Uploaded to VFC Website

November 2012

This Document has been provided to you courtesy of Veterans-For-Change!

Feel free to pass to any veteran who might be able to use this information!

For thousands more files like this and hundreds of links to useful information, and hundreds of "Frequently Asked Questions, please go to:

Veterans-For-Change

Veterans-For-Change is a 501(c)(3) Non-Profit Corporation
Tax ID #27-3820181

If Veteran's don't help Veteran's, who will?

We appreciate all donations to continue to provide information and services to Veterans and their families.

https://www.paypal.com/cgi-bin/webscr?cmd=_s-xclick&hosted_button_id=WGT2M5UTB9A78

Note: VFC is not liable for source information in this document, it is merely provided as a courtesy to our members.

Item ID Number	05307 ☐ **Not Scanned**
Author	Warren, Edward W.
Corporate Author	Dow Chemical Company
Report/Article Title	Before the Environmental Protection Agency (EPA) of the United States of America, In re: The Dow Chemical Company, et al., Docket Nos. 415, et al., The Dow Chemical Company's Pretrial Risk Brief
Journal/Book Title	
Year	1980
Month/Day	January 25
Color	☐
Number of Images	64
Descripton Notes	

BEFORE THE
ENVIRONMENTAL PROTECTION AGENCY
OF THE UNITED STATES OF AMERICA

In Re:	
The Dow Chemical Company, et al.	Docket Nos. 415, et al.

THE DOW CHEMICAL COMPANY'S PRETRIAL RISK BRIEF

Edward W. Warren
L. Mark Wine
Richard L. McConnell
John A. Zackrison

KIRKLAND & ELLIS
1776 K Street, N.W.
Washington, D.C. 20006
(202) 857-5000

Of Counsel:

Rudolf H. Schroeter

John Scriven
Mark Tucker
Dow Chemical U.S.A.
2030 Dow Center
Midland, Michigan 48640

LA FOLLETTE, JOHNSON,
SCHROETER, & DE HAAS
320 North Vermont Avenue
Los Angeles, California 90004

Counsel for The Dow Chemical Company

January 25, 1980

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

BEFORE THE
ENVIRONMENTAL PROTECTION AGENCY
OF THE UNITED STATES OF AMERICA

In Re:	
The Dow Chemical Company, et al.	Docket Nos. 415, et al.

THE DOW CHEMICAL COMPANY'S PRETRIAL RISK BRIEF

INTRODUCTION

In accordance with the Administrative Law Judge's directions, The Dow Chemical Company (Dow) submits this pretrial brief on the risk issues, presenting a concise overview of the entire risk case. While the evidence to be presented in these consolidated hearings is voluminous, the organization of this brief and the issues themselves are straightforward.

The evidence will show that all uses of 2,4,5-T and silvex are safe, that these herbicides present no reproductive risk, and that the extremely small potential carcinogenic risk predicted for TCDD is well within acceptable limits. Accordingly, 2,4,5-T and silvex products should be approved for all registered uses, and each and every registration subject to the Agency's Section 6(b)(1) and Section 6(b)(2) hearing notices should be continued in full force and effect.

Part I of this brief presents a brief history of 2,4,5-T and silvex, showing more than 30 years of safe use with substantial economic and social benefits. This part also summarizes the years of extensive regulatory and scientific scrutiny which assure the safety of these herbicides, as well as the more recent developments which set the stage for these hearings.

Part II addresses OGC's burden of going forward with the evidence to establish an affirmative case for cancellation or restriction, and the elements of such a prima facie case under FIFRA's risk/benefit balancing standards.

Part III addresses the critical issue of human exposure potential. Careful analysis of application techniques and patterns of use, environmental behavior characteristics, residue testing results, and pharmacokinetics data shows that the quantities of 2,4,5-T, silvex, and 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)[1/] to which humans might be exposed, either directly or indirectly, are extraordinarily minute.

In Part IV, we set forth the extensive data showing that 2,4,5-T and silvex are not carcinogenic, and the results of carcinogenicity testing with the trace contaminant TCDD. Even using greatly exaggerated assumptions regarding exposure, and the most conservative risk-assessment models, the

---

1/ Although there are 22 different tetrachlorodibenzo-p-dioxins isomers, in this brief, TCDD refers only to 2,3,7,8-tetrachlorodibenzo-p-dioxin, the isomer present in 2,4,5-T and silvex.

risks potentially posed to applicators and the general public are extremely small, well below acceptable levels of risk established by EPA and other federal regulatory agencies.

Part V deals extensively with the evidence on reproductive risk, including both fetotoxic and teratogenic risk. Comparison of the minute human exposure potential to well-established no-effect levels for 2,4,5-T, silvex, and TCDD demonstrates high margins of safety for all of these compounds. The absence of reproductive hazard is confirmed by observations made at Seveso, Italy, where the general population was exposed to high levels of TCDD produced in the explosion of a trichlorophenol plant, without adverse reproductive consequences.

I. REGULATORY HISTORY.

2,4,5-T and silvex are phenoxy herbicides used for selective control of broadleaved weeds, brush, and undesirable trees. Developed during the 1940's, 2,4,5-T was first registered as a pesticide in 1948, and silvex was registered in 1954.

For more than 30 years, these products have been used safely and effectively in countries throughout the world. Although the extensive economic and social benefits derived from these products will be addressed fully in the benefits case, the brief summary of uses presented here helps place the risk issues in perspective.

In modern range and pasture management, 2,4,5-T and silvex are used to control weeds and brush such as mesquite which otherwise would crowd out forage grasses, and to control poisonous plants dangerous to grazing animals. These management practices greatly enhance range productivity, and replace environmentally destructive alternatives such as burning or plowing.

Forest productivity is also increased by the use of 2,4,5-T and silvex for site clearance and conifer release. 2,4,5-T and silvex are used to eliminate harmful tree species that would otherwise inhibit or prevent conifer growth. As with rangeland, the use of these herbicides in the forest replaces environmentally destructive alternatives, and in addition prevents injuries to workmen using chain saws and other dangerous implements.

Similarly, 2,4,5-T and silvex are used to maintain rights-of-way along utility lines, roads, and railroads, and to control weeds in many non-crop areas, ditches, lawns, recreational sites, and so forth. Significantly cheaper than alternatives such as manual clearing, the aerial application of these herbicides also permits control in otherwise inaccessible locations.

In rice growing, 2,4,5-T and silvex are used to control competing weeds, thereby markedly increasing yield. Silvex is also used to increase sugar cane productivity and to prevent fruit-drop on orchard crops such as apples and prunes.

Throughout the more than thirty years these pesticides have been used, and particularly during the last decade, 2,4,5-T, silvex, and TCDD have been subjected to intense scientific and regulatory review, providing a safety evaluation far more comprehensive than available for most commonly used chemicals and drugs. The extensive evidence developed by federal agencies, by industry, and by academics in the United States and abroad fully support the safety of these herbicides.

Recent regulatory review of 2,4,5-T began in 1970, with proceedings before the Secretary of Agriculture.[2/] Pursuant to a referral from the Secretary, in February 1971 the National Academy of Sciences Advisory Committee on 2,4,5-T endorsed continued use of 2,4,5-T on forests, rangeland, and rights-of-way, and recommended a maximum manufacturing specification of 0.1 ppm TCDD.[3/]

After assuming administration of FIFRA late in 1970, EPA continued the regulatory review of 2,4,5-T begun by the Secretary of Agriculture, and in 1973 set hearings on all

---

2/ The Secretary of Agriculture administered FIFRA until December 18, 1970, when administration of the Act was transferred to EPA. 35 Fed. Reg. 19169 (December 18, 1970).

3/ Report of the Advisory Committee on 2,4,5-T to the Administrator of the Environmental Protection Agency, National Academy of Sciences (unpublished 1971). The 0.1 ppm standard remains as the manufacturing specification, but improved manufacturing capabilities currently yield commercial 2,4,5-T at much lower TCDD concentrations.

uses of 2,4,5-T, to begin in April 1974.[4] But in March 1974, a Scientific Workshop comprised of leading scientists from around the world firmly endorsed the safety of 2,4,5-T.[5] After continuing the scheduled hearing date and tentatively expanding the scope of the hearing to include silvex and other herbicides,[6] EPA withdrew its hearing notices on June 24, 1974.[7]

Following EPA's abandonment of the 1974 hearings, Dow, EPA, and others participated in the Dioxin Implementation Plan, a comprehensive and cooperative program for monitoring possible TCDD residues in human and environmental samples. Beginning in April 1978,[8] Dow and many other interested persons participated in EPA's RPAR review of 2,4,5-T through submission of extensive data and comments to the Agency. Dow believed that both the Implementation Plan and the RPAR

4/ EPA, "2,4,5-T: Intent to Hold Hearing," and EPA, "2,4,5-T: Statement of Issues," 38 Fed. Reg. 19859 (July 24, 1973).

5/ USDA Memorandum from R.W. Fullerton, et al. to Administrative Law Judge Frederick Denniston, Workshop Participants, and Parties to 2,4,5-T Hearing Re Final Report of 2,4,5-T Scientific Workshop (1974).

6/ EPA, "2,4,5-T: Intent to Hold Hearing" 38 Fed. Reg. 19859 (July 24, 1973).

7/ EPA, "2,4,5-T and Herbicides Potentially Containing TCDD: Withdrawal of Cancellation and Withdrawal of Intent to Hold Hearings," 39 Fed. Reg. 24049 (June 24, 1974).

8/ EPA, "Rebuttable Presumption Against Registration and Continued Registration of Pesticide Products Containing 2,4,5-T," 43 Fed. Reg. 17116 (April 21, 1978).

review offered an opportunity for dispassionate scientific investigation and exchange.

This cooperative scientific effort was shattered on March 1, 1979, when EPA issued unprecedented "emergency" suspension orders for major uses of 2,4,5-T and silvex, based on the now discredited Alsea II study.[9/] The Alsea II report was prepared secretly with no opportunity for scientific peer review, and EPA deprived Dow and other RPAR participants of advance notice or opportunity to comment on the "emergency" suspensions, which were weeks in preparation.[10/]

Along with the suspension orders, EPA issued Section 6(b)(1) cancellation hearing notices for each of the suspended uses.[11/] Dow and other parties filed timely objections to the hearing notices, initiating these cancellation hearings.[12/]

Dow immediately challenged the ill-founded suspensions in District Court. Under circumstances which effectively

---

9/ EPA, "Decision and Emergency Order Suspending Registrations for the Forest, Rights-of-Way, and Pasture Uses of 2,4,5-T," 44 Fed. Reg. 15874 (March 15, 1979); EPA, "Decision and Emergency Order Suspending Registration for Certain Uses of Silvex," 44 Fed. Reg. 15897 (March 15, 1979).

10/ See Transcript of Press Conference by Barbara Blum at 30 (March 1, 1979).

11/ EPA, "2,4,5-T: Notice of Intent to Cancel the Forestry, Rights-of-Way, and Pasture Registrations of Pesticide Products Containing 2,4,5-T," 44 Fed. Reg. 15893 (March 15, 1978) and EPA," Notice of Intent to Cancel Certain Registrations of Pesticide Products Containing Silvex," 44 Fed. Reg. 15917 (March 15, 1979).

12/ See Request for Hearing and Objections on Behalf of Registrant The Dow Chemical Company (filed April 9, 1979).

precluded full scientific review of Alsea II, including the Agency's surprise introduction of new data on the final day of trial, the court "reluctantly" declined to set aside the suspensions, but concluded that it would not have suspended registration based on the evidence before the Agency.[13/]

Subsequently, the Alsea II report has been reviewed and repeatedly discounted by independent scientific reviewers, including most recently an interdisciplinary task force assembled by the Environmental Health Sciences Center at Oregon State University. The Oregon State task force concluded

> EPA erred seriously in each of the three conclusions in the Alsea II Report. If there is a relationship between herbicide use and miscarriage in the "Alsea Basin" and its surrounding area, it is not apparent and cannot be tested using the data from the Alsea II study.[14/]

Similar conclusions were reached in reviews conducted by the governments of Great Britain,[15/] Australia,[16/] and New

---

13/ "[T]he Court will frankly concede that it arrives at this decision with great reluctance and would not in its judgment have ordered the emergency suspensions on the basis of the information before the EPA." The Dow Chemical Co. v. Barbara Blum, 469 F. Supp. 892, 907 (E.D. Mich. 1979).

14/ Environmental Health Sciences Center, Oregon State University, A Scientific Critique of the EPA Alsea II Study and Report at 46 (October 25, 1979) (Hereinafter "Oregon State Critique").

15/ Transcript from House of Lords, "Dioxin and Synthetic Chemicals: Hazards," at 1394 (July 17, 1979).

16/ Snelson, J.T., "Observations and Comments on the Report of Investigations of Spontaneous Abortion Rates in Oregon" (1979).

Zealand,[17] at the June scientific conference on 2,4,5-T sponsored by the American Farm Bureau,[18] and in a detailed report prepared by Dr. Steven Lamm and submitted by Dow to the Scientific Advisory Panel and to the Agency in August.[19]

In July, EPA published proposed Section 6(b)(2) hearing notices for the nonsuspended uses of 2,4,5-T and silvex.[20] Apparently recognizing the futility of continued reliance on Alsea II, the Agency staff based its arguments on poorly-reasoned reinterpretations of animal test data.

Unlike the Section 6(b)(1) cancellation notices issued in March, EPA was required by law to submit the proposed Section 6(b)(2) notices to the FIFRA Scientific Advisory Panel for review.[21] At hearings conducted in August and

---

17/ Becroft, D.M.O., et al. (Reviewers), "An Evaluation of the Preliminary Report of Assessment of a Field Investigation of Six-year Spontaneous Abortion Rates in Three Oregon Areas in Relation to Forest 2,4,5-T Spray Practices," New Zealand Department of Health (May 1979).

18/ American Farm Bureau Federation, Scientific Dispute Resolution Conference on 2,4,5-T (August, 1979).

19/ Lamm, Steven H., An Epidemiologic Assessment of the Alsea II Report (August 6, 1979).

20/ 44 Fed. Reg. 41531 (July 17, 1979).

21/ FIFRA Section 6(b), 25(d). The statute permits EPA to omit Scientific Advisory Panel review where a cancellation hearing notice is issued in conjunction with a suspension. Although the Panel expressly requested permission to review the notices issued in March, the Agency refused to submit them for review. See Memorandum from the Executive Secretary, FIFRA Scientific Advisory Panel, to the Administrator (April 17, 1979) (transmitting the Panel's unanimous resolution and setting forth the Panel's reasons for wishing to review the 2,4,5-T and silvex notices).

September, the Panel reviewed extensive scientific evidence submitted by Dow and EPA.

Rejecting key aspects of EPA's arguments, the Panel found that potential exposure related to the nonsuspended uses does not "suggest . . . the possibility of significant risk."[22/] Accordingly, the Panel expressly recommended that no Section 6(b)(2) hearing be held at this time.[23/]

In light of the Scientific Advisory Panel's considered judgement on the risk issues, the proper and prudent course would have been to withdraw the proposed Section 6(b)(2) notices and proceed no further. But EPA determined to proceed with final 6(b)(2) notices in the face of the Panel's report, apparently before the Agency's technical staff had even been given an opportunity to review the Panel's report in detail.[24/]

In expressly acknowledging the absence of an "imminent hazard" for the nonsuspended uses,[25/] the final Section

---

22/ FIFRA Scientific Advisory Panel, Review of Notices of Intent at 6 (September 27, 1979) (hereinafter "SAP Report").

23/ SAP Report at 2.

24/ See Weekly Operational Report From OPP (November 8, 1979) [reporting that Deputy Assistant Administrator Edwin Johnson already had decided to proceed with Section 6(b)(2) hearings and that "A formal response to the SAP Report will be published in the Federal Register after an in depth review by EPA scientific staff." (emphasis supplied)]. See also Letter from Steven D. Jellinek to Thomas S. Foley (November 14, 1979).

25/ EPA, "Preliminary Determination Concerning RPAR of Certain Uses of Pesticide Products Containing 2,4,5-T and Silvex," 44 Fed. Reg. 41531, 41536, 41542 (July 17, 1979).

6(b)(2) notices tacitly acknowledge the lack of foundation for the March suspensions. Indeed, OGC itself has recently conceded that:

> [A]ssessment of risk for all uses covers the same or similar factual ground in such areas as toxicology, environmental stability, exposure potential, and chemistry.26/

Yet, even though the risks for all uses are essentially the same, EPA apparently has given no consideration to withdrawing the unsupportable suspension and cancellation notices.

Dow and other interested parties have responded to the Section 6(b)(2) notices by stating their intent to participate fully in Section 6(b)(2) hearings on the nonsuspended uses.27/ The Chief Administrative Law Judge has consolidated the Section 6(b)(1) and 6(b)(2) proceedings, so that these hearings will encompass all suspended and nonsuspended uses of 2,4,5-T and silvex.28/

II. THE PROPONENTS OF CANCELLATION OR RESTRICTION BEAR THE BURDEN OF GOING FORWARD TO ESTABLISH A PRIMA FACIE CASE UNDER FIFRA'S EXPLICIT RISK/BENEFIT BALANCING STANDARDS.

EPA's hearing regulations, as well as the formal hearing requirements of the Administrative Procedure Act, require

---

26/ Respondent's Motion for Consolidation at 2 (filed December 6, 1979).

27/ See The Dow Chemical Company's Response to Section 6(b)(2) Statements of Issues for the Nonsuspended Uses of 2,4,5-T and Silvex (filed January 10, 1980).

28/ Order of Consolidation (filed December 14, 1979).

the proponents of cancellation or restriction to bear the burden of going forward with the evidence in these Section 6(b)(1) and 6(b)(2) proceedings. Accordingly, OGC, EDF, and NCAP bear the burden of establishing a prima facie case for regulatory action, under the risk/benefit balancing requirements of FIFRA.

The regulations governing these hearings expressly provide that "the proponent of cancellation or change in classification has the burden of going forward to present an affirmative case for the cancellation or change in classification of the registration." 40 C.F.R. § 164.80(a). The regulations also provide that in hearings "called by the Administrator" (Section 6(b)(2) hearings), "the Respondent [OGC] has the burden of going forward to present an affirmative case as to the statement of issues." 40 C.F.R. § 164.80(a).

Even absent these express provisions of the rules, the formal hearing provisions of the Administrative Procedure Act[29/] would require proponents of cancellation or other regulatory restrictions to bear the burden of going forward with the evidence in hearings under Section 6 of FIFRA. In

---

29/ The APA's formal hearing requirements apply here because FIFRA requires that the decision in hearings initiated under Section 6(b) be made on the record, after a hearing. 5 U.S.C. § 554. See United States v. Florida East Coast Ry. Co., 410 U.S. 224, 234-38 (1973); United States v. Allegheny-Ludlum Steel Corp., 406 U.S. 742, 756-57 (1972).

Environmental Defense Fund v. EPA[30/] the court held that § 556(d) of the APA, requiring the proponent of a rule or order to bear the burden of proof, directs the proponents of suspension in Section 6 suspension hearings to bear the burden of going forward. Similarly, this provision of the APA places the burden of going forward with the evidence on the proponents of regulatory restrictions in Section 6(b)(1) and 6(b)(2) hearings.

Consequently, OGC, NCAP, and EDF bear the burden of going forward to show a prima facie case that the registrations at issue in these hearings do not meet the registration standards set out in FIFRA. As shown below, establishment of a prima facie case requires affirmative proof of a significant risk, affirmative proof quantifying the benefits of continued use and the impact of cancellation or restrictions, and, ultimately, a demonstration that the risk posed by continued use outweighs the benefits of continued use.

Cancellation or restriction of registrations may be based on a finding that the registered pesticide, "when used in accordance with widespread and commonly recognized practice, generally causes unreasonable adverse effects on the environment."[31/] FIFRA defines unreasonable adverse effects on the

---

30/ 548 F.2d 998 (D.C. Cir. 1976), supplemental opinion on petition for rehearing, 548 F.2d 1012 (D.C. Cir. 1971).

31/ FIFRA Section 6(b); see Section 3(c)(5)(d). Although Section 6(b) permits regulatory action on other bases, such as labelling which does not comply with statutory requirements, there is no suggestion that OGC relies on such a theory in this case.

environment as "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of [the] pesticide."[32/] Thus, the Act requires an explicit balancing of economic, social, and environmental benefits against the risk, if any, to determine whether such risk is "unreasonable."

Accordingly, the proponents of cancellation or restriction first must show by affirmative evidence the existence of a significant risk. Unsubstantiated or hypothetical allegations, unsupported by substantial evidence, should be accorded no weight in the statutory weighing of risks and benefits. Moreover, the risk considered must be that posed by the pesticide "when used in accordance with widespread and commonly recognized practice" -- not the risk which might be presented by misuse or abuse.

Second, the proponents of cancellation must introduce affirmative proof quantifying the benefits of continued use and the impact of the advocated cancellation or restrictions. The economic and social benefits to be considered under the Act range broadly, including increased productivity, economic savings to users and consumers, and enhanced health and safety for workers and the public. Likewise, environmental benefits, such as the avoidance of adverse environmental consequences caused by alternative control methods which would replace the pesticide, must also be considered.

32/ FIFRA Section 2(bb) (emphasis supplied).

Third, the proponents of cancellation or restriction must demonstrate that, considering all risks and benefits attributable to the pesticide, the risks of continued registration are "unreasonable." This ultimate balancing of risks and benefits can be performed, of course, only at the conclusion of both risk and benefits presentations.

III. HUMAN EXPOSURE TO 2,4,5-T, SILVEX, AND TCDD OCCURS, IF AT ALL, ONLY AT MINUTE QUANTITIES POSING NO SIGNIFICANT RISK.

Any assessment of the risk to humans posed by a toxic substance depends critically on an accurate determination of the dose to which humans might be exposed. At low levels of exposure, there will be no substantial human risk.

In this case, the potential for human exposure is confined almost exclusively to applicators, and even these exposures are so small as to present no substantial risk whatsoever. Non-applicators are so rarely exposed, at such extremely low levels, that continued use of 2,4,5-T and silvex products presents virtually no risk to members of the public.

It is axiomatic among toxicologists, and consistent with everyday experience and common sense, that toxic substances exhibit a direct relationship between dose and response, with increased toxic effects seen at higher doses and decreased or no toxic effects seen at lower doses. The dose-response principle applies equally to measurements of

fetotoxic, teratogenic, and carcinogenic effects, as well as other forms of toxicity.

All fetotoxic and teratogenic compounds exhibit no-effect levels, which can be determined in properly conducted experimental studies which employ appropriate test doses. Below the no-effect dose, no toxic effects are observed. Accordingly, where exposure is below the no-effect level, no risk is presented and a margin of safety exists.[33/]

Many experts believe that no-effect levels also exist for some or all carcinogens; others, however, contend that there is no "threshold" level for carcinogenic effects, and that some risk should be assumed even at the lowest doses of exposure. Nevertheless, scientists universally agree that carcinogens, like other toxic substances, follow a dose-response relationship, so that the incidence of carcinogenic effects decreases as exposure decreases. Accordingly, for many substances the degree of risk posed by different levels of exposure can be calculated and compared to other risks deemed acceptable by society.

Despite the critical importance of exposure data, OGC's contentions regarding exposure consist of little more than speculation -- contradicted by all the available evidence -- that new evidence not yet developed may show significant

---

33/ A margin of safety represents the difference between expected exposure levels and the established no-effect level. EPA commonly accepts safety margins of 100 fold in regulating pesticides and other substances.

human exposure. Indeed, the exposure analysis published with the final Section 6(b)(2) notices begins with an admission of the Agency's "need for additional data," and is devoted almost exclusively to the discussion of ongoing or planned studies for which no results are available.[34/]

The Agency's reluctance to address the existing evidence is understandable, particularly in light of the Scientific Advisory Panel's thorough and explicit rejection of the exposure analysis advanced in the July Section 6(b)(2) position documents.[35/] While recognizing the need for continuing data collection, the Panel expressly rejected the Agency's position on each of four exposure questions submitted to the Panel by the Agency.[36/] The Panel summarized its conclusions as follows:

> The monitoring data obtained thus far does not suggest that TCDD derived from commercial 2,4,5-T and Silvex exhibits any tendency to accumulate in the human food chain in amounts which would pose a substantial risk.[37/]

Similarly, the Panel found that "current monitoring data do not indicate that there is a substantial reproductive or

---

34/ EPA, 2,4,5-T/Silvex Position Document 4, 44 Fed. Reg. 72320, 72322-23 (2,4,5-T Notice); 44 Fed. Reg. 72333, 72335-36 (Silvex Notice).

35/ SAP Report at 4-6.

36/ SAP Report at 4-6.

37/ SAP Report, Appendix I at 8.

teratogenic risk posed by the accumulation of TCDD in the human food chain."[38/]

The available evidence demonstrates that there is no significant potential for human exposure to 2,4,5-T, silvex, or TCDD. As shown below, analysis of use and application patterns, the environmental behavior of 2,4,5-T, silvex, and TCDD, the results of residue testing programs, and field studies of human exposure show that potential human exposure is extraordinarily small. In conjunction with the extensive data on carcinogenicity and reproductive effects discussed in Parts IV and V of this brief, the data described below provide sound assurance that the continued use of these herbicides presents no significant risk to applicators or to members of the public.

A. Patterns of Use and Application Techniques Limit the Potential for Direct Spray Exposure.

Under constantly improving manufacturing practices, recent commercial grade 2,4,5-T and silvex products produced by Dow and others contain $\leq$ 0.025 ppm TCDD, well below the 0.1 ppm manufacturing specification set in 1971.[39/] Further

---

38/ SAP Report, Appendix I at 11.

39/ This figure of $\leq$ 0.025 ppm is based on the highest concentration of TCDD detected in recent tests conducted by an EPA contractor using 16 commercial samples of 2,4,5-T from five manufacturers. The tests showed a range of concentration from "not detectable" to 0.025 ppm in 2,4,5-T, excluding higher values reported as doubtful by the contractor. Similar tests with 8 commercial silvex samples showed TCDD ranging from 0.012 to 0.024. 2,4,5-T Position Document 2/3 at 8, note; Silvex Position Document 1/2/3 at 9, note.

reductions in TCDD content may be possible on the basis of continuing advances in technology. Even at present levels, however, only a few ounces of TCDD are present in all 2,4,5-T and silvex products used annually in the United States.

2,4,5-T and silvex usually are applied as liquid formulations, diluted in a carrier of diesel oil, water, or oil-in-water emulsions.[40/] In aerial application, rigorous controls, including a ban on aerial spraying during excessive winds, the use of special spray apparatus to control droplet size and direction, and other restrictions greatly limit the potential for spray drift.

B. Actual Exposure Measurements Under Field Conditions Show That the Potential for Direct Human Exposure During Aerial Application Is Extremely Limited.

Pesticide applicators experience small direct exposures in the scope of their employment, and there is a potential for extremely minute, direct exposure to bystanders who on isolated occasions might be sprayed inadvertently during application. Careful application techniques, however, limit possible direct exposure through spray drift. Actual measured levels of exposure for applicators are very low, and potential exposure levels calculated for incidental bystanders are extremely low.

40/ 2,4,5-T and silvex formulations are applied by aerial spray, by spray trucks or tractors, or by back-pack spray apparatus carried by the applicator. In addition, silvex may be applied as a granular solid for home and lawn use.

Actual exposure levels for applicators were established in a comprehensive field study conducted in August 1978, with workers engaged in ordinary spray application of 2,4,5-T. This study, sponsored by the National Forest Products Association, contains highly accurate data concerning the exposure potential in most common applications. The nineteen men and two women who served as subjects in the study were personnel regularly employed as pesticide applicators, and were given no special instructions or safety precautions. For example, the workers did not wear protective clothing, and some wore sleeveless shirts.41/

Exposure levels were calculated from measurements of 2,4,5-T excreted in the urine, based on known rates of 2,4,5-T metabolism and excretion determined in experimental animals and in human volunteers.42/ The results show that the applicators absorbed very small amounts of 2,4,5-T.

As one would logically expect, the levels of exposure varied by the particular jobs and application techniques employed. For example, the highest exposure was measured in

---

41/ Lavy, T.L., "Measurement of 2,4,5-T Exposure of Forest Workers," submitted as part of Project Completion Report to National Forest Products Association RPAR Response (1978).

42/ Ramsey, J.R., et al., "Exposure of Forest Workers to 2,4,5-T: Calculated Dose Levels," submitted as part of Project Completion Report to National Forest Products Association RPAR Response (1979). 2,4,5-T is excreted rapidly in humans, with 98% of the administered dose excreted within one week. Gehring, P.J., et al., "The Fate of 2,4,5-Trichlorophenoxyacetic Acid (2,4,5-T) Following Oral Administration to Man," Toxicol. Appl. Pharmacol. 26 at 352-361 (1973).

mixers, who come into direct contact with the herbicide concentrate as well as the spray solution. Backpack sprayers have less exposure, and helicopter pilots even less.

Flagmen who stood directly in the spray path have even smaller exposures, even though they were directly in the spray path for eight helicopter passes per day. Thus, the flagmen received eight times the dose which a bystander accidentally sprayed on a single pass would be likely to receive.

Finally, while the measured 2,4,5-T exposures are very small, calculated exposures to the minute traces of TCDD present in the herbicide are infinitesimally small.

C. There Is Little, If Any, Potential For Indirect Human Exposure to 2,4,5-T, Silvex, or TCDD Through Environmental or Dietary Residues.

Following application, 2,4,5-T, silvex, and TCDD decompose rapidly, do not accumulate in the environment, and are found only rarely, at very low concentrations, in environmental samples. All of these factors limit the potential for human exposure through food and water to quantities so exceedingly small as to be toxicologically insignificant.

1. The Environmental Behavior of 2,4,5-T Silvex, and TCDD Prevents Environmental Accumulation and Contamination.

The chemical properties of 2,4,5-T, silvex, and TCDD, which determine their environmental behavior, are critical

to any assessment of risk. As shown below, 2,4,5-T and silvex decompose and do not accumulate in the environment; contamination of surface and ground water is extremely unlikely.

TCDD undergoes extremely rapid photodegradation, degrades in soil, and is extremely insoluble in water. TCDD contamination of surface or ground water is therefore extremely unlikely.

a. 2,4,5-T and Silvex.

2,4,5-T and silvex are generally applied as high molecular weight esters, which degrade rapidly. The joint USDA/States/EPA Assessment Team for 2,4,5-T found that "under normal application practices, initial levels of 2,4,5-T in soils are usually low and disappear relatively rapidly."[43/]

Rapid environmental degradation of these herbicides after application is confirmed by field studies, in which precise measurements of residues taken immediately after application and at intervals thereafter show rapidly decreasing concentrations of 2,4,5-T and silvex. Studies of residues on foliage, on the forest floor, in soil, and on

---

43/ USDA/States/EPA 2,4,5-T Assessment Team, Biologic and Economic Assessment of 2,4,5-T at 5-28 (February 15, 1979) (hereinafter "Assessment Team Report.") Included in the Team's comprehensive report is extensive evidence concerning environmental fate and exposure. The Secretary of Agriculture's witness list filed in these proceedings indicates that many of the experts assembled to develop the Assessment Team Report will testify concerning these data.

grasslands demonstrate short half-lives, with most of the herbicides disappearing within days or weeks.44/

2,4,5-T and silvex also degrade rapidly in water. Field studies demonstrate that the residues detectable immediately following experimental application of these herbicides directly to water follow the same pattern of decomposition observed on foliage, grasslands, and soil.45/

The National Academy of Sciences Safe Drinking Water Committee found that contamination of drinking water or other surface water is extremely unlikely.46/ In addition to the rapid decomposition described above, the minute quantities of 2,4,5-T and silvex which might be dissolved or

---

44/ See, e.g., Altom, J.D., et al., "Degradation of Dicamba, Picloram, and Four Phenoxy Herbicides in Soils," Weed Science 21(6) at 557 (1973) (half lives for 2,4,5-T and silvex on grassland and forest sites ranged from 14 to 24 days); Jensen, D.J., et al, "Dissipation of Silvex from Soil in Fields Treated With Kuron Herbicides," unpublished, The Dow Chemical Company (1975) (Confidential) (silvex concentrations in soil decreased rapidly and were nondetectable within one year); Norris, L.A., et al., "The Persistence of 2,4,5-T in a Pacific Northwest Forest," Weed Science 25(5) at 417 (1977) (comprehensive field study examining samples from foliage, forest floor, and soil showed 90% decline in 2,4,5-T residues within six months).

45/ See Bailey, G.W., et al., "The Degradation Kinetics of an Ester of Silvex and the Persistence of Silvex in Water and Sediment," Weed Science 18 at 413 (1970) (the concentration of silvex in water decreased to 0 by 3 weeks); Frank, P.A., "Herbicidal Residues in Aquatic Environments," Adv. Chem. Ser. 111 at 135 (1972) (non-purposeful herbicide contamination of natural waters occurs infrequently and at low levels).

46/ National Academy of Sciences, "Drinking Water and Health," Safe Drinking Water Committee at 500 (1977).

suspended in water are quickly dissipated in streams by dilution.[47]

Studies also show that 2,4,5-T and silvex are relatively immobile in soil and do not leach significantly. Thus, herbicide residues remain within a few inches of the soil surface, and do not leach into ground water.[48] The USDA Assessment Team found that contamination of "ground water supplies is very unlikely."[49]

In short, 2,4,5-T and silvex are not persistent in the environment, and do not accumulate in environmental substrates such as soil or sediment. In addition, the chemical properties of these herbicides limit environmental mobility and preclude contamination of ground and surface water.

b. TCDD.

TCDD decomposes rapidly following application. Thus, even the extraordinarily minute concentrations of TCDD present following herbicide applications disappear quickly.

TCDD undergoes extremely rapid photodegradation in sunlight, in the presence of hydrogen donors such as the

---

47/ Assessment Team Report at 5-1.

48/ Norris, L.A., et al., "The Persistence of 2,4,5-T in a Pacific Northwest Forest," Weed Science 25(5) at 417 (1977) (forest field study showing no 2,4,5-T residues below 6 inches in soil on the forest floor); Wiese, A.F., et al., "Herbicide Movement in Soil and Various Amounts of Water," Weeds 12(2) at 101-2 (1964) (experimental application of silvex to soil in tubes, with silvex remaining within 3 inches of soil surface).

49/ Assessment Team Report at 5-1.

hydrocarbons found in 2,4,5-T and silvex formulations and the waxy surfaces of leaves. Almost all 2,4,5-T and silvex (and therefore TCDD) initally comes to rest on foliage. Within 24 hours, TCDD contained in a thin herbicide film on leaves, soil, or glass plates exposed to outdoor sunlight is broken down by photodegradation.[50]

The USDA Assessment Team concluded that because of rapid photodegradation and low TCDD content, under normal pesticide use TCDD is unlikely to be introduced into soil.[51] Nevertheless, TCDD degrades in soil at a half-life of about one year.[52] Thus, the extremely small quantities of TCDD which may sometimes escape immediate photodegradation decompose after entering the soil.

TCDD is extremely insoluble in water.[53] Contamination of surface water or water supplies is therefore highly unlikely.

Moreover, TCDD adheres strongly to sediment and particulates,[54] and normally remains on the surface of plants

---

50/ Crosby, D.G., et al., "Environmental Degradation of TCDD," Science 195 at 1337 (1977).

51/ Assessment Team Report at 5-63.

52/ Young, A.L., et al., "Field Studies on the Soil Persistence and Movement of 2,4-D, 2,4,5-T, and TCDD," Presentation to the Weed Science Society of America (1974)(half-life between six months and one year); USDA/EPA Assessment Report at 5-63 (about one year).

53/ Advisory Committee on 2,4,5-T, "Report to the Administrator of the Environmental Protection Agency" (1971).

54/ Ward, C.T., et al., "Fate of Tetrachlorodibenzo-p-Dioxin (TCDD) in a Model Aquatic Ecosystem," Arch. of Environm. Contamin. Toxicol. 7 at 349-57 (1978).

and soil.[55] Accordingly, TCDD in soil is immobile and does not leach significantly.[56] The combination of extremely low solubility, rapid photodegradation, and immobility in soils prevents ground water contamination.[57]

Thus, TCDD is not environmentally persistent and does not accumulate in the environment. Most TCDD contained in 2,4,5-T or silvex applications is destroyed by photodegradation within 24 hours of application. This rapid decomposition, as well as the insolubility and soil-adherence of TCDD, prevent contamination of surface and ground water.

2. Extensive Environmental Monitoring Programs Reveal 2,4,5-T, Silvex, and TCDD Residues Only in Exceptional Cases, At Extremely Low Concentrations.

As shown above, application practices as well as environmental behavior characteristics limit possible environmental concentrations of 2,4,5-T, silvex, and TCDD to very low levels. Residue monitoring with extremely sensitive analytical testing procedures shows no detectable residues in most environmental and food samples, and only extraordinarily minute quantities of these compounds in the few "positive" samples, thereby demonstrating the absence of any substantial human exposure.

55/ Assessment Team Report at 5-63.

56/ Id.

57/ Kearney, P.C., et al., "Tetrachlorodibenzodioxin in the Environment: Sources, Fate, and Decontamination," Environmental Health Perspectives 5 at 275 (Sept. 1973).

Residue monitoring is performed with sophisticated gas chromatography and mass spectrometry equipment. The sensitivity of analytic testing is critically dependent on sample clean-up procedures, which remove potential sources of interference, on the capacities of the equipment used, on the procedures employed, and on the experience and skill of the scientists who perform the analyses. All of this information must be considered in evaluating the results obtained in these tests.

Improvements in technology and procedures during the last few years have radically reduced detection limits for TCDD. Below the limit of detection, any trace residues which might be present are simply not detected; well above the detection limit, results showing either the presence or absence of residues are generally reliable. At or near the limit of detection, results are ambiguous and must be interpreted with caution.

Because detection limits have changed significantly in recent years, evaluation of test data requires a thorough knowledge of the sensitivity of the test employed. Currently, the best analytic procedures for 2,4,5-T and silvex are sensitive in the part per billion range. For TCDD, the most sensitive current tests can detect residues as low as 1 part per trillion.

a. 2,4,5-T and Silvex.

Extensive monitoring, including samples from sediments, fish, rice, grazing animals, and consumer foodstuffs shows that no detectable residues of 2,4,5-T and silvex are present in the overwhelming majority of samples, and that the isolated "positive" residues results are at extremely low concentrations. Experimental feeding studies examining the tissues and milk of animals fed diets containing high levels of 2,4,5-T and silvex show no significant accumulation in any tissue, and also show rapid reductions in concentration following removal from the herbicide-added diet.

Extensive "market basket" surveys and agricultural commodity surveys conducted annually by the Food and Drug Administration have shown no detectable residues of 2,4,5-T or silvex in any of the samples tested.[58/] Thus, there is no known human exposure to 2,4,5-T or silvex through the diet.

Exhaustive searches for 2,4,5-T and silvex in water and in sediments from streams, ponds, and lakes have disclosed only isolated residues of 2,4,5-T and silvex. For example, EPA's National Surface Water Monitoring Program for Pesticides showed no residues in 600 bottom material (sediment) samples

---

58/ Memorandum from Frederick W. Kutz to Robert Brown, "Summary of Federal Monitoring Data on 2,4,5-T, Silvex and TCDD," at 6 (March 22, 1979) (hereinafter "Kutz Memorandum").

collected between May, 1976 and August, 1978.[59] The same study detected only 6 "positive" samples for 2,4,5-T out of 1350 whole water samples tested, five of them at less than 1 part per billion; out of 1350 water samples tested for silvex, only 2 positives were found, both at the same site.[60]

Similarly, EPA's computerized data base for 2,4,5-T and silvex monitoring contains the results of 30,000 samplings, primarily in water and sediment, only "a small percentage" of which showed detectable residues.[61] Thus, as the environmental behavior characteristics of these compounds predict, their presence in the nation's streams, ponds, and lakes is virtually nil.

Experimental feeding studies show that animals fed on experimental diets with lower doses of 2,4,5-T and silvex show no detectable residues in milk or cream, even during administration of the herbicide diet.[62] Even where cattle and sheep are deliberately fed high dietary levels of 2,4,5-T and silvex, only small concentrations of these herbicides are detected in milk or tissue during or immediately following

---

59/ Kutz Memorandum at 3.

60/ Id.

61/ Id.

62/ Leng, M.L., "Residues in Milk and Meat and Safety to Livestock from the Use of Phenoxy Herbicides in Pasture and Rangeland," Down to Earth 28(1) at 12-15 (1972); Clark, D.E., et al., "Residues of Chlorophenoxy Acid Herbicides and Their Phenolic Metabolites in Tissues of Sheep and Cattle," J. Agr. Food Chem., 23(3) at 573, 576 (1975).

feeding with the herbicide-treated diet. After only a few days on an untreated diet following termination of the herbicide diet, residues in these animals are greatly reduced or not detectable.

These studies demonstrate conclusively that sheep and cattle grazing on range and pasture treated with 2,4,5-T and silvex could not accumulate significant residues in milk or tissue, since the residues present on edible foliage even immediately following herbicide application are far below the exaggerated dose levels used in the experimental feeding studies. Moreover, label requirements, which prohibit the grazing of dairy animals on treated areas for periods of from one to six weeks following herbicide application, further reduce the potential ingestion of 2,4,5-T or silvex residues by permitting chemical degradation of herbicidal residues. Similarly, labels require that meat animals be withdrawn from treated areas at least two weeks before slaughter, permitting excretion of 2,4,5-T and silvex residues.

b. TCDD.

Monitoring for TCDD, including the multi-year Dioxin Implementation Plan undertaken by EPA, Dow, and others in 1974, has been as extensive as that for 2,4,5-T and silvex. Monitoring data show that TCDD, like its herbicide carriers, is found infrequently and only at extremely low levels.

Moreover, recent research by Dow and others demonstrates that trace amounts of TCDD are produced in many ordinary

combustion processes, such as those in coal-fired power plants and municipal incinerators. Thus, trace quantities of TCDD detected in monitoring programs may well derive from sources other than pesticides.

Beef liver samples from cattle grazed on 2,4,5-T-treated rangeland tested in the Dioxin Implementation Plan showed no residues of TCDD, and the vast majority of beef-fat samples also showed negative results. A single sample showed a 60 part per trillion residue, while two samples showed unvalidated residues at 20 ppt, and another five samples showed equivocal results close to the limit of detection.[63/]

Samples of water, mud, catfish, walleyed pike, and bass from a pond containing water from heavily treated Arkansas rice fields, and from the San Angelo, Texas Reservoir which has as its watershed vast rangelands treated with 2,4,5-T, showed no detectable residues of TCDD.[64/] Similarly, rice samples obtained from high treatment rice fields and from retail stores throughout the country show no residues.[65/]

63/ EPA, "Dioxin Position Document," Draft Report of the Dioxin Working Group at 13 (April 26, 1977).

64/ Shadoff, L.A., et al., "A Search for TCDD in an Environment Exposed Annually to 2,4,5-T Acid Ester Herbicides," Bull. of Environm. Contamin. and Toxicol. 18(4) at 485 (1977).

65/ Jensen, D.J., et al., "Analysis for TCDD Residues in Rice Grain from Retail Stores and From Fields Treated With 2,4,5-T," Unpublished, The Dow Chemical Company (Confidential).

Cattle and sheep fed exaggerated doses of TCDD for extended periods of time in experimental feeding studies show residues of TCDD in milk and tissues. Levels of TCDD in the milk and tissues remain constant during continued dietary exposure, and decrease following removal from the TCDD diet.66/

The extraordinarily low concentrations of TCDD which might be present on range or pasture grasses immediately following herbicide application are far below the dietary concentrations used in these feeding studies, and accordingly would produce no significant TCDD residues in milk or tissues if sheep and cattle were grazed on treated land on the day of application. Moreover, due to label restrictions which prohibit grazing of dairy animals on treated areas for one to six weeks following application, almost all TCDD initially present photodegrades long before animals are returned for grazing. In addition, label restrictions and market practices result in the removal of all animals from the range weeks or months before slaughter, markedly reducing the potential for

---

66/ Jensen, D.J., R.A. Hummel, N.H. Mahle, C.W. Kocher, "A Residue Study on Beef Cattle Consuming 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD)," Unpublished, The Dow Chemical Company (1978) (Confidential). Jensen, D.J., R.A. Hummel, H.S. Higgins, L. Lamparski, E. Madrid, "A Residue Study on Sheep Consuming 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD)," Unpublished, The Dow Chemical Company (1978) (Confidential). Jensen, D.J., R.A. Hummel, H.S. Higgins, L. Lamparski, E.T. Madrid, "Secretion of TCDD in Milk and Cream Following the Feeding of TCDD to Lactating Dairy Cows," Unpublished, The Dow Chemical Company (1978) (Confidential).

TCDD residues in animals at slaughter. Accordingly, TCDD residues in meat and dairy products -- if present at all -- are both rare and at extremely low levels.

D. Human Monitoring Results Demonstrate Conclusively That No Significant Human Exposure Occurs.

The very small direct exposures measured in the Lavy-Ramsey study, as well as the absence of any significant residues in water, grazing animals, and foodstuffs, demonstrate an extremely small potential for human exposure among the general public. The results of monitoring tests performed with samples of human urine and mother's milk confirm that no significant exposure occurs, showing no residues in most samples tested and only a few positive residues at extremely low concentrations.

Results of EPA's monitoring program for TCDD in mother's milk released on January 15, 1980,[67/] show no residues of TCDD in 103 samples of mother's milk collected from women living in the forestry use areas of the Pacific Northwest.

Analyses of human urine for residues of 2,4,5-T and silvex show no detectable residues in the vast majority of samples tested. In conjunction with HEW's Health and Nutrition Survey II (HANES II) study, EPA analyzed 1085 human

---

67/ Despite Dow's long-standing Freedom of Information Act and discovery requests for documents related to the mother's milk study, EPA still has provided few data to Dow. Instead, EPA announced the results of this study in a press release on January 15. Because of OGC's continued failure to provide Dow with this and other data, Dow is unable to supply further details concerning the mother's milk study in this brief.

urine samples for 2,4,5-T and silvex, finding only four quantifiable silvex residues at low parts per billion levels. Trace findings of 2,4,5-T in 3 samples, and of silvex in 13 samples, all close to the level of detection, are uncertain.[68/]

Thus, monitoring programs show no significant concentrations of 2,4,5-T, silvex, and TCDD in human urine and mother's milk. The overall potential for human exposure to these compounds is extremely slight, with the only detected concentrations at low parts per billion levels for 2,4,5-T and silvex, and very low parts per trillion levels for TCDD.

IV. THE THEORETICAL CARCINOGENIC RISK POSED BY 2,4,5-T AND SILVEX PRODUCTS CONTAINING TCDD IS EXTREMELY SMALL, AND WELL WITHIN ACCEPTABLE LIMITS.

Extensive experimental data show that "pure" 2,4,5-T and silvex are not carcinogenic in laboratory animals. Indeed, no increased carcinogenic response is observed in test animals even with technical grade 2,4,5-T and silvex

---

68/ Additional analyses of human samples for 2,4,5-T and silvex have been performed by Dr. Ralph Dougherty at Florida State University. Because critical aspects of Dougherty's work, including even summaries of a seven-year screening program, have not yet been produced in discovery, Dow has been unable to evaluate the few results reported by Dr. Dougherty. But significantly, EPA contractor Clement Associates, Inc. pointed out that one critical study by Dougherty "lacks credibility because the analysis was faulty." See Nisbet, I.C.T. et al., "Exposure, Toxicity, and Risk Assessment of 2,4,5-T/TCDD," Clement Associates, Inc. EPA Contract No. 68-01-5095 at I-57 (May 15, 1979).

containing measurable levels of TCDD. Thus, there is no direct experimental evidence that 2,4,5-T and silvex products are carcinogenic.

TCDD administered to rats at relatively high levels in the diet produces an increase in liver, lung, and hard palate tumors, although no increased carcinogenic response is observed at lower doses. While a carcinogenic threshold, or no-effect level, may well exist for TCDD, the potential risk posed by TCDD is extremely small, even assuming that no threshold exists.

Quantitative risk assessments for potential dietary exposure to TCDD, as well as the theoretical risk posed by direct exposure to 2,4,5-T or silvex containing current levels of TCDD, show risks well within the range normally considered acceptable by EPA and other federal regulatory agencies. Indeed, the potential risks posed by direct or indirect exposure to TCDD are insignificant compared to other carcinogenic risks routinely accepted by society.

Finally, long-term epidemiological studies fail to demonstrate increased carcinogenic risk for manufacturing workers accidentally exposed to very high levels of TCDD.

A. 2,4,5-T and Silvex Produce No Measurable Carcinogenic Effects in Test Animals.

Extensive carcinogenicity testing with 2,4,5-T and silvex fed to mice and rats shows no carcinogenic effects, even with TCDD concentrations well above those found in presently available commercial products.

Early in 1979, EPA's Carcinogen Assessment Group (CAG) reviewed the available data on 2,4,5-T and concluded: "On the basis of the completed mice and rat studies, there is no significant evidence of carcinogenicity for 2,4,5-T, but the testing has not been done adequately in mice."[69/] The CAG based its conclusions on the Dow two-year feeding study in rats and on seven studies completed in mice.[70/]

The Scientific Advisory Panel concurred in the CAG's evaluation, finding that the studies in mice "have not demonstrated a carcinogenic risk from commercial 2,4,5-T in this rodent species."[71/] The Panel also reviewed and approved Dow's two-year feeding study with specially purified 2,4,5-T, finding that "2,4,5-T . . . essentially free of contaminating TCDD, is not oncogenic in rats."[72/] Similarly, the Panel found that studies with commercial silvex in both

---

69/ CAG, "Risk Assessment on 2,4,5-T and TCDD" at 2 (February 23, 1979). This CAG position was stated approximately a year ago. Despite Dow's repeated efforts to obtain through discovery documents pertaining to CAG's latest work concerning 2,4,5-T, silvex, and TCDD, OGC has produced very little of value. Accordingly, Dow is unable fully to address the CAG's most recent work in this brief.

70/ CAG explicitly rejected the statistical increase in tumors reported in one 1976 study, which suffered from severe methodological deficiencies and was not confirmed even by other studies performed by the same researchers, stating that "CAG cannot regard the study as furnishing significant evidence for the carcinogenicity of 2,4,5-T." CAG, Response to Rebuttal Comments on Risk Assessment of 2,4,5-T and TCDD" at 2 (April 4, 1979).

71/ SAP Report, Appendix I at 1-2.

72/ SAP Report, Appendix I at 2.

mice and rats "did not indicate an increase in oncogenicity as a result of chronic exposure to Silvex."

The most comprehensive studies with 2,4,5-T are the two-year feeding study with rats performed by Dow researchers, using specially purified 2,4,5-T containing less than 0.0003 ppm TCDD,[73] and a similar two-year feeding study in rats performed in Hamburg, Germany, using technical grade 2,4,5-T containing 0.05 ppm TCDD.[74] These studies showed no carcinogenic effects at any level.

Because of the theoretical risk posed by the minute quantities of TCDD present in commercial 2,4,5-T and silvex, the Scientific Advisory Panel considered the results of the German study especially important, and recommended that the "full details" of that study be "obtained and evaluated."[75] The Panel was advised of preliminary results indicating "no increase in tumors relative to the control groups," but recognized that "until the pathological examination is complete no definitive conclusion can be drawn relative to the oncogenic potential of commercial 2,4,5-T in rats."[76]

73/ Kociba, R.J. et al., "Results of a Two-Year Chronic Toxicity and Oncogenic Study of Rats Ingesting Diets Containing 2,4,5-T," Fd. Cosmet. Toxicol. 17 at 504-521 (1979).

74/ Leuschner, F., et al., "Chronic Oral Toxicity of 2,4,5-T, Batch No. 503, Control No. 153574b - Called for Short '2,4,5-T' - In Sprague-Dawley (SIV 50) Rats," Laboratorium Für Pharmakologie Und Toxikologie (Unpublished) (April 9, 1979).

75/ SAP Report at 2.

76/ SAP Report, Appendix I at 2.

The full results of the German study are now available and confirm preliminary reports of no increased cancer incidence. Along with other studies of commercial 2,4,5-T and silvex containing even higher concentrations of TCDD, it demonstrates that the theoretical risk posed by TCDD contamination in 2,4,5-T and silvex does not produce an observable increase in carcinogenic response.

B. TCDD Produces Observable Carcinogenic Effects Only at Relatively High Doses Producing General Toxicity.

Unlike 2,4,5-T and silvex, TCDD produces increased carcinogenic response in laboratory animals at relatively high dose levels which cause general toxicity in the animals. At lower doses, no increase in the incidence of cancer has been observed.

The Scientific Advisory Panel reviewed all available carcinogenicity evidence regarding TCDD, and concluded that "there is a level of TCDD below which no oncogenic or tumorigenic effects were seen in either mice or rats."[77/]

The Panel evaluated and confirmed results reported in Dow's two-year feeding study in rats,[78/] which show an increase in tumors of the liver, lung, and hard palate tissues only at the highest TCDD dose; increased hyperplastic

---

77/ SAP Report, Appendix I at 7.

78/ Kociba, R.J. et al., "Results of a Two-Year Chronic Toxicity and Oncogenic Study of Rats Ingesting Diets Containing 2,4,5-T," Fd. Cosmet. Toxicol. 17 at 504-521 (1979).

nodules of the liver at the middle dose; and no carcinogenic response at the lowest dose.[79] One member of the Panel, a pathologist, reviewed selected tissue slides from the study and reported that "the group at Dow extensively and properly surveyed the evidence of hepatocellular disease . . . . I am very comfortable with their evaluation for toxic injury and carcinogenesis."[80] The Panel questioned EPA's attempt to characterize the middle-dose liver nodules as precusors to cancer,[81] and noted the Carcinogen Assessment Group's agreement that no oncogenic response occurred at the lowest dose.[82]

The Panel also reviewed a Hungarian study of TCDD in mice, concluding that there was no increase in tumor formation at the lower of two weekly doses and at a higher daily dose which shortened the life span of the mice. At other dose levels, the Panel found the data "insufficient to reach a

---

79/ SAP Report, Appendix I at 6-8. EPA's Carcinogen Assessment Group has also described the Kociba (Dow) study as "well-conducted."

80/ Edward Smuckler, M.D., Ph.D., "A Selected Review of the Histology of the Dow TCDD Study" (August 15, 1979), printed as Appendix II to the SAP Report.

81/ SAP Report, Appendix I at 6. Dr. Smuckler reported that "The midrange dose shows hyperplastic nodules, the remaining changes were identical with the high dose, but these slides did not show a carcinoma." Appendix II at 3 (emphasis added).

82/ SAP Report, Appendix I at 8.

firm conclusion regarding whether there was a true oncogenic response."[83/]

The third available carcinogenicity study with TCDD is the highly questionable Van Miller-Allen study in Sprague-Dawley rats. The severe deficiencies in this study, first confirmed in an EPA laboratory audit,[84/] led EPA's Carcinogen Assessment Group to reject the claimed results at the lower dose levels.[85/] As set forth in Dow's report to the Panel, the Van Miller-Allen data -- if valid for any purpose -- show increased carcinogenesis only at the highest dose level, and provide no reliable evidence of increased cancer at lower doses.[86/]

83/ SAP Report, Appendix I at 7. See, Toth, K. et al., "Carcinