York
US Courthouse
225 Cadman Plaza East
Brooklyn, NY 11201

Re: Agent Orange Product Liability Litigation
MDL No. 381


Dear Sir or Madam:

I enclose for filing in the above-captioned litigation The Dow Chemical Company's Amended Answers to Plaintiffs' Interrogatories to Defendants which were served on all parties on February 17, 1984.

Thank you for your cooperation.

Very truly yours,

RIVKIN, LEFF, SHERMAN & RADLER


Steven Brock

SB:clb

Enclosure

cc: Attached Service List w/o enclosures

13943

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Special Master
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Judicial Panel on Multidistrict Lit.
1120 Vermont Avenue, NW
Suite 1002
Washington, DC 20005

Magistrate Shira A. Scheindlin
United States District Court
Eastern District of New York
225 Cadman Plaza East
Brooklyn, NY 11201

13947

RIVKIN, LEFF, SHERMAN & RADLER

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Page 2

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O'Quinn, Hagans & Wettman
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Neal R. Peterson, Esq. and
Gene Locks, Esq.
Greitzer & Locks
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Philadelphia, Pennsylvania 19102

Newton B. Schwartz, Esq.
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Suite 325
Houston, Texas 77002

13948

AGENT ORANGE TRIAL TESTIMONY
DAY 12
MOYER V DOW

13949

OS
7

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

FILED
IN CLERK'S OFFICE
U.S. DISTRICT COURT E.D.N.Y.

★ MAR 2 1983 ★

TIME: A.M.
P.M.

In re

MDL No. 381

(All Cases)

"AGENT ORANGE"

Product Liability Litigation

NOTICE OF CONFIDENTIALITY
AND UPDATED INDEX OF
CONFIDENTIAL DOCUMENTS OF
DEFENDANT THE DOW CHEMICAL
COMPANY

13950

RIVKIN, LEFF, SHERMAN & RADLER
ATTORNEYS AND COUNSELLORS AT LAW
100 GARDEN CITY PLAZA, GARDEN CITY, N.Y. 11530



UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NEW YORK

-----X
In re

"AGENT ORANGE"

Product Liability Litigation

NOTICE OF CONFIDENTIALITY
AND UPDATED INDEX OF
CONFIDENTIAL DOCUMENTS OF
DEFENDANT THE DOW CHEMICAL
COMPANY

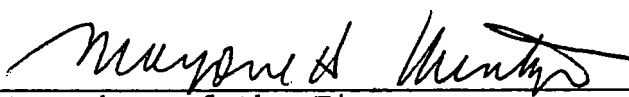
MDL No. 381 (GCP)
(All Cases)

-----X
Defendant, The Dow Chemical Company, ("Dow"), pursuant to the Protective Order regarding Production of Confidential Documents by Defendants dated February 6, 1981 (the "Confidentiality Order"), annexes hereto a Notice of Confidentiality (Exhibit A) and an Updated Index of Confidential Documents (Exhibit B) for those documents referenced in the Defendant The Dow Chemical Company's Answers to Plaintiffs' Interrogatories to Defendants (First Wave), dated February 13, 1981, which Dow has designated as "CONFIDENTIAL."

In accordance with paragraph 14 of the Confidentiality Order, Dow reserves its right to prepare and distribute further notices of confidentiality and indexes as the need arises, and to avail itself of the procedures set forth in the Confidentiality Order for the documents identified therein.

Dated: Garden City, New York
March 1, 1983

RIVKIN, LEFF, SHERMAN & RADLER

By: 
A Member of the Firm
Attorneys for The Dow Chemical Company
100 Garden City Plaza
Garden City, N.Y. 11530
(516) 746-7500

TO: ATTACHED SERVICE LIST

13951

NOTICE OF CONFIDENTIALITY AND
UPDATED INDEX OF CONFIDENTIAL
DOCUMENTS OF THE DOW CHEMICAL
COMPANY

13952

NOTICE OF CONFIDENTIALITY

13953

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0088347- 0088348*	701217	Dow Hoyle, HR Norris, JM	
0088349- 0088350*	701217	Dow Norris, JM	
0088649- 0088650*	590122	Dow Hoyle, HR McCollister, DD Wolf, MA	
0088651 *	590500	Dow	
0088911- 0088913*	660506	Dow Hoyle, HR McCollister, DD Olson, KJ	
0088914- 0088916*	771001	Dow	
0088930- 0088962*	661209	Dow	
0088969- 0088972*	670316	Dow Hoyle, HR Olson, KJ Oyen, F	
0088973- 0089003*	690515	Buerge, TE Dow	

13954

Distributees

General Subject Matter

M-3592 (Data sheet of properties, health hazards, and precautions for safe handling of materials)

M-32592 (Medical information)

Forrone Brush Killer (Data sheet of properties health hazards and precautions for safe handling of materials)

Forrone Brush Killer M-1368, Safety data sheet

M-2993 (Data sheet of properties, health hazards, and precautions for safe handling of materials)

Tordon 155 Mixture Brush Killer (Material safety data sheet)

2M0-3083-1 (Request for screening or application testing)

Tordon 105 Mixture (Data sheet of properties, health hazards, and precautions for safe handling of materials)

Toxicological properties and industrial handling hazards of

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		Norris, JM Torkelson	
0091173- 0091176*	670316	Buerge, TE Dow Lynn, GE Olson, K Oyen, F	
0091177- 0091178*	670227	Dow Hoyle, HR Olson, KJ Oyen, F	

13955

DistributeesGeneral Subject Matter

Boundy, RH
 Dean, P
 Dow
 Elshere, D
 Holder, BB
 Jones, GD
 Kagy, JF
 Killian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, HH
 Moss, RD
 Sheetz, DP
 Shrader, SA
 Wilson, AW
 Wright, N

Tordon 225 Mixture herbicide
 (M-3199X)

Toxicological properties and
 industrial handling hazards of
 Tordon 105 Mixture
 (T2.M031-3132-1) (CRI 123032)

Boundy, RH
 Dean, P
 Dow
 Elshere, D
 Holder, BB
 Jones, GD
 Kagy, JF
 Killian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, HH
 Moss, RD
 Sheetz, DP

Tordon 105 Mixture data sheet of
 properties, health hazards, and
 precautions for safe handling of
 materials (T2.M0-3132-1)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0278385- 0278390*	540106	Dow Wolf, MA	
0278390- 0278392*	531230		
0278393- 0278395*	540106		
0278396- 0278404*	540106		
0503923 *	000000	Dow	
0564850- 0564851*	000000	Dow Hoyle, HR JMN	
0725179- 0725184*	650615	Dow	
0750332- 0750354*	571122	Dow McCollister, DD Olson, KJ	

13956

Distributees

General Subject Matter

M-213 (Acute oral toxicity)

M-213 (Acute oral toxicity)

M-213

M-213 (Skin irritation)

Esteron 76BE

Tordon 225 herbicide (Data sheet of properties, health hazards, and precautions for safe handling of materials)

Pulsafeeder test sheet hydrochloric acid

Allinson, RL
Athay, RN
Beshgetoor, AW
Boundy, RH
Colby, RW
Dosser, RC
Dow

Results of range finding toxicological tests on Brush Killer X, Weed Killer X, and Brush Killer TX

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0750465- 0750469*	501017	Adams, EM Dow McCollister, DD Rowe, VK	Allen, WW Alquist, FN Britton, JW Dossier, RC Dow Dutton, WC Irish, DD Kagy, JF Lynn, GE
0750470- 0750484*	530217	Dow RJE McCollister, DD Oyen, F	

13957

Distributees

Elshere, D
Gay, HH
Greene, LM
Hart, A
Hymas, TA
Jones, GD
Kilian, DJ
Luce, EN
Martin, D
McIntyre, HH
Mussell, DR
Perkins, RP
Tisdale, WO
White, LC
Wright, N

General Subject Matter

Results of skin irritation and
skin sensitization tests conducted
on human subjects with Esteron 245
(New Ester)

Allen, WW
Allinson, RL
Alquist, FN
Beshgetoor, AW
Boundy, RH
Britton, EC

Results of range finding toxicological
tests on Esteron 245

Dow Number

Date

Author

Recipient

0750560-
0750587*

531030

Adams, EM
Oyen, F

13958

Distributees

General Subject Matter

Britton, JW
Collier, B
Davidson, JH
Dow
Dutton, WC
Gay, HH
Gibson, J
Greene, LN
Heath, SB
Johnson, JE
Kagy, JF
Kelly, JA
Kriner, RR
Luce, EN
Lynn, GE
MacCutcheon
Melass, VH
Nation, HA
Otis, CE
Prendergast, DT
Southwick, L
Sunderland, WW
Vanhorn, JC
Walker, H
White, LC
Wright, P
Zuhl, HH

Allen, WW
Allinson, RL
Alquist, FN
Barrons, KC
Beshgetoor, AW

Results of range finding toxicological tests on Dow Brush Killer T

Dow Number

Date

Author

Recipient

0750602-
0750633*

560501

Dow
McCollister, DD
Torkelson, TR

13959

DistributeesGeneral Subject Matter

Boundy, RH
Britton, EC
Davidson, JH
Dow
Dutton, WC
Gay, HH
Greene, LM
Kagy, JF
Luce, EN
Lynn, GE
MacCutcheon, SM
Prescott, RF
Sunderland, WW
White, L
Wright, P

Allinson, RL
Beshgetoor, AW
Boundy, RH
Britton, EC
Coulter, LL
Dow
Elshere, D
Gay, HH
Greene, LM
Hart, A
Kilian, DJ
Luce, EN
McCutcheon, SM
Martin, D
Scoles, G
Sunderland, WW
Wright, N

Results of range finding toxicological tests on M-631 (Esteron 245-Type Formulation)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0750666- 0750693*	560409	Dow McCollister, DD Wolf, MA	

0750694- 0750714*	560702	Dow McCollister, DD Olson, KJ	
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13960

Distributees

General Subject Matter

Allinson, RL
Beshgetoor, AW
Boundy, RH
Britton, EC
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hart, A
Kagy, JF
Kelly, J
Killian, DJ
Luce, EN
Lynn, GE
MacCutcheon, SM
Sunderland, WW
Wright, N

Results of range finding toxicological tests on formulations of Reddon (M-640 and M-713)

Allinson, RL
Alquist, FN
Barrons, KC
Beshgetoor, AW
Boundy, RH
Britton, EC
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hart, A
Kagy, KF
Kelly, JA

Results of range finding toxicological tests on Esteron Brush Killer O.S. (M-726)

Dow Number

Date

Author

Recipient

0750719-
0750726*

570806

Dow
Hoyle, HR
Wolf, MA

0750727-
0750736*

570510

Babcock, I
Dow
Dunn, EE

Dow
Wolf, MA

13961

Distributees

General Subject Matter

Kilian, DJ
Luce, EN
Lynn, GE
MacCutcheon, SM
Sunderland, WW
Wright, N

Results of range finding toxicological tests on M-1085 (A 245T Triethylamine Liquid Formulation)

Allinson, RL
Athay, RM
Beshgetoor, AW
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McCollister, DD
McIntyre, HH
Mussell, DR
Perkins, RP
Scoles, GW
Tisdale, WL
Wright, N

Request for application testing
for M-1085 with eye and skin
contact tests attached

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		KS MAW	
0750739- 0750740*	570510	Dow Hoyle, HR McCollister, DD Wolf, MA	
0750741- 0750743*	000000	Dow Hoyle, HR McCollister, DD Wolf, MA	
0750744- 0750746*	580521	Dow McCollister, DD Olson, KJ	Coulter, LL Dow
0750747- 0750764*	580425	Dow Hoyle, HR McCollister, DD Olson, KJ	

13962

Distributees

General Subject Matter

M-1085 data sheet of properties,
health hazards, and precautions
for safe handling of materials

M-1085 data sheet of properties,
health hazards, and precautions
for safe handling of materials

Results of range finding toxicolo-
gical tests on Weed Killer
Formulation M-1094 containing a
245T Ester

Allinson, RL
Athay, RM
Beshgetoor, AW
Boundy, RH
Colby, RW
Coulter, LL
Dow
Elshere, D
Fletcher, FW
Gay, HH
Greene, LM
Hammer, OH
Hart, A
Jones, GD
Kagy, JF

M-1094 Weed Killer Formulation
Data sheet of properties, health
hazards and precautions for safe
handling of materials

Dow Number

Date

Author

Recipient

0750769-
0750790*

610316

Hoyle, HR
Olson, KJ
Oyen, F
Thompson, E

0750791-
0750793*

000000

Hoyle, HR
Olson, KJ
Oyen, F

13963

Distributees

General Subject Matter

Kilian, DJ
Luce, EN
McIntyre, HH
Perkins, RP
Scoles, GW
Tisdale, WL
Vanvalkenburg, W
Wright, N

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Falkenstein, WJ
Gay, HH
Greene, LM
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Shrader, SA
Tisdale, WL
Vanvalkenburg, W
Wright, N

Results of range finding toxicological tests on M-1123

M-1123 data sheet of properties, health hazards, and precautions for safe handling of materials

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0750795- 0750813*	600125	Dow Oyen, F Wolf, MA	

0750814- 0750827*	610601	Dow Olson, KJ Oyen, F	
----------------------	--------	-----------------------------	--

13964

Distributees

Barrons, KC
 Boundy, RH
 Colby, RW
 Dow
 Elshere, D
 Gay, HH
 Greene, LM
 Hammer, OH
 Hart, A
 Hymas, TA
 Jones, GD
 Kagy, JF
 Kilian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, HH
 Perkins, RP
 Stenger, VA
 Tisdale, WL
 Wright, N

Barrons, KC
 Boundy, RH
 Colby, RW
 Dow
 Elshere, D
 Falkenstein, WJ
 Gay, HH
 Greene, LM
 Hart, A
 Jones, GD
 Kagy, JF
 Kilian, DJ

General Subject Matter

Results of range finding toxicological tests on Esteron 245 OS (M-1257)

Results of range finding toxicological tests on Esteron 245 OS (Replacement for present Formulation M-1257)

Dow Number

Date

Author

Recipient

0750833-
0750854*

571122

Dow
McCollister, DD
Olson, KJ

0750855-
0750873*

590818

Olson, KJ
Oyen, F

13965

Distributees

Luce, EN
 Lynn, GE
 McIntyre, HH
 Perkins, RP
 Shrader, SA
 Tisdale, WL
 White, LC, Jr.
 Wright, N

Allinson, RL
 Athay, RM
 Beshgetoor, AW
 Boundy, RH
 Colby, RW
 Dosser, RC
 Dow
 Elshere, D
 Gay, HH
 Greene, LM
 Hart, A
 Hymas, TA
 Jones, GD
 Killian, DJ
 Luce, EN
 Martin, D
 McIntyre, HH
 Mussell, DR
 Perkins, RP
 Tisdale, WL
 White, LC
 Wright, N

Barrons, KC
 Boundy, RH

General Subject Matter

Results of range finding toxicological tests on Brush Killer X, Weed Killer X, and Brush Killer TX

Results of range finding toxicological tests on M-1413 (Formulation

Dow Number

Date

Author

Recipient

0750874-
0750876*

590706

Dow
Hoyle, HR
Olson, KJ
Oyen, F

0750878-
0750903*

590506

Dow
McCollister, DD
Wolf, MA

13955

Distributees

Colby, RW
Dow
Elshere, D
Gay, HH
Gray, HE
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Killian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Scoles, G
Stenger, VA
Tisdale, WL
Wright, N

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH

General Subject Matter

of Dowanol Ester 245T) made for
the Stull Chemical Company

M-1413 Formulation of K 7856
(Dowanol Ester 245T). Data sheet
of properties, health hazards and
precautions for safe handling of
materials

Results of range finding toxicological
tests on M-1447 and M-1443
Weed Killer Formulations (Similar
to Esteron 245 OS and Esteron
Brush Killer OS respectively)

265

Dow Number

Date

Author

Recipient

0750915-
0750940*

590506

Dow
McCollister, DD
Wolf, MA

13967

Distributees

General Subject Matter

Gray, HE
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Stenger, VA
Tisdale, WL
Vanvalkenburg, JW
Wright, N

Results of range finding toxicological tests on M-1447 and M-1433 Weed Killer Formulations (Similar to Esteron 245 OS and Esteron Brush Killer OS respectively)

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Gray, HE
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, JD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE

Dow Number

Date

Author

Recipient

0750951-
0750952*

591209

Dow
Wolf, MA

McIntyre, HH

0750956-
0750974*

590903

Dow
Olson, KJ
Oyen, F

13968

Distributees

General Subject Matter

McIntyre, HH
Perkins, RP
Stenger, VA
Tisdale, WL
Vanvalkenburg, JW
Wright, N

Dow
Wolf, MA

Toxicological information on
Esteron 99 granules (M-1741)
suitable for presentation to the
USDA

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Kilian, DJ
Leasure, JK
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Scoles, G
Stenger, VA
Tisdale, WL
Wright, N

Results of range finding toxicological tests on Agricultural Chemical Formulation M-1511 containing Dowanol 97B70 Ester 245T (K-7856)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0750975- 0750976*	590811	Dow HRH Olson, KJ Oyen, F	
0750977- 0550996*	600216	Dow Olson, K Oyen, F	
0750998- 0751016*	600223	Dow Olson, KJ Oyen, F	

13959

Distributees

General Subject Matter

M-1511 Data sheet of properties,
health hazards and precautions for
safe handling of materials

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Scoles, GW
Stenger, VA
Tisdale, WL
Wright, N

Results of range finding toxicological tests on Agricultural Chemical Formulation M-1683 (Esteron 245 Type)

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D

Results of range finding toxicological tests on Agricultural Chemical Formulation M-1684 (Esteron Brush Killer Type)

Dow Number

Date

Author

Recipient

0751056-
0751058*

611120

Dow
Olson, KJ
Oyen, F
Plomer, ET
Scoles, GW

13970

Distributees

General Subject Matter

Gay, HH
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Scoles, GW
Stenger, VA
Tisdale, WL
Wright, N

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Falkenstein, W
Gay, HH
Greene, LM
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, P

Results of range finding toxicological tests on M-2115, an agricultural chemical formulation containing 245T and triethyl amine

Dow Number

Date

Author

Recipient

0751059 *

611120

0751060-
0751075*

611106

Dow
Hoyle, HR
Olson, KJ
Oyen, F
Plomer, ET

13971

Distributees

General Subject Matter

Scoles, GW
Shrader, SA
Tisdale, WL
Wright, N

First aid measures

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Falkenstein, W
Gay, HH
Greene, LM
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, P
Scoles, GW
Shrader, SA
Tisdale, WL
Wright, N

M-2115 data sheet of properties,
health hazards and precautions for
safe handling of materials

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Falkenstein, W
Gay, HH

Dow Number

Date

Author

Recipient

0751078-
0751080*

620403

Dow
Olson, KJ
Oyen, F
Vanvalkenburg, W

13972

DistributeesGeneral Subject Matter

Greene, LM
 Hart, A
 Jones, GD
 Kagy, JF
 Kilian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, HH
 Perkins, P
 Scoles, GW
 Shrader, SA
 Tisdale, WL
 Wright, N

Barrons, KC
 Boundy, RH
 Brown, R
 Colby, RW
 Dow
 Elshere, D
 Falkenstein, WJ
 Gay, HH
 Greene, LM
 Hart, A
 Jones, GD
 Kagy, JF
 Kilian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, HH
 Nash, HA
 Perkins, RP
 Shrader, SA

Results of range finding toxicological tests on M-2235, an emulsifiable formulation of 24D and 245T Dowanol Esters in kerosene

Dow Number

Date

Author

Recipient

0751081 *

620323

0751082-
0751098*

620323

Dow
Hoyle, HR
Olson, KJ
Oyen, F

13973

DistributeesGeneral Subject Matter

Vanvalkenburg, W
 Wilson, AW
 Wright, N

Barrons, KC
 Boundy, RH
 Brown, R
 Colby, RW
 Dow
 Elshere, D
 Falkenstein, WJ
 Gay, HH
 Greene, LM
 Hart, A
 Jones, GD
 Kagy, JF
 Kilian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, H#
 Nash, HA
 Perkins, RP
 Shrader, SA
 Vanvalkenburg, W
 Wilson, AW
 Wright, N

First aid measures

Barrons, KC
 Boundy, RH
 Brown, R
 Colby, RW
 Dow
 Elshere, D

M-2235 data sheet of properties,
 health hazards, and precautions for
 safe handling of materials

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0751099- 0751101*	630809	Hoyle, HR Olson, KJ Oyen, F	
0751102 *	620124	Dow Wolf, MA	Dow McIntyre, HH
0751209- 0751210*	630225	Dow Olson, KJ Oyen, F Scoles, G	

13974

Distributees

General Subject Matter

Falkenstein, WJ
Gay, HH
Greene, LM
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Nash, HA
Perkins, RP
Shrader, SA
Vanvalkenburg, W
Wilson, AW
Wright, N

Verton T sales specification

Suggested precautionary labeling
for M-2235

Barrons, KC
Boundy, RH
Brown, R
Colby, RW
Dow
Elshere, D
Falkenstein, WJ
Gay, HH
Greene, LM

Results of range finding toxicological tests on agricultural chemical formulation M-2422 containing 91 percent Dowanol PIB Ester of 245T

Dow Number

Date

Author

Recipient

0751211 *

630225

13975

Distributees

Hart, A
 Jones, GD
 Kagy, JF
 Killian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, HH
 Mullison, WR
 Nash, HA
 Norton, TR
 Shrader, SA
 Wilson, AW
 Wright, N

General Subject Matter

Barrons, KC
 Boundy, RH
 Brown, R
 Colby, RW
 Dow
 Elshere, D
 Falkenstein, WJ
 Gay, HH
 Greene, LM
 Hart, A
 Jones, GD
 Kagy, JF
 Killian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, HH
 Mullison, WR
 Nash, HA
 Norton, TR

First aid measures

Dow Number

Date

Author

Recipient

0751212-
0751213*

630220

Dow
Hoyle, HR
Olson, KJ
Oyen, F

0751214-
0751236*

630225

13976

Distributees

General Subject Matter

Shrader, SA
Wilson, AW
Wright, N

Barrons, KC
Boundy, RH
Brown, R
Colby, RW
Dow
Elshere, D
Falkenstein, WJ
Gay, HH
Greene, LM
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Mullison, WR
Nash, HA
Norton, TR
Shrader, SA
Wilson, AW
Wright, N

M-2422 data sheet of properties,
health hazards and precautions for
safe handling of materials

Barrons, KC
Boundy, RH
Brown, R
Colby, RW
Dow
Elshere, D

Toxicological properties of
Formulation M-2422

Dow Number Date Author Recipient

0752264- 670328 Dow
0752265* Hoyle, HR
 McCollister, DD
 Olson, KJ

0752266 * 661220 Buerge, TE Dow
 Dow Lynn, GE

0752360- 670410
0752361*

0752385- 690415 Dow
0752386* Norris, JM
 Torkelson, TR

13977

Distributees

General Subject Matter

Falkenstein, WJ
Gay, HH
Greene, LM
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Mullison, WR
Nash, HA
Norton, TR
Shrader, SA
Wilson, AW
Wright, N

M-3060 data sheet of properties,
health hazards and precautions for
safe handling of materials

M-3060 request for screening or
application testing

M-3060, Safety Data and
Formulation

M-3401 Brush Killer-A Tordon Acid
Formulation

Axe, FD
Barton, J
Beauchamp, RR
Blair, EH
Burgert, BE

Distributees

General Subject Matter

Dow
Edwards, H
Elshere, D
Gordon, HL
Holder, BB
Johnson, JE
Kagy, JF
Kilian, DJ
Kimmel, CE
Lloyd, BH
MacCutcheon, SM
McCollister, DD
McIntyre, HH
Morse, D
Pitman-Moore
Robinson, VB
Schwartz, AJ
Wright, N

M-3402 Brush Killer data sheet of
properties, health hazards and
precautions for safe handling of
materials

Toxicological properties of M-3401
Brush Killer-A Tordon acid for-
mulation

Tordon 225 herbicide release to
sales

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		Newport, JJ Ridner, JM Seymour, KG Stein, JS Williams, CS Williams, RW Wolf, MA	
0752553- 0752554*	690429	Dow Hoyle, HR Norris, JM	
0762493- 0762496*	500829	Dow Rowe, VK Spencer, HC	Allen, WW Barrons, KC Britton, JW Dossier, RC Dow Dutton, WC Irish, DD Kagy, JF Lynn, GE
0762497 *	000000		
0762498 *	490309	Dow Irish, DD McCollister, DD Rowe, VK White, L	
0762499 *	490412	Dow Wyse, H	

13979

Distributees

General Subject Matter

Tordon 225 mixture herbicide data sheet of properties, health hazards and precautions for safe handling of materials

Results of range finding toxicological tests on Esteron 245T formulations

Summary of toxicological information on 24D & 245T formulations

Esteron 245T (New formulation)
(Request for biological test)

K7716-1 Esteron 245T (New formulation) (Acute oral toxicity)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0762500 *	490321	Dow Wyse, H	
0762501- 0762504*	490000	Dow Wyse, H	
0762505 *	490517	Dow Wyse, H	
0762506 *	490225	Dow HAS RSH Irish Rowe, VK White, L	
0762507 *	490414	Dow Wyse, H	
0762508 *	490321	Dow Wyse, H	
0762509- 0762512*	490000	Dow Wyse, H	
0762513 *	490517	Dow Wyse, H	
0766698- 0766699*	690415	Beauchamp, RR Dow Norris, JM	

13980

Distributees

General Subject Matter

Esteron 245T (New formulation)

K7716-1 Esteron 245T (New
formulation) (Skin irritation)

K7716-1 Esteron 245T (New
formulation) (Single absorption
exposure record)

Esteron 245T formulation (Request
for biological test)

K7716-2 Esteron 245T formulation
(acute oral toxicity)

Esteron 245T formulation

K7716-2 Esteron 245T formulation
(Skin irritation)

K7716-2 Esteron 245T formulation
(Single absorption exposure
record)

Axe, FD
Barron, J
Beauchamp, RR

M-3401 Brush Killer-A Tordon Acid
Formulation

Dow Number

Date

Author

Recipient

Torkelson, TR

0766700-
0766701*

690320

Dow
Hoyle, JR
Norris, JM
Torkelson, TR

0766702-
0766708*

690417

Dow
Norris, JM

0766709 *

681008

Beauchamp, RR
Dow
McCollister, DD

Byrd, BC
Dow
Hoerger, FD
McCollister, DD

13981

Distributees

General Subject Matter

Blair, EH
Burgert, BE
Dow
Edwards, H
Elshere, D
Gordon, HL
Holder, BB
Johnson, JE
Kagy, JF
Kilian, DJ
Kimmel, CE
Lloyd, BH
MacCutcheon, SM
McCollister, DD
McIntyre, HH
Morse, D
Robinson, VB
Schwarz, AJ
Wright, N

M-3401 Brush Killer (Data sheet of properties, health hazards and precautions for safe handling of materials)

Toxicological properties of M-3401 Brush Killer, a Tordon acid formulation

Proposed name, Tordon 124V Brush Killer (M3401) (Request for screening or application testing)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0766710 *	681008	Dow	
0766711- 0766726*	680000	Dow Litchfield, N Norris, JM	
0766727- 0766729*	690310	Dow Norris, JM	
0766730- 0766737*	680000	Dow King, CD Litchfield, N Sparschu, GL Trice, V	
0766738- 0766740*	681000	Dow Dunn, FL	
0766741- 0766744*	681104	Dow Dunn, FL	
0766745- 0766746*	690128	Dow Dunn, FL	
0766747- 0766750*	690000	Dow Litchfield, N	
0766751- 0766765*	690123	Dow Norris, JM	
0766766 *	690123	Dow	

13982

Distributees

General Subject Matter

Toxicology work sheet (Tordon
124V Brush Killer)

Tordon 124V Brush Killer (Acute
oral toxicity)

M-3401 Brush Killer, oral dosage
to male rats

Tordon 124V Brush Killer (Request
for pathology)

Tordon 124V Brush Killer (Eye con-
tact test)

Tordon 124V Brush Killer (Skin
contact, irritation)

M-3401 Tordon 124V Sample 2, (Skin
contact, irritation)

Tordon (Skin contact absorption)

Toxicological properties of Tordon
124V Brush Killer made with CA
Tordon acid

Tordon 124V Brush Killer
(Toxicology work sheet)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0766767 *	681008	Beauchamp, RR Dow McCollister, DD	
0766768- 0766769*	000000	Dow	
0766770- 0766800*	680000	Dow Dunn, FL Litchfield, N	
0766801- 0766821*	680000	Conran, PB Dow King, CD Litchfield, N Sparschu, GL Trice, V	
0766822- 0766823*	690107	Beauchamp, RR Dow Leong, BKJ Trice, VR	
0766824- 0766847*	690113	Beauchamp, RR Conran, PB Dow Leong, BKJ Sparschu, GL Trice, VR	

13983

Distributees

General Subject Matter

Proposed name Tordon 124V Brush
Killer (Request for screening or
application testing)

M3401 Brush Killer (Data sheet of
properties, health hazards and
precautions for safe handling of
materials)

Tordon 124V Brush Killer, male rat
testing

Tordon 124V Brush Killer (Request
for pathology)

Summary report on the effect of
acute inhalation of the volatile
components of California Tordon
Acid and Texas Tordon Acid
(Biochemical Res Lab Sample 1)

Summary pathology report on the
effect of acute inhalation of the
volatile components of California
Tordon Acid and Texas Acid
(Biochem Res Lab Pathology Report
Sample)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767018- 0767019*	560412	Dow	
0767020- 0767021*	610525	Dow Hoyle, HR Olson, KJ Oyen, F	
0767022- 0767023*	790216	Dow Fishbeck, WA Keeler, P	
0767024- 0767025*	720329	Dow	
0767026- 0767027*	580613	Dow McCollister, DD Wolf, MA	
0767028- 0767029*	610525	Dow Olson, KJ Oyen, F	
0767030 *	610531	Dow	
0767031 *	000000	Dow	
0767032 *	700721	Dow	

13984

Distributees

General Subject Matter

Esteron Brush Killer OS M-726 (T2.30-71-1), safety data sheet with formulation

Esteron 99 data sheet of properties, health hazards and precautions for safe handling of materials

Esteron 99 medical information

Esteron 99 material safety data sheet

Esteron 99 data sheet of properties, health hazards and precautions for safe handling of materials

Esteron 99 data sheet of properties, health hazards and precautions for safe handling of materials

Esteron 99 (Replacement formulation)

Esteron 99 medical information symptomatology and treatment

Esteron 99 toxicology, anticipated human response

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767033- 0767034*	720329	Dow	
0767054- 0767055*	570514	Dow Hoyle, HR McCollister, DD Wolf, MA	
0767056- 0767057*	580514	Dow Hoyle, HR McCollister, DD Wolf, MA	
0767058 *	000000	Dow Hoyle, HR Wolf, MA	
0767059- 0767060*	710900	Dow	
0767061 *	580716	Dow Wolf, MA	Dow McIntyre, HH
0767062 *	610112	Dow Wolf, MA	Dow McIntyre, HH
0767063- 0767064*	580425	Dow Hoyle, HR McCollister, DD Olson, KJ	
0767065 *	580717	Dow Hoyle, HR Olson, KJ	

13985

Distributees

General Subject Matter

Esteron 99 material safety data sheet

M-1086 data sheet of properties, health hazards and precautions for safe handling of materials

Veon brush killer (M-1086) data sheet of properties, health hazards and precautions for safe handling of materials

M-1086 (A herbicidal formulation T2.3098), safety data sheet

Veon brush killer

Suggested precautionary labeling for M-1094

Suggested precautionary labeling for M-1094

M-1094 weed killer formulation data sheet of properties, health hazards and precautions for safe handling of materials

M-1094 containing 245T Ester T2, 30-112-1, safety data sheet

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767066 *	570730	Dow Wolf, MA	Coulter, LL Dow
0767067- 0767068*	571120	Dow Hoyle, HR McCollister, DD Olson, KJ	
0767069- 0767070*	571028	Dow Hoyle, HR McCollister, DD Olson, KJ	
0767071 *	571206	Dow Hoyle, HR Olson, KJ	
0767072 *	571206	Dow Hoyle, HR Olson, KJ	
0767073 *	610112	Dow Wolf, MA	Dow McIntyre, HH
0767073- 0767074*	610311	Dow Hoyle, HR Olson, KJ Oyen, F	
0767075 *	610400	Dow	
0767092- 0767098*	531029	Adams, EM	

13986

Distributees

General Subject Matter

Inverton, a letter showing concern for hazards

Inverton M-1116 data sheet of properties, health hazards and precautions for safe handling of materials

M-1116 dilution C1-14-100 data sheet of properties, health hazards and precautions for safe handling of materials

Inverton weed killer (M-1116)
T2.30-101-1, safety data sheet

M-1116 dilution Inverton formulation

Suggested precautionary labeling for M-1123

M-1123 data sheet of properties, health hazards and precautions for safe handling of materials

M-1123, safety data sheet

Allen, WW

Results of range finding toxicolo-

Dow Number

Date

Author

Recipient

Dow
Eslunn, E
Maxey, JS
Oyen, F

0767099-
0767119*

530325

Dow
HCS
Rowe, VK
Wolf, MA

0767153-
0767160*

570806

Dow
McCollister, DD
Wolf, MA

13987

Distributees

Allinson, RL
Alquist, FN
Barrons, KC
Beshgetoor, AW
Boundy, RH
Britton, EC
Davidson, JH
Dow
Dutton, WC
Gay, HH
Greene, LM
Kagy, JF
Luce, EN
Lynn, GE
MacCutcheon, SM
Prescott, RF
Sunderland, WW
White, LC
Wright, P

General Subject Matter

gical tests on Dow Brush Killer
50-50

Toxicity of Dow Brush Killer 50-50
(T2.30-28-1)

Allinson, RL
Athay, RM
Beshgetoor, AW
Boundy, RF
Colby, RW
Dow
Elshere
Gay, HH

Results of range finding toxicological tests on M-1085 (A 245T triethylamine liquid formulation T2.30-97-1)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767154- 0767155*	571005	Dow Hoyle, HR McCollister, DD Wolf, MA	
0767161 *	570228	Dow	
0767162 *	570301	Dow	Barrons, KC Dow
0767163- 0767164*	570402	Babcock, D Dow Wolf, MA	
0767165- 0767166*	570415	Dow .	

13988
88681

Distributees

General Subject Matter

Greene, LM
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Luceen
Lynn, GE
McIntyre, HH
Mussell, DR
Perkins, RP
Scoles, GW
Tisdale, WL
Wright, N

M-1085 (A 245T alkyl amine formulation) data sheet of properties, health hazards and precautions for safe handling of materials

Sample 1, M-1085 (T2.30-97-1), eye and skin contact

M-1085 request for applications testing (2.30-97-1)

Sample 1 (2.30-97-1) (eye contact test)

Sample 1 M-1085 skin contact irritation T2.30-97-1

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767184- 0767191*	570806	Dow McCollister, DD Wolf, MA	
0767185- 0767186*	570511	Dow Hoyle, HR McCollister, DD Wolf, MA	
0767192 *	570228	Dow Wolf, MA	
0767193 *	570227	Dow Scoles, G	Barrons, KC Dow

68891

Distributees

Allison, RW
Athay, RM
Barrons, KC
Beshgetoor, AW
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hart, A
Jones, GD
Kagy, JF
Killian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Russel, DR
Scoles, G
Tisdale, WL
Wright, N

General Subject Matter

Results of range finding toxicological tests on M-1086 (A 245T and 24D alkyl amine formulation)

M-1086 (Data sheet of properties, health hazards and precautions for safe handling of materials)

Sample 1, M-1086 (Toxicology work sheet)

M-1086 (2.30-96-1) (Request for applications testing)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767194- 0767195*	570326	Dow Stagerstron, E	
0767196- 0767197*	570228	Dow	
0767213- 0767222*	580521	Dow McCollister, DD Olson, K	

0767216- 0767217*	580425	Dow Hoyle, HR McCollister, DD Olson, KJ	
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13990

Distributees

Allinson, RL
Athay, RM
Beshgetoor, AW
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hammer, OH
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
McIntyre, HH
Perkins, RP
Scoles, GW
Tisdale, WL
Vanvalkenburg, W
Wright, N

General Subject Matter

Eye contact test M-1086,
T2.30-96-1

M-1086 (Skin contact irritation)
(T2.30-96-1)

Results of range finding toxicological tests on weed killer formulation M-1094 containing a 245T Ester (T2.30-112-1)

M-1094 Weed Killer formulation
(Data sheet of properties, health hazards, and precautions for safe handling of materials)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767223 *	580225	Dow	
0767224 *	000000	Dow Scoles, G	
0767225 *	580218	Coulter, LL Dow	Dow Rowe, VK
0767226 *	580225	Dow NCG	
0767227- 0767228*	530311	Dow NCG	
0767229- 0767230*	580525	Dow NCG	
0767231 *	580402	Coulter, LL Dow	Dow Rowe, VK
0767243- 0767251*	571220	Dow McCollister, DD Olson, KJ	

13991

DistributeesGeneral Subject Matter

Dow
 Fletcher, FW
 Scoles, GW
 Vanvalkenburg, W

Sample 1 Weed Killer formulation
 (M-1094) (Toxicology work sheet)

245T (Request for screening or
 application testing)

Formulation M-1094, contemplated
 sales program

Sample 1 Weed Killer formulation
 (M-1094) (T2.30-112-1) (acute oral
 toxicity)

Sample 1 Weed Killer formulation
 (M-1094) (eye contact test)

Sample 1, weed killer formulation
 (M-1094) (T2.30-112-1) (skin con-
 tact irritation)

Dow
 Fletcher, FW
 Scoles, GW
 Vanvalkenburg, JW

M-1094, will remain in development
 during 580000

Allinson, RL
 Beshgetoor, AW
 Boundy, RH
 Colby, RW
 Coulter, LL
 Dow

Results of range finding toxicolo-
 gical tests on Inverton (brush
 killer). (T2.30-101-1)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
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0767245- 0767246*	571120	Dow Hoyle, HR McCollister, DD Olson, KJ	
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0767252 *	570520	Dow	
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0767253 *	000000	Dow Scoles, G	
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0767254 *	570520	Dow	
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0767255- 0767256*	570520	Babcock, D Dow	
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13992

Distributees

Elshere, D
Gay, HH
Gray, HE
Greene, LM
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Killian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Mussell, DR
Perkins, RP
Scoles, GW
Tisdale, WL
Wright, N

General Subject Matter

Inverton M-1116 (Data sheet of properties, health hazards and precautions for safe handling of materials)

Sample 1 M-1116 (T2.30-101-1)
(Toxicology work sheet)

M-1116 (Request for applications testing) (2.30-101-1)

Sample 1 M 1116 (Acute oral toxicity) (T2.30-101-1)

Sample 1 M-1116 (Eye contact test) (T2.30-101-1)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767257- 0767258*	570624	Babcock, D Dow	
0767259- 0767260*	570730	Dow Wolf, MA	Coulter, LL Dow
0767261 *	580221	Dow	Dow Olson, KJ
0767262 *	580408	Dow Wolf, MA	Dow McIntyre, HH
0767263- 0767267*	610316	Dow Olson, KJ Oyen, K Thompson, E Vanvalkenburg, W	

13993

Distributees

General Subject Matter

Sample 1 M-1116 (Skin contact irritation) (T2.30-101-1)

Inverton, a letter showing concern for hazards

Request for report

Suggested precautionary labelling for Inverton (M-1116)

Results of range finding toxicological tests on M-1123 (T2.30-201-1)

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Falkenstein, WJ
Gay, HH
Greene, LM
Hart
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Shrader, SA
Tisdale, WL
Vanvalkenburg, W
Wright, N

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767268- 0767269*	610311	Dow Hoyle, HR Olson, KJ Oyen, F	
0767270 *	601228	Dow	
0767271 *	601229	Dow	
0767272 *	601223	Dow Vanvalkenburg, W	Dow Olson, KJ
0767273 *	610106	Dow Wolf, MA	Dow Ritty, PM
0767274 *	601228	Dow	
0767275- 0767276*	610110	Dow Thompson, E	
0767277- 0767280*	601228	Dow Thompson, E	
0767281- 0767282*	610120	Dow Thompson, E	
0767288- 0767300*	610601	Dow White, LC, Jr.	

13994

Distributees

General Subject Matter

M-1123 (Data sheet of properties, health hazards and precautions for safe handling of materials)

M-1123 (Toxicology work sheet)
(T2.30-201-1)

M-1123 (request for screening or application testing)

M-1123, Formulation, use, release to sale plans

Formulation for M-1094, no data available on toxicity for M-1123

Sample 1 M-1123 (Acute oral toxicity) (T2.30-201-1)

Sample 1 M-1123 (Eye contact test) (T2.30-201-1)

Sample 1 M-1123 (Skin contact irritation) (T2.30-201-1)

Sample 1 M-1123 (Skin contact absorption) (T2.30-201-1)

Results of range finding toxicological tests on Esteron 245-OS (replacement for present for-

Dow
Johnson, JE
Ritty, PM

Barrons, KC
Boundy, RH
Colby, RW

Dow Number

Date

Author

Recipient

0767301-
0767314*

600125

Dow
Wolf, MA

13985

Distributees

Dow
 Elshere, D
 Falkenstein, WJ
 Gay, HH
 Greene, LM
 Hart, A
 Jones, GD
 Kagy, JF
 Kilian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, HH
 Oyen, F
 Perkins, RP
 Shrader, SA
 Tisdale, WL
 White, LC, Jr.
 Wright, N

Barrons, KC
 Boundy, RH
 Colby, RW
 Dow
 Elshere, D
 Gay, HH
 Greene, LM
 Hammer, OH
 Hart, A
 Hymas, TA
 Jones, GD
 Kagy, JF
 Kilian, DJ
 Luce, EN

General Subject Matter

mulation M-1257) (BC T2.30-167-2)

Results of range finding toxicological tests on Esteron 245
 OS(M.1257) (BC T2.30-167-1)

Dow Number

Date

Author

Recipient

0767309 *

591102

Dow
Vanvalkenburg, JW

Dow
Wolf, MA

13996

0767315 *

591028

Dow
Ritty, PM

Dow
Wolf, MA

Distributees

Lynn, GE
 McIntyre, HH
 Oyen, F
 Perkins, RP
 Stenger, VA
 Tisdale, WL
 Wright, N

Barrons, KC
 Boundy, RH
 Colby, RW
 Coulter, LL
 Dow
 Elshere, D
 Gay, HH
 Greene, LM
 Hammer, OH
 Hart, A
 Heath, SB
 Hymas, TA
 Jones, GD
 Kagy, JF
 Kilian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, HH
 Oyen, F
 Perkins, RP
 Stenger, VA
 Tisdale, WL
 Wright, N

Barrons, KC
 Boundy, RH

General Subject Matter

Esteron 245 OS (M-1257), For-
 mulation plans for toxicological
 evaluation

Need toxicology information
 sheets on Esteron Brush Killer

Dow Number

Date

Author

Recipient

0767321-
0767342*

571122

Dow
Olson, KJ

13997

Distributees

Colby, RW
 Coulter, LL
 Dow
 Elshere, D
 Gay, HH
 Greene, LM
 Hammer, OH
 Hart, A
 Heath, SB
 Hymas, TA
 Jones, GD
 Kagy, JF
 Kilian, DJ
 Luce, EN
 Lynn, GE
 McIntyre, HH
 Oyen, F
 Perkins, RP
 Stenger, VA
 Tisdale, WL
 Wright, N

Allinson, RL
 Athay, RM
 Beshgetoor, AW
 Boundy, RH
 Colby, RW
 Dossler, RC
 Dow
 Elshere, D
 Gay, HH
 Greene, LM
 Hart, A

General Subject Matter

O.S.

Results of range finding toxicological tests on Brush Killer X, Weec Killer X and Brush Killer TX
 (T2.30-76-1 T2.30-77-1
 T2.30-78-1)

Dow Number

Date

Author

Recipient

0767366-
0767385*

590423

Dow
Wolf, MA

13998

DistributeesGeneral Subject Matter

Hymas, TA
 Jones, GD
 Kilian, DJ
 Luce, EN
 Martin, D
 McCollister, DD
 McIntyre, HH
 Mussell, DR
 Perkins, RP
 Tisdale, WL
 White, LC
 Wright, N

Results of range finding toxicological tests on Forron brush killer (M-1368) (T2.30-123-1)

Athay, RM
 Barrons, KC
 Boundy, RH
 Colby, RW
 Dow
 Elshere, D
 Gay, HH
 Greene, LM
 Hammer, OH
 Hart, A
 Hymas, TA
 Jones, GD
 Kagy, JF
 Kilian, DJ
 Luce, EN
 Lynn, GE
 McCollister, DD
 McIntyre, HH
 Perkins, RP
 Stenger, VA

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767417- 0767418*	590506	Dow McCollister, DD Wolf, MA	
0767419- 0767421*	590202	Dow Hoyle, HR McCollister, DD Wolf, MA	
0767422- 0767930*	590202	Dow Hoyle, HR McCollister, DD Wolf, MA	

13999

Distributees

General Subject Matter

Tisdale, WL
Vanvalkenburg, W
Wright, N

Results of range finding toxicological tests on M-1447 and M-1433 weed killer formulations (Similar to Esteron 245 OS and Esteron Brush Killer respectively)

A concentrate formulation of 245T Dowanol 97B70 Ester data sheet of properties, health hazards and precautions for safe handling of materials

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Gray, HE
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Killian, DJ
Luce, EN
Lynn, GE
McIntyre, HH

A concentrate formulation of 24D and 245T Dowanol 97B70. Esters data sheet of properties, health hazards and precautions for safe handling of materials

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
-------------------	-------------	---------------	------------------

0767431 *	590127	Dow	
0767432 *	581120	Dow Wade, J	
0767433 *	581121	Dow Vanvalkenburg, JW	Dow Olson, KJ
0767434- 0767439*	581120	Dow	
0767440- 0767441*	590506	Dow McCollister, DD Wolf, MA	
0767442- 0767444*	590202	Dow Hoyle, HR McCollister, DD Wolf, MA	

14000

Distributees

General Subject Matter

Perkins, RP
Stenger, VA
Tisdale, HH
Vanvalkenburg, W
Wright, N

M-1433 Toxicology work sheet

A concentrate brush killer formulation of 31b. 24D and 31b. 245T acid equiv per gal. based on Dowanol 97B70 Esters. Request for screening or application testing

Coulter, LL
Dow
Heath, SB

M-1433 and M-1447, formulations

M-1433 eye contact test

Results of range finding toxicological tests on M-1447 and M-1433 weed killer formulations (Similar to Esteron 245 OS and Esteron Brush Killer OS respectively)

M-1447 A concentrate formulation of 245T Dowanol 97B70 esters. Data sheet of properties, health hazards and precautions for safe handling of materials

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767445- 0767453*	590202	Dow Hoyle, HR McCollister, DD Wolf, MA	

0767454 *	590127	Dow	
0767455- 0767456*	581120	Dow Vanvalkenburg, JW	
0767457- 0767462*	581120	Dow	
0767463- 0767464*	590202	Dow Hoyle, HR	

14001

Distributees

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Gray, HE
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Stenger, VA
Tisdale, WL
Vanvalkenburg, JW
Wright, N

General Subject Matter

M-1433 A concentrate formulation of 24D and 245T Dowanol 97B70 esters. Data sheet of properties, health hazards and precautions for safe handling of materials

M-1447 toxicology work sheet

M-1447 request for screening or application testing

M-1447 acute oral toxicity

M-1433 A concentrate formulation of 24D and 245T Dowanol 97B70

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		McCollister, DD Wolf, MA	
0767465- 0767466*	700709	Dow	
0767478- 0767479*	590713	Dow McCollister, DD Wolf, MA	
0767480- 0767485*	590414	Dow McCollister, DD Peterson, JE Wolf, MA	

14002

Distributees

General Subject Matter

esters. Data sheet of properties, health hazards and precautions for safe handling of materials

Dowanol 97 B-70 medical information

Results of range finding toxicological tests on Forron 235T

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GS
Kagy, JF
Killian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Stenger, VA
Tisdale, WL
Vanvalkenburg, W
Wright, N

Forron 245 M-1456 data sheet of properties, health hazards and precautions for safe handling of materials

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767486 *	590319	Dow	
0767487 *	590127	Dow	
0767488 *	590113	Dow Vanvalkenburg, JW	Dow Olson, RJ
0767489- 0767493*	590127	Dow	
0767494 *	000000	Dow Wolf, MA	
0767495- 0767497*	590610	Dow McCollister, DD Peterson, JE Wolf, MA	
0767498 *	590722	Dow Olson, K Oyen, F	
0767499- 0767504*	590702	Dow Hoyle, HR Olson, KJ Oyen, F	

14003

Distributees

General Subject Matter

M-1456 (Forrón 245T) toxicology work sheet

M-1456 (Contains K-7756) (Forrón 245) Request for screening of application testing

Formulation M-1456

M-1456 acute oral toxicity

Suggested precautionary labeling for Forrón 245

Forrón 245 (M-1456) Data sheet of properties, health hazards and precautions for safe handling of materials

Results of range finding toxicological tests on M-1459. Formulation of K-7797 and K-7856

M-1459 formulation of K-7797 and K-7856

Coulter, LL
Dow
Heath, SB

Athay, RM
Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D

Dow Number

Date

Author

Recipient

0767505 *

590618

Dow

0767506 *

590216

Dow

0767635-
0767637*

590901

Dow
Olson, K
Oyen, F
Scoles, GE

14004

Distributees

General Subject Matter

Gay, HH
Gray, HE
Greene, LM
Hammer, OH
Hart, A
Hymas, T
Jones, GD
Kilian, DJ
Lynn, GE
Martin, D
McIntyre, HH
Perkins, RP
Scoles, GE
Stenger, YA
Tisdale, WL
Wright, N

M-1459 Toxicology work sheet

M-1459 formulation of K-7797 and request for screening or application testing

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hammer, OH
Hart, A
Hymas, TA

Results of range finding toxicological tests on M-1586 (Formulation containing Dowanol 97B70 Esters of 24D and 245T)(t2.30-156-1)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767638- 0767639*	590811	Dow Hoyle, HR Olson, KJ Oyen, F	
0767640 *	590729	Dow KO	
0767641 *	590611	Dow Scoles, G	
0767642 *	590610	Dow Scoles, GW	Dow Olson, KJ

14005

Distributees

General Subject Matter

Jones, GD
Kagy, JF
Kilian, DJ
Leasure, JK
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP
Scoles, GE
Stenger, VA
Tisdale, WL
Wright, N

M-1586 (Data sheet of properties,
health hazards and precautions for
safe handling of materials)

M-1586 (Toxicology work sheet)
(T2.30-156-1)

Coulter, LL
Dow
Scoles, G

Formulation containing the Dowanol
97B70 Esters of 24D and 245T
(M-1586) (Request for screening or
application testing)

Coulter, LL
Dow
Dosser, RC
Heath, SB
Maddox, JF
White, LC

Improved Esteron formulation

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767643 *	590710	Dow Greenhoe, NC KO	
0767644- 0767646*	590721	Dow Greenhoe, NC KO	
0767647- 0767649*	590727	Dow Greenhoe, NC KO	
0767650- 0767652*	590811	Dow Hoyle, HR Olson, KJ Oyen, F	
0767767- 0767780*	600331	Dow Olson, KJ Scoles, G	

14006

Distributees

General Subject Matter

M-1586 (Acute oral toxicity)
(T2.30-156-1)

M-1586 (Eye contact test)
(T2.30-156-1)

M-1586 (Skin contact irritation)
(T2.30-156-1)

M-1586 (Data sheet of properties,
health hazards and precautions for
safe handling of materials)

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE

Results of range finding toxicological tests on agricultural chemical formulation M-1639 (Veon brush killer type)

Distributees

McIntyre, HH
Oyen, F
Perkins, RP
Scoles, G
Stenger, VA
Tisdale, WL
Wright, N

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Killian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Perkins, RP

General Subject Matter

M-1639 (Veon brush killer type)
(Data sheet of properties, health hazards and precautions for safe handling of materials)

M-1639 (Veon brush killer type),
Safety data sheet

Results of range finding toxicological tests on agricultural chemical formulation M-1683 (Esteron 245 Type)

Dow Number

Date

Author

Recipient

0767825-
0767828*

600223

Dow
Olson, KJ

0767829-
0767830*

600126

Dow
Hoyle, HR
Olson, KJ
Oyen, F

0767831-
0767841*

600000

Dow
EO
NS
O'Connor
Scoles, GW
Torkelson, TR

0767851-
0767852*

600126

Dow
Hoyle, HR
Olson, KJ
Oyen, F

14068

Distributees

Scoles, G
Stenger, VA
Tisdale, WL
Wright, N

General Subject Matter

Corrections in biochemical research laboratory reports (T2.30-177-1) Results of range finding toxicological tests on agricultural chemical formulation M-1683 (Esteron 245 Type), Results of range finding toxicological tests on Bis Acetonitrilo Decaborane (Band) (T23.14-94-2); Results of range finding toxicological tests on Alpha Phenoxy Propionic Acid

M-1683 (Esteron 245T) (Data sheet of properties, health hazards and precautions for safe handling of materials)

Toxicology work sheet, acute oral toxicity, eye contact test, skin contact irritation, single vapor exposure record (M-1683)

M-1683 (Esteron 245T) (Data sheet of properties, health hazards and precautions for safe handling of materials)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0767853 *	600212	Dow	
0767854 *	551108	Dow	
0767872 *	600406	Dow Wolf, MA	Dow McIntyre, HH
0767873- 0767875*	600215	Dow Olson, KJ Oyen, F	
0767988- 0767990*	611031	Dow Olson, KJ Oyen, F	
0767994- 0767997*	611106	Dow Hoyle, HR Oyen, F Plomer, ET	
0768010- 0768025*	611117	Dow Olson, KJ Plomer, ET	

14009

Distributees

General Subject Matter

Dow Sales Wolf, MA	AG chem formulation M-1683 Esteron 245T, safety data sheet Suggested precautionary labeling for M-1684
Dow Hoyle, HR	M-1684 (Esteron Brush Killer type) Data sheet of properties, health hazards and precautions for safe handling of materials
Dow Hoyle, HR	M-2016 data sheet of properties, health hazards and precautions for safe handling of materials
Dow Hoyle, HR	M-2115 data sheet of properties, health hazards and precautions for safe handling of materials
Barrons, KC Boundy, RH Colby, RW Dow Elshere, D Falkenstein, W Gay, HH Greene, LM Hart, A Jones, GD	Results of range finding toxicological tests on M-2115, an agricultural chemical formulation containing 245T acid and triethyl amine

Dow Number

Date

Author

Recipient

0768104-
0768143*

631129

Dow
Lynn, GE
Olson, KJ

14010

Distributees

General Subject Matter

Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Oyen, F
Perkins, RP
Scoles, GW
Shrader, Sa
Tisdale, WL
Wright, N

Results of range finding toxicological tests on Verton T herbicide (M-2137) a formulation containing Dowanol Ester of 245T

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Epstein, J
Falkenstein, WJ
Gordon, HL
Greene, LM
Hake, CL
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Koerker, FW
Luce, EN
Lynn, GE
McIntyre, HH
Mullison, WR
Norton, TR
Oyen, F

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0768297- 0768299*	630108	Dow Hoyle, HR Olson, KJ Oyen, F	
0768300- 0768301*	710400		
0768302 *	630507	Dow	
0768303- 0768304*	720328	Dow	
0768305- 0768306*	780401	Dow	
0768680- 0768699*	660526	Dow Stevenson, GT	

14011

Distributees

General Subject Matter

Shrader, SA
Wilson, AW
Wright, N

M-2422 (Data sheet of proportions
for safe handling of materials)

Esteron 245 concentrate

Esteron 245 concentrate (Sales
specification)

Esteron 245 concentrate brush and
weed killer (Material safety data
sheet)

Esteron 245 concentrate brush and
weed killer (Material safety data
sheet)

Dow
Haagsma, TA
BLS
GTS
KJO
Prod. Plan Target Team
Mgr.
Robinson, VB
RJS
RMS
RVJ

A summary of acute oral toxicity
LD50 studies in poultry from
TOX-37 thru TOX-66 inclusive
(Report GH-A 186)

Dow Number

Date

Author

Recipient

0768984-
0769027*

660510

Dow
Lynn, GE
Olson, KJ

0769080 *

001216

Dow
Getzendaner, ME
Herman, JL
Moss, RD

14012

Distributees

Barrons, KC
 Boundy, RH
 Dow
 Elshere, D
 Falkenstein, WJ
 Hart, A
 Holder, BB
 Johnston, RV
 Jones, GD
 Kagy, JF
 Kilian, DJ
 Luce, EN
 Lynn, GE
 McCollister, DD
 McIntyre, HH
 Moss, RD
 Mullison, WR
 Norton, TR
 Pitman-Moore
 Shrader, SA
 Wilson, AW
 Wright, N

General Subject Matter

Toxicological properties of her-
 bicide formulation M-2993 con-
 taining 4-amino-356-trichloro-
 picolinic acid, isooctyl ester and
 245T polypropylene glycol butyl
 ether ester

Barrons, KC
 Bauriedel, WR
 Dow
 Dowell, FH
 Hanson, RG
 Hymas, TA
 Johnston, RV
 Kagy, JF
 Laning, ER
 Ludwig, PD

A residue study picloram and 245T
 in grass from application of
 M-3060 formulation (GH-C 343)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0769081- 0769082*	670410	Dow	
0769083- 0769085*	661205	Dow Olson, KJ Oyen, F Wilson, H	
0769086- 0769087*	661108	Dow Hoyle, HR Olson, KJ Oyen, F Wilson, H	
0769088- 0769094*	660816	Dow Wilson, H	
0769160- 0769162*	670316	Olson, KJ Oyen, F	

14013

Distributees

General Subject Matter

Moss, RD
Osborne, DW
Popoff, FP
Ridner, JM
Rowe, VK
Seymour, KG
Shaver, RJ
Spalding, JL
Williams, CS

M-3060, safety data sheet

Dow
Lynn, GE

Results of range finding toxicological tests on Esteron O.S.
(M-3094) (T2.3094-1)

Esteron 245 O.S. (Data sheet of properties, health hazards and precautions for safe handling of materials)

Esteron 245 O.S. (M-3094) Toxicology work sheets

Boundy, RH
Buerge, TE
Dean, P
Dow
Elshere, D
Holder, BB

Toxicological properties and industrial handling hazards of Tordon 105 mixture
(T2.MO-3132-1)

Dow Number

Date

Author

Recipient

0769163-
0769179*

660000

Dow
Tinker, B
Wilson, H

0769268-
0769271*

671224

Dow
McCollister, DD
Olson, KJ

0769272-
0769297*

680104

Dow
Lynn, GE
Olson, KJ

14014

Distributees

Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Moss, RD
Sheetz, DP
Shrader, SA
Wilson, AW
Wright, N

General Subject Matter

Tordon 105 mixture (Toxicology worksheet)

Tordon 144 mixture data sheet of properties, health hazards and precautions for safe handling

Bouandy, RH
Dean, P
Dow
Elshere, D
Holder, BB
Jones, GD
Kagy, JF
Luce, EN
McCollister, DD
McIntyre, HH
Moss, RD
Olson, KJ
Robinson, VB

Toxicological properties and industrial handling hazards of Tordon 144 mixture herbicide

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0769351- 0769352*	690121	Dow Hoyle, HR Norris, JM	
0769353- 0769354*	700130	Bjork, C Dow Gowell, JH JBD Loucks, MF Nagele, RE Newport, JJ Seymour, KG Sheldon, HW Stein, JS Talcott, AT Williams, CS Wolf, MA	
0769355- 0769356*	681213	Dow Norris, JM	
0770043- 0770058*	571122	Dow Olson, KJ	

14013

Distributees

Sheetz, DP
Shrader, SA
Wilson, AW
Wright, N

General Subject Matter

M-3199X Tordon 225 mixture herbicide data sheet of properties, health hazards and precautions for safe handling of materials.
(T2.MO-003199-1)

Tordon 225 herbicide release to sales

M-3199X Tordon 225 herbicide (T2.MO-003199-(1)), safety data sheet

Allinson, RL
Athay, RM
Beshgetoor, AW
Boundy, RH

Results of range finding toxicological tests on Brush Killer X, Weed Killer X and Brush Killer TX

Dow Number Date Author Recipient

0770044- 571115 Dow
0770045* McCollister, DD
 Olson, KJ
 Peterson, JE

0770047- 571115 Dow
0770048* McCollister, DD
 Olson, KJ
 Peterson, JE

0770049 * 000000 Dow

14016

Distributees

General Subject Matter

Colby, RW
Dosser, RC
Dow
Elshere, D
Gay, HH
Greene, LM
Hart, A
Hymas, TA
Jones, GD
Kilian, DJ
Luce, EN
Martin, D
McCollister, DD
McIntyre, HH
Mussell, DR
Perkins, RP
Tisdale, WL
White, LC
Wright, N

Brush Killer TX (Data sheet of properties, health hazards and precautions for safe handling of materials)

Weed Killer X (Data sheet of properties, health hazards and precautions for safe handling of materials)

Brush Killer X (Data sheet of properties, health hazards and precautions for safe handling of materials)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0770050- 0770052*	571115	Dow McCollister, DD Olson, KJ Peterson, JE	
0770059 *	560308	Dow White, LE	
0770060- 0770061*	560424	Dow	
0770062- 0770063*	560521	Dow	
0770064- 0770065*	571115	Dow McCollister, DD Olson, KJ Peterson, JE	
0770665- 0770684*	660526	Dow Stevenson, GT Stock, BL	
0781791- 0781794*	501017	Dow Rowe, VK	Allen, WW Alquist, FC Britton, JW Dosser, RC Dow

14017

Distributees

General Subject Matter

Brush Killer X (Data sheet of properties, health hazards and precautions for safe handling of materials)

Brush Killer TX (Request for application testing)

Brush Killer TX (Eye contact test)

Brush Killer TX (Skin contact irritation)

Brush Killer TX (Data sheet of properties, health hazards and precautions for safe handling of materials)

A summary of acute oral toxicity LD50 studies in poultry from TOX-37 thru TOX-66 inclusive (GH-A 186)

BLS
GTS
KJO
RJS
RMS
RVJ
TAH
VBR

Results of skin irritation and skin sensitization tests conducted on human subjects with Esteron 245 (New Ester) (T2.30-3-1)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
			Dutton, WC Irish, FN Kagy, JF Lynn, GE
0781795 *	500405	Dow REW Streeter, LE	Dow White, L
0781796- 0781810*	530217	Dow Oyen, F	Allen, WW Allinson, RL Alquist, FN Beshgetoor, AW Boundy, RH Britton, EC Britton, JW Collier, B Davidson, JH Dow Dutton, WC Gay, HH Gibson, J Greene, LM Heath, SB Johnson, JE Kagy, JF Kelly, JA Kriner, RR Luce, EN Lynn, GE MacCutcheon, SM Melass, YH Nation, HA

14018

Distributees

General Subject Matter

Esteron 245T (Main lab report
sheet)

Results of range finding toxicological
tests on Esteron 245
(T2.30-3-2)

Dow Number

Date

Author

Recipient

Otis, CE
Predergast
Southwick, L
Sunderland, WW
Vanhorn, JC
Walker, H
White, LC
Wright, P
Zuhl, HH

0782085-
0782091*

531030

Dow
Oyen, F

0782092 *

530305

Dow
Rowe, VK

14019

Distributees

General Subject Matter

Allen, WW
Allinson, RL
Alquist, FN
Barrons, KC
Beshgetoor, AW
Boundy, RH
Britton, EC
Davidson, JH
Dow
Dutton, WC
Gay, HH
Greene, LM
Kagy, JF
Luce, EN
Lynn, GE
MacCutcheon, SM
Prescott, RF
Sunderland, WW
White, L
Wright, P

Results of range finding toxicological tests on Dow Brush Killer T

Dow Brush Killer T (Request for biological test)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		Spencer, HC White, L	
0782093- 0782100*	530000	Dow Wolf, MA Wyse, H	
0782101- 0782103*	530000	Dow Wyse, H	
0782104- 0782112*	530000	Dow Wyse, H	
0782113- 0782114*	700721	Dow HCS	
0782115 *	000000	Dow	
0782116- 0782117*	710714	Dow Hoyle, HR Wolf, MA	
0782118- 0782119*	710920	Dow Wolf, MA	
0782178- 0782198*	560501	Dow McCollister, DD Torkelson, TR	

14020

Distributees

General Subject Matter

Dow Brush Killer T (Acute oral toxicity)

Brush Killer T (Eye irritation)

Brush Killer T (Skin irritation)

Brush Killer T, safety data sheet

Brush Killer T (Medical information)

Brush killer T (Data sheet of properties, health hazards and precautions for safe handling of materials)

Brush Killer T (Medical information)

Results of range finding toxicological tests on M-631 (Esteron 245 type formulation) (BC T2.30-67-1)

Allinson, RL
Beshgetoor, AW
Boundy, RH
Britton, EC
Coulter, LL
Dow

Dow Number Date Author Recipient

0782199- 580916 Dow
0782200* Hoyle, HR
 Torkelson, TR

0782201 * 560504 Dow

0782202- 560409 Dow
0782220* McCollister, DD
 Wolf, MA

14021

Distributees

General Subject Matter

Elshere, D
Gay, HH
Greene, LM
Hart, A
Kilian, DJ
Luce, EN
MacCutcheon, SM
Martin, D
Scoles, G
Sunderland, WW
Wright, N

Esteron 245 type formulation
(M-631) (Data sheet of properties,
health hazards and precautions for
safe handling of materials)

M-631 (Esteron 245 type for-
mulation) (T2.30-67-1), safety
data sheet

Allinson, RL
Beshgetoor, AW
Boundy, RH
Britton, EC
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hart, A
Kagy, JF
Kelly, J

Results of range finding toxicolo-
gical tests on 2 formulations of
Reddon (M-640 and M-713)

Dow Number

Date

Author

Recipient

0782285-
0782306*

560503

Dow
Lockwood, D
McCollister, DD
Torkelson, TR

0782379-
0782393*

560702

Dow
Lockwood, D
McCollister, DD
Olson, KJ

14022

Distributees

Kilian, DJ
Luce, EN
Lynn, GE
MacCutcheon, SM
Sunderland, WW
Wright, N

Allinson, RL
Beshgetoor, AW
Boundy, RH
Britton, EC
Coulter, LL
Dow
Elshere, D
Gay, HH
Greene, LM
Hart, A
Kilian, DJ
Luce, EN
MacCutcheon, SM
Martin, D
Scoles, G
Sunderland, WW
Wright, N

Allinson, RL
Alquist, FN
Barrons, KC
Beshgetoor, AW
Boundy, RH
Britton, EC
Colby, RW
Dow

General Subject Matter

Results of range finding toxicological tests on M-697 (Esteron Brush Killer type formulation) (T2.30-66)

Results of range finding toxicological tests on Esteron Brush Killer OS (M-726) (T2.30-71-1)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0786942- 0786954*	000000	Dow	
0786955- 0786975*	000000	Dow	
0787000- 0787030*	680122	DeLong, HC	
0970330- 0970343*	700901	Blair, EH Dow	
0979734 *	670914	EMS	
0979735 *	670914	EMS	
0979736 *	670914	EMS	

14023

Distributees

General Subject Matter

Elshere, D
Gay, HH
Greene, LM
Hart, A
Kagy, JF
Kelly, JA
Kilian, DJ
Luce, EN
Lynn, GE
MacCutcheon, SM
Sunderland, WW
Wright, N

24D Esters-process information

Direct Ester process

Acid Ester operating instructions
489 Bldg

Chemistry of the Dow agricultural
department

Chloroacetic acid plant unit
ratios

Crystalline chloroacetate acid unit
ratios.

Butyl chloroacetate plant unit
ratios

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
0979989- 0979994*	670417	DeIisle, NG EMS	
1232117- 1232129*	570806	Dow McCollister, DD Wolf, MA	
1232130- 1232143*	600331	Dow Olson, KJ Oyen, F	

1232355- 1232378*	571122	Dow McCollister, DD Olson, KJ	
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14024

Distributees

General Subject Matter

Flow sheets on 24D butyl ester acid

Results of range finding toxicological tests on M1086 (A 245T and 24D alkyl amine formulation)

Results of range finding toxicological tests on agricultural chemical formulation M1639 (Veon Brush Killer type)

Barrons, KC
Boundy, RH
Colby, RW
Dow
Elshere, D
Gay, HH
Greene, LM
Hammer, OH
Hart, A
Hymas, TA
Jones, GD
Kagy, JF
Killian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Scoles, G
Stenger, VA
Tisdale, WL
Wright, N

Allinson, RL
Allison, WE
Athay, RM
Beshgetoor, AW
Boundy, RH

Results of range finding toxicological tests on Brush Killer X, Weed Killer X and Brush Killer TX

Dow Number

Date

Author

Recipient

1298297-
1298299*

741204

Dow
JNJ

1298300 *

640921

Dow
EMS

1298301-
1298302*

000000

Dow

1298303 *

000000

Dow

14025

Distributees

General Subject Matter

Colby, RW
Dosser, RC
Dow
Elshere, D
Gay, HH
Greene, LM
Hart, A
Hymas, TA
Jones, GD
Kilian, DJ
Luce, EN
Martin, D
McIntyre, HH
Mussell, DR
Perkins, RP
Tisdale, WL
White, LC
Wright, N

2-(2-4 dichlorophenoxy) proprionic
acid (Physical properties data
sheet)

Dowanol Ester of 245T (Physical
properties data sheet)

Silvex (Physical properties data
sheet)

24D NA salt monohydrate (Physical
properties data sheet)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1298304- 1298305*	681030	Dow Erickson, AC	
1298306 *	741202	Dow JNJ	
1298307- 1298309*	730315	Dow	
1298310- 1298312*	490720	Dow BFW WJC Luce, EN Waling, BF	Dow Schrauf, B
1298313- 1298315*	680826	Dow JJ RH Stobby, G	
1298316- 1298320*	731128	Dow Messing, S	Dow Hart, JP

14026

Distributees

General Subject Matter

245-Trichlorophenol (Physical properties data sheet)

245T (Physical properties data sheet)

Freezing point molten 24D H₂O

24D report sheet (Main lab No. SSR 146-851)

Colby, A
Dow
Holdeman, GE
Kiley, L
Shrader, S
Wengert, GB

Herbicides, vapor pressure data
(Analytical laboratories report
AL 79-202)

Arestin,
Bleiweiss, J
Chase, F
Dhingra, Y
Dow
Haberstroh
Jones, W
Lafevor, D
Manfrom, R
Martin, R
Miller, B

24D acid ester process
solubilities

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1298321- 1298322*	670327	Dow Stull, DR Walker, LC	
1298323- 1298326*	691022	Dow Sinke, GC Stull, DR	
1298328 *	710917	Dow Gilbert, PW Hawley, HM Holdeman, GE Loucks, MF MacDonald, LA Reigler, PF Talcott, AT	
1298329 *	720615	Blosser, KC Chase, FT Dow Flannery, RF Fraser, JM Gill, HH Hoff, RC Holdeman, GE Talcott, AT Woodward, R	

14027

DistributeesGeneral Subject Matter

Mintz, M
Morehouse, DS
Yeager, L

Dow
Fernander, J

Thermal data for process steps in
synthesis of 24D (HL-304)

Holdeman, GE

Heat of reaction of dimethylamine
and 24D (HL-527)

Dow
Gilbert, PW
Hawley, HM
Holdeman, GE
Loucks, MF
MacDonald, LA
Reigler, PF
Talcott, AT
Tree, RM

2,4-Dichlorophenol, technical
(product specification)

Blosser, KC
Chase, FT
Dow
Flannery, RF
Fraser, JM
Gill, HH
Hoff, RC
Talcott, AT
Woodward, R

245T propylene glycol butyl ether
esters (Product specification)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1298330 *	720615	Dow	
1298331 *	710118	Chase, FI Dow Hawley, HM Holdeman, GE Loucks, MF MacDonald, LA Reigler, PF Seymour, KG Tait, SR Talcott, AT Woodward, RE	
1298332 *	730412	Blosser, KC Chase, FI Dow Flannery, RF Fraser, JM Hoff, RC Holdeman, GE Seymour, KG Talcott, AT Woodward, RE	
1298333 *	710601	Chase, FI Dow Hawley, HM Holdeman, GE Loucks, MF MacDonald, LA	

14028

Distributees

General Subject Matter

245T propylene glycol butyl ether esters (Sales specification)

Chase, FI
Dow
Hawley, HM
Holdeman, GE
Loucks, MF
MacDonald, LA
Reigler, PF
Seymour, KG
Tait, SR
Talcott, AT
Woodward, RE

Formula 40 Weed killer M-3604
(Product specification)

Blosser, KC
Chase, FI

DMA-6 unsequestered M-2255
(Product specification)

Dow
Flannery, RF
Fraser, JM
Hoff, RC
Holdeman, GE
Seymour, KG
Talcott, AT
Woodward, RE

Chase, FI
Dow
Hawley, HM
Holdeman, GE
Loucks, MF
MacDonald, LA

DMA-6 sequestered M-3637 (Product specification)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		Reigler, PF Seymour, KG Tait, SR Talcott, AT Woodward, RE	
1298334 *	000000	Dow	
1298335 *	000000	Dow	
1298336 *	000000	Dow	
1298337 *	000000	Dow	
1298338 *	000000	Dow	
1298339 *	000000	Dow	
1298340 *	710316	Dow	
1298341 *	720117	Blosser, KC Chase, FI Dow	

14028

Distributees

Reigler, PF
Seymour, KG
Tait, SR
Talcott, AT
Woodward, RE

General Subject Matter

Propylene glycol butyl ether
esters of Silvex (Physical
properties)

Isooctyl esters of 245T (Physical
properties)

Low volatile esters of 245T Dow
sales grade 245T, propylene glycol
(C3H6O to C9H18O3) butyl ether
esters (Physical properties)

Isooctyl esters of 24D (Physical
properties)

N-Butyl ester of 24D (Physical
properties)

24D Butyl esters (Physical
properties)

24D propylene glycol butyl ether
ester (Product specification)

Blosser, KC
Chase, FI
Dow

24D (Product specification)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		Flannery, RF Gill, HH Hoff, RC Holdeman, GE Scoles, GW Talcott, AT Woodward, RE	
1298342 *	000000	Dow	
1298343- 1298344*	611017	Dow Hoyle, HR Olson, KJ	
1298345 *	000000	Dow	
1298346- 1298347*	570927	Dow Hoyle, HR Peterson, JE	
1298348- 1298349*	000000	Dow	
1298350 *	741202	Bethke Boust, HF Dersnah	

14030

Distributees

Flannery, RF
Gill, HH
Hoff, RC
Holdeman, GE
Scoles, GW
Talcott, AT
Woodward, RE

General Subject Matter

Tordon 101 mixture (Data sheet of properties, health hazards and precautions for safe handling of materials)

Dowanol PIB mix ester of 24D (Data sheet of properties, health hazards and precautions for safe handling of materials)

245-Trichlorophenol (Data sheet of properties, health hazards and precautions for safe handling of materials)

24D (Data sheet of properties, health hazards and precautions for safe handling of materials)

Consequences of overexposure for chemicals in 489 building

Bis-(24D) (Reactive chemical hazard data)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		Dow Jones, W	
1298351 *	750109	Dersnah Dow Fey, K	
1298352 *	700801	Abegg, CF Dow Harris, W Higgins, HS	
1298353 *	741211	Wozniak, LJ	
1298354 *	750123	Dersnah Dow Jones, JN, Jr.	
1298355 *	750123	Dersnah Dow Jones, JN, Jr.	
1298356 *	750123	Dersnah Dow Jones, JN, Jr.	
1298357- 1298360*	741204	Dow Jones, J	
1298361- 1298362*	710526	Boggs, GU Dow	Dow Dunlap, R Haberstroh, WH Higgins, HS Theis, JM

14031

Distributees

General Subject Matter

Ethylene Glycol W/ 24D acid;
molten 24D process (Reactive che-
mical hazard data)

24D (Reactive chemical hazard
data)

DE waste treatment plant

Waste treatment, butyl ester of
24D, distillation feed (Reactive
chemical hazard data)

Waste treatment, butyl ester of
24D solvent (Reactive chemical
hazard data)

Waste treatment of butyl ester of
24D tars (Reactive chemical hazard
data)

Alcohols, and molecular weight
data summary

Direct ester "T" waste 710309 from
489 (Analytical laboratories
report AL28-830)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1298363- 1298369*	730000	Dow Southwick, L	
1298603- 1298605*	000000	Dow	
1298606- 1298607*	650119	Dow Hoyle, HR Olson, KJ Oyen, F	
1298608- 1298609*	650125	Dow Hoyle, HR Olson, KJ	
1298610- 1298611*	740300	Dow	
1298612- 1298614*	780601	Dow	
1298615- 1298617*	780601	Dow	
1298618- 1298620*	780601	Dow	
1298621- 1298623*	780601	Dow	

14032

Distributees

General Subject Matter

Kuron Silvex herbicide continues to gain acceptance (Ind vegetation mgmt 5(2), 18-24)

Properties and hazards, flash points of various products

Tordon 500 formulation (Data sheet of properties, health hazards and precautions for safe handling of materials) (T2.MO-2777X-1)

Tordon 101 mixture (Data sheet of properties, health hazards and precautions for safe handling of materials) (T2.MO-2439-1)

Tordon 101 mixture weed and brush killer (Material safety data sheet) (Form 336-158-74)

Tordon (R) 101 mixture weed and brush killer (Material safety data sheet)

Tordon (R) 101 mixture weed and brush killer private label (Material safety data sheet)

Tordon (R) 101R forestry herbicide (material safety data sheet)

Tordon (R) 155 mixture brush killer (Material safety data sheet)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1298624- 1298625*	660412	Dow Hoyle, HR McCollister, DD Olson, KJ	
1298626- 1298627*	740300	Dow	
1298628- 1298629*	660201	Dow Hoyle, HR McCollister, DD Olson, KJ	
1298630- 1298632*	780601	Dow	
1298633- 1298634*	671031	Dow Hoyle, HR Norris, JM Olson, KJ	
1298635- 1298636*	760800	Dow	
1298637- 1298638*	780601	Dow	
1298639- 1298640*	771001	Dow	
1298641- 1298643*	780601	Dow	

14033

Distributees

General Subject Matter

1 Tordon 155 (Data sheet of properties, health hazards and precautions for safe handling of materials) (T2.MO-2993-1)

Tordon 155 mixture brush killer
(Material safety data sheet)

Tordon 202 mixture (Data sheet of properties, health hazards and precautions for safe handling of materials) (T2.MO-2861-1)

Tordon (R) 202C mixture herbicide
(Material safety data sheet)

Tordon 212 (Data sheet of properties, health hazards and precautions for safe handling of materials) (T2.MO-3200-1)

Tordon 212 mixture herbicide
(Material safety data sheet) (Form 336-161-76)

Tordon (R) 212 mixture herbicide
(Material safety data sheet)

Tordon (R) 225 herbicide (Material safety data sheet)

Tordon (R) 225E mixture herbicide
(Material safety data sheet)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1298644- 1298651*	750811	Dow Gutenkunst, V Porter, DF Skelly, NE	
1298652- 1298653*	700514	Dow Hoyle, HR Norris, JM	
1298654- 1298655*	750600	Dow	
1298656- 1298658*	780601	Dow	
1298659- 1298660*	710422	Dow Hoyle, HR Norris, JM	
1298661- 1298662*	710917	Dow Hoyle, HR Wolf, MA	
1298663- 1298664*	750310	Dow Silverstein, LG Wolf, MA	
1298665- 1298666*	760823	Dow Langner, RR	

14034

Distributees

General Subject Matter

Analytical method Tordon 225E mixture herbicide by liquid chromatography (Method 87141)

Tordon 472 herbicide (Data sheet of properties, health hazards and precautions for safe handling of materials) (BC12.MO-3427-1)

Tordon 472 herbicide (Material safety data sheet) (Form 336-166-75)

Tordon (R) 472 weed killer (Material safety data sheet)

DMA4 (Data sheet of properties, health hazards and precautions for safe handling of materials) (NB T2.MO-3538-1)

245T Dowanol 97B ester (Data sheet of properties, health hazards and precautions for safe handling of materials) (K-7856 NB725.14-106)

24D Trisopropanolamine salt (Data sheet of properties, health hazards and precautions for safe handling of materials) (K-8866)

DMA-6 (Data sheet of properties, health hazards and precautions for

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		Wroblewski, D	
1298667 *	000000	Dow Lamott, S	Rafos, G
1298668- 1298670*	760800	Dow	
1298671- 1298672*	710917	Dow Hoyle, HR Wolf, MA	
1298673- 1298674*	650125	Dow Hoyle, HR Olson, KJ	
1298675- 1298676*	690909	Dow Hoyle, HR Norris, JM	
1298677- 1298678*	650119	Dow Hoyle, HR Olson, KJ Oyen, F	
1298679- 1298680*	660412	Dow Hoyle, HR McCollister, DD Olson, KJ	

14035

Distributees

General Subject Matter

safe handling of materials)
(M-3637)

Cover memo for data sheets

Tordon 212 mixture herbicide
(Material safety data sheet)
(Form 336-161-76)

245T Dowanol 97B ester (Data sheet
of properties, health hazards and
precautions for safe handling of
materials) (K-7856 NBT25.14-106)

Tordon 101 mixture (Data sheet of
properties, health hazards and
precautions for safe handling of
materials) (T2.MO-2439-1)

Tordon 472 herbicide (Data sheet
of properties, health hazards and
precautions for safe handling of
materials) (BC T2.MO-3472-1)

Tordon 50D formulation (Data sheet
of properties, health hazards and
precautions for safe handling of
materials) (BC T2.MO-2777X-1)

Tordon 155 (Data sheet of proper-
ties, health hazards and pre-
cautions for safe handling of
materials) (T2.MO-2993-1)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1298681- 1298682*	751009	Dow Hoyle, HR Yakel, HO	
1298683- 1298684*	700319	Dow Hoyle, HR Norris, JM	
1298685 *	750711	Dow Krumel, KL	
1298686- 1298689*	750711	Dersnah, H Dow	Dow Krumel, KL
1298690 *	711116	Brown, M Dow JL Robb, J	
1298691- 1298692*	000000	Dow	
1298693 *	741031	Dow Hebbourn, R Kerby, JE	
1298694- 1298695*	690716	Dow	

14036

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General Subject Matter

Tordon 212 mixture herbicide (Data sheet of properties, health hazards and precautions for safe handling of materials) (HET M-3179-(2))

Tordon 212 mixture herbicide (Data sheet of properties, health hazards and precautions for safe handling of materials) (T2.MO-3179-1)

24D (Reactive chemical hazard data)

Dust explosion properties of 24D acid (Analytical report)

DMA-6 (unsequestered) (Reactive chemical hazard data)

24D (Summary of chemical reactivity precautions and properties)

24D PGBEE (Reactive chemical hazard data)

Tordon 212 mixture (Summary of

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		Dullap, RL Mandrell, ME	
1298696- 1298697*	690716	Dow Dunlap, RL Mandrell, ME	
1298698 *	750206	Bethke Dersnah Dow Holdeman, G Keeney, N Vanhorn, R	
1298699- 1298700*	691003	Dow Gilbert, PW Mandrell, ME	
1298701 *	710830	Dow CJR JRL RSS	
1298702- 1298703*	690716	Dow Dunlap, RL Mandrell, ME	
1298704- 1298714*	710125	Dow Prophet, H Stull, DR	
1298715 *	710801	Dersnah, H Dow McCarty, WM	

14037

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General Subject Matter

chemical reactivity precautions and properties)

Tordon 101 mixture (Summary of chemical reactivity precautions and properties)

Tordon 101 R (Reactive chemical hazard data)

Tordon acid (Summary of chemical reactivity precautions and properties)

Tordon 225 (Reactive chemical hazard data)

Tordon 155 mixture (Summary of chemical reactivity precautions and properties)

Studies of hazardous chemicals and their reactions, kinetics of chemical destruction by burning (NCT-5007)

Esteron 245 CONC (Reactive chemical hazard data)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1298716- 1298717*	690627	Dow Gilbert, PW Mandrell, ME	
1298718- 1298719*	690718	Dow Gilbert, RW Mandrell, ME	
1339420- 1339423*	650810	Barrons, KC Lynn, GE McCoy, WJ Southwick, L Wolf, MA Vanvalkenburg, W Sachs, SB Branaman, J Gill, WM DeLong, HC Matutz, H Davis, H Corbin, WL Johnson, J CEO DEP	
1341834- 1341853*	700422	Fauver, VA	MacDonald, LA

14038

Distributees

General Subject Matter

Dowanol PIB esters of 245T
(Summary of chemical reactivity
precautions and properties)

24D TIPA mix (Summary of chemical
reactivity precautions and
properties)

Esteron TR2 (Release to Sales 12)

Demott, DN
Hanners, HH
Martin, RA
Tree, RM
Deline, DD
Kennedy, TL
Robbins, LA
Plepys, RA

High purity 245-trichlorophenol,
state of the art review

Dow Number

Date

Author

Recipient

1410790-
1410792*

701217

Dow
Gehring, PJ
Norris, JM
Williams, CS

1410793-
1410794*

701228

Dow
Hoyle, HR
Norris, JM

14039

Distributees

Stamand, VE
Clark, GA
Spencer, RA
Dylewski, SW
Bleiweiss, JC

Barton, J
Blair, EH
Burgert, BE
Clegg, DH
Dow
Edwards, H
Frevel, LK
Gordon, HL
Goring, Ca
Holder, BB
Johnson, JE
Killian, DJ
Kimmel, CE
Lloyd, BH
MacCutcheon, SM
McCollister, DD
McIntyre, HH
Morgan, RW
Morse, D
Pitchforth, L
Robinson, VB
Schwarz, BA
Williams, CS

General Subject Matter

Toxicological properties and industrial handling hazards of formulation M-3592 containing the propylene glycol butyl ether ester of 245T

M-3592 (Data sheet of properties, health hazards, and precautions for safe handling of materials)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1410795- 1410798	701217	Dow Norris, JM	
1410799- 1410800*	701119	Bourne, JE Dow	
1410801- 1410802*	701228	Silverstein, EH	
1410803- 1410804*	701110	Silverstein, EG	
1410805 *	701106	Silverstein, EH	
1410806- 1410807*	701210	Silverstein, EH	
1410810- 1410811*	701210	Silverstein, EH	
1410812- 1410813*	701210	Silverstein, EH	
1410814- 1410815*	701217	Dow Gehring, PJ Norris, JM Williams, CS	

14040

Distributees

General Subject Matter

Acute toxicological properties of
Formulation M-3592 containing the
propylene glycol butyl ester of
245T

M-3592 (Acute oral toxicity)

M-3592 (Acute oral toxicity)

M-3592 (Eye irritation)

M-3592 (Primary skin irritation -
patch test (household chemical))

M-3592 (Skin contact absorption)

M-3592 (Skin contact absorption)

M-3592 (Skin contact absorption)

Bergert, BE
Blair, EH
Clegg, DH
Dow
Frevel, LK
Gordon, HL
Goring, CA

Toxicological properties and
industrial handling hazards of
formulation M-3592 containing the
propylene glycol butyl ether ester
of 245T

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1410816- 1410817*	701217	Dow Hoyle, HR Norris, JM	
1410818- 1410821*	701217	Dow Norris, JM	
1410822- 1410823*	701119	Bourne, JE	
1410824- 1410825*	701228	Silverstein, EH	
1410826- 1410827*	701110	Silverstein, EH	
1410828 *	701106	Silverstein, EH	

14041

Distributees

Holder, BB
Johnson, JE
Kimmel, CE
Lloyd, BH
MacCutcheon, SM
McCollister, DD
McIntyre, HH
Morgan, RW
Morse, D
Pitchforth, L
Robinson, VB
Schwarz, AJ
Williams, CS

General Subject Matter

M-3592, (Data sheet of properties, health hazards and precautions for safe handling of materials)

Acute toxicological properties of formulation M-3592 containing the propylene glycol butyl ether ester of 245T

M-3592 (Acute oral toxicity)

M-3592 (Acute oral toxicity)

M-3592 (Eye irritation)

M-3592 (Primary skin irritation - patch test (household chemical))

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1410829- 1410830*	701210	Silverstein, EH	
1410831- 1410832*	701210	Silverstein, EH	
1410833- 1410834*	701210	Silverstein, EH	
1410835- 1410836*	701210	Silverstein, EH	
1410880- 1410902*	630225	Dow Olson, KJ Oyen, F Scoles, G	

14042

Distributees

General Subject Matter

M-3592 (Skin contact absorption)

M-3592 (Skin contact absorption)

M-3592 (Skin contact absorption)

M-3592 (Skin contact absorption)

Barrons, KC
Boundy, RH
Brown, R
Colby, RW
Dow
Elshere, D
Falkenstein, WJ
Gay, HH
Greene, LM
Hart, A
Jones, GD
Kagy, JF
Kilian, DJ
Luce, EN
Lynn, GE
McIntyre, HH
Mullison, WR
Nash, HA
Norton, TR
Scoles, G
Shrader, SA

Results of range finding toxicological tests on agricultural chemical formulation M-2422 containing 91 percent Dowanol PIB ester of 245T (Biochemical Research Laboratory)

Dow Number Date Author Recipient

1410903- 531030 Dreyer, F
1410909*

1428610- 611228 Dow
1428611* Winston, AW, Jr.

1431259- 000000 Ivon Watkins
1431263*

14043

1436354- 000000
1436364*

Distributees

Wilson, AW
Wright, N

Adams, EM
Allen, WW
Allinson, RL
Alquist, FN
Barrons, KC
Beshgetoor, AW
Boundy, RH
Britton, EC
Davidson, JH
Dow
Dutton, WC
Gay, HH
Greene, LM
Kagy, JF
Luce, EN
Lynn, GE
MacCutcheon, SM
Prescott, RF
Sunderland, WW
White, L
Wright, P

General Subject Matter

Results of range finding toxicological tests on Dow Brush Killer T

Fish toxicity of some herbicide formulations and their ingredients

IWD 245T Esters

Compounds showing toxicity to fish at 5 MG/L or less

Dow Number

Date

Author

Recipient

1437060-
1437102*

660622

Graves, HH
DRE

1443921-
1443922*

701217

Dow
Gehring, PJ
Norris, JM
Williams, CS

14044

Distributees

Goergen, GG
Lueck, A
Sauers, RC
Widiger, AH
Tuttle, FC
Poffenberger, N
Wolf, RR
Eigsti, DR
Hillman, RE
Anderson, RE
Graves, HE
Coulter, KE
Snyder, AP
Delisle, NG

Barton, J
Blair, EH
Burgert, BE
Clegg, DH
Dow
Edwards, H
Frevel, LK
Gordon, HL
Goring, CA
Holder, BB
Johnson, JE
Kilian, DJ
Kimmel, CE
Lloyd, BH
MacCutcheon, SM
McCollister, DD
McIntyre, HH
Morgan, RW

General Subject Matter

Pilot Plant Study of the Caustic
Hydrolysis of 1245 -
Tetrachlorobenzene CF-1043-2

Toxicological properties and
industrial handling hazards of
formulation M-3592 containing the
propylene glycol butyl ether of
245T

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1443923- 1443924*	701217	Dow Hoyle, HR Norris, JM	
1443925- 1443928*	701217	Dow Norris, JM	
1443929- 1443932*	700000	Bourne, JE Dow Silverstein, EH	
1443933- 1443934*	761110	Dow Silverstein, EH	
1443935 *	701106	Dow Silverstein, EH	
1443936- 1443941*	701210	Dow Silverstein, EH	
1511476 *	800606	K&E Wine, LM	Braun, WH Dow
1551589- 1551591*	580417	Dow Stevenson, GT	

1
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12

Distributees

Morse, D
Pitchforth, L
Schwarz, AJ
Williams, CS

General Subject Matter

M-3592 (Data sheet of properties,
health hazards and precautions for
safe handling of materials)

Acute toxicological properties of
formulation M-3592T

M-3592 (Acute oral toxicity)

M-3592 (Eye irritation)

Primary skin irritation patch test
(household chemical) (M-3592)

M-3592 skin contact absorption

Dow
Tucker, M

Barrons, KC
Blair, EH
Boundy, RH
Colby, RW
Coulter, LL

Inverton (brush killer) hay spray
cattle feeding test

Dow Number

Date

Author

Recipient

1568559-
1568560

650000

Dow

1568627-
1568630

641208

Sauers, RC

1568666-
1568667

641208

Sorge

1573474*

700915

Haberstroh, WH

Savaso, JC

14046

Distributees

Dow
Green, J
Hymas, TA
Johnson, JE
Kagy, JF
Lippie, LJ
Lynn, GE
Norton, TR
Nutting, HS
Perkins, RP
Rowe, VK
Spalding, J
Vanvalkenburg, JW

General Subject Matter

Analysis of caustic insoluble oil and 245 Trichlorophenol for composition by gas liquid chromatography

Chronological survey of the first production period of 245T production

Chronological survey of the first production period of 245T production.

Bleiweiss, JC
Deline, DD
Henry, HE
Hensley, EF
Schmidt, BV
Tefft, TH

24D Capital Estimates

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1573475- 1573482*	700910	Haberstroh, WH Seidel, EM	
1580542- 1580566*	680514	JFL Kern, WG Fernandez Gorgasz Dalman	
1580567- 1580585*	680822	Dow	
1581983- 1582013*	620700	Gilzorrilla, F FGZ CAH	
1582654- 1582657*		McCaughey, V Mathew, BA	
1583667- 1583675*	000000	Millhisler, RD	
1583690- 1583691*	721125	Vanhorn, R Bethke	
1630441*	500600		
1630444*	510228	Dupont	
1630446*	501000		

14037

Distributees

General Subject Matter

Revision of 24D Capital Estimates

Technology review of industrial
chloroacetic acid

Dowanol, Butyl & Isooctyl
Chloroacetate technology review

Preliminary engineering study for
Dow Quimica Argentina, SA

Tordon 105 Manufacture

Tordon 225E

M3990 or Tordon 225E reactive
chemical hazard data

24D Amine Weed Killer
(Raw materials description and
specifications)

Raw material specification

24D Amine Weed Killer
(Raw materials handling &
storage conditions)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1630447- 1630473*	501000		
1630466	500810	Ott, RC	
1630474- 1630478*	491200		
1630479- 1630483*	500201	Jirouch, EA	
1630485*	500510	Dupont	
1630489- 1630490*	491200		
1630491- 1630494*	491200		
1642690- 1642691*	000000	JRU	
1645090- 1645098*	550826	Bennett, CM Widiger, A Dugan, G	

14048

Distributees

General Subject Matter

24D Amine Weed Killer
(operating directions)

Effect of DMA Concentration on PH
of 24D Amine Weed Killer

24D Amine Weed Killer
(Operational hazards)

Tentative Operating Instructions,
Dimethylamine

24D Amine Weed Killer
Specifications & average analysis

24D Amine Weed Killer
(Labor Required for Operation).

24D Amine Weed Killer
(Production and Yield Accounting
Methods and Information)

Trichlorophenol Manufacturing

Griswold, A
Williams, WH
Britton, EC
Alquist, FN
Colby, A
Vanarsdale, J
Reese, R

Phenol, 245 Tricholor

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
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1650079-
1650081*

630429

Barrons, KC
Coulter, LL
Johnson, JE
Lynn, GE
Wolf, MA
Hunt, M
Loucks, MF
Vanvalkenburg, W
Fayerweather, BL
McIntyre, HH
Branaman, J
Lang, HC
Falkenstein, WJ
Davis, HW
Allen, WW

1650139-
1650141*

670522

Barrons, KC
Byrd, BC
Wolf, MA
Gowell
Loucks, MF
Falsey, MP
Buerge, TE
McIntyre, HH
Hammer, OH
Gill, WM
Highhill, CA
Woodward, RE

14049

Distributees

Brainerd, A
Poffenberger, N
Widiger, A
Dugan, G

General Subject Matter

Verton CE with oil
(Release to Sales)

Tordon 155 Mixture
(Release to Sales 9)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		Davis, H Corbin, WF Nummy, WR DEP CJK JLS	
1650146- 1650148*	671009	Dow	Woodward, RE
1650262 1650264*	630517	Barrons, KC Coulter, LL Johnson, JE Lynn, GE Ritty, PM Wolf, MA Loucks, MF Vanvalkenberg, W Branaman, J Lang, HC Falkenstein, WJ Allen Saunders, ES	
1650466- 1650468*	621012	Amstutz, FC Barrons, KC Johnson, JE Lynn, GE Southwick, L Wolf, MA	

14050

Distributees

General Subject Matter

Dosser, RC
Hoff, RC
Matuska, R
Colby, A
Stone, F

Sales Release Tordon 155

Verton T (Release to Sales 16)

Esteron 245 Concentrate
(Proposed Release to Sales 21)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
		Vanvalkenberg, W McIntyre, HH Branaman, J Lang, HC Allen, WW JLS KEE ES PMR Saunders, E	
1727967- 1727968*	580630	Dow McCullister, DD Wolf, MA	
1728049- 1728050*	590702	Dow Olson, KJ Oyen, F	
1728053- 1728054*	630108	Dow Olson, KJ Oyen, F	
1728057- 1728058*	621214	Dow Olson, KJ Oyen, F	
1728059- 1728060*	660412	Dow McCullister, DD Olson, KJ	

14051

Distributees

General Subject Matter

Dow
Hoyle, HR

Dow 245T amine weed killer (Data sheet of properties, health hazards and precautions for safe handling of materials)

Dow
Hoyle, HR

M-1459 formulation of K-7797 and K-7856 (Data sheet of properties, health hazards and precautions for safe handling of materials)

Dow
Hoyle, HR

M-2422 (Data sheet of properties, health hazards and precautions for safe handling of materials)

Dow
Hoyle, HR

M-2468 (Data sheet of properties, health hazards and precautions for safe handling of materials)

Dow
Hoyle, HR

M-2993 (Data sheet of properties, health hazards and precautions for safe handling of materials)
(T2.MO-2993-1)

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1728061- 1728062*	700514	Dow Norris, JM	
1728101- 1728102*	580616	Dow McCollister, DD Wolf, MA	
1728103- 1728104*	580630	Dow McCollister, DD Wolf, MA	
1728167- 1728168*	580514	Dow McCollister, DD Wolf, MA	
1765919*	650919	Sinke, GC	
1766300- 1766308	661104	Widiger, AH Johnson, RL Dugan, GF	

14052

Distributees

General Subject Matter

Dow
Falkenstein, WJ
Hoyle, HR

M-3427 (Data sheet of properties,
health hazards and precautions for
safe handling of materials)
(BC T2.MO-3427-1)

Dow
Hoyle, HR

Reddon (Data sheet of properties,
health hazards and precautions for
safe handling of materials)

Dow
Hoyle, HR

Reddon concentrate (Data sheet of
properties, health hazards and
precautions for safe handling of
materials)

Dow
Hoyle, HR

Veon brush killer (Data sheet of
properties, health hazards and
precautions for safe handling of
materials)

Heat of reaction data per
GC Sinke of the Thermal Lab

Widiger, AH
Coulter, KE
Johnson, R
Thurston, D
Dugan, G
Haberstroh, WH
Goergen, GG
Sauers, RC
Bender, S
Wolf, RR
Louck, A

Phenol, 245 Trichloro study
of Chloracne problem
Preparation of 245 Trichlorophenol
from Trichlorobenzene

Dow Number

Date

Author

Recipient

1766309-
1766336*

650203

Poffenberger, N
Bradley, K
Ebert
Warren

1766651-
1766660*

641125

1766681-
1766686*

650107

Poffenberger, N

14053

Distributees

General Subject Matter

Poffenberger, N
Bailey, CZ
Putnam, MS
Nielson, WH
Staehling, EC

Bradley, K
Graves, H
Dylewski, S
Haberstroh, WH
Sauers, R
Trapp, W
Poffenberger, N
Widiger, AH
Coulter, KE
Goergen, GG
Lueck, A
Redmond, W
Delisle, NG
Staehling, EC

Phenol 245 Trichloro
Preliminary Process Design
Using 100 percent NAOH,
PL2028-4

Trichlorophenol Process

Poffenberger, N
Sauers, RC
Trapp, WB
Widiger, A
Lueck, A
Holmes, R
Bradley, K
Goergen, GG

245 Trichlorophenol - Outline of
Requirements

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1766687- 1766694*	650112	Poffenberger, N	
1766695- 1766698*	650105	Poffenberger, N	
1766704- 1766708*	641120	Holmes, R	
1766713- 1766730*	641224	Sorge	Sauers
1766734- 1766736*	691212	Widiger, A	Chang, KY

14054

DistributeesGeneral Subject Matter

Poffenberger, N
 Delisle, NG
 Sauers, R
 Trapp, WB
 Widiger, A
 Lueck, A
 Holmes, R
 Bradley, K
 Goergen, G

Appendix to Report PL2028-3
 (245 Trichlorophenol)

Poffenberger, N
 Sauers, R
 Trapp, W
 Lueck, A
 Widiger, A
 Bradley, K
 Goergen, G
 Holmes, R

245 Trichlorophenol Process
 Information

Hydrolysis of Tetrachlorobenzene
 using flake caustic

Description and prints for the
 current production methods for
 obtaining 245 Trichlorophenolate
 solution in building 74 (Report 50)

Leavittg, FC
 Demott, DN
 Poffenberger, N
 Tree, R
 Plepys, RA
 Schmidtke, DJ

Progress report on research
 on blooming of 245 -
 Trichlorophenol

<u>Dow Number</u>	<u>Date</u>	<u>Author</u>	<u>Recipient</u>
1766739- 1766750*	700720	Chang, KY Tou, JC	
1766760 1766761*	641118	Widiger, AH Holmes, RD	Greiss, GA
1766762- 1766764*	640730	Holmes, R	Hoyle, HR
1766766- 1766769*	641120	Holmes, RD	
1766770- 1766771*	000000	Dow	

14055

Distributees

General Subject Matter

Chang, KY
Tou, JC
Look, A
Leavitt, FC
Demott, DN
Poffenberger, N
Gum, WF
Plepys, RA
Pierce, JK
Frevel, LK
Potts, WJ
Westover, LB
Fauver, VA
Kennedy, TL
Widiger, AT
Pews, G
Rodia, RM
Nummy, WR
Blue, RD
Delisle, NG
Sheetz, DP

Oxygen 18 labeling study on
the mechanism of caustic
hydrolysis of 1245 -
tetrachlorobenzene in methanol

Goergen, GG

199 Bldg Production of
Sodium 245 Trichlorophenolate

Manufacture of Trichlorophenol at
199 Bulding

Hydrolysis of Tetrachlorobenzene
using flake caustic

TCP Process Flow Sheet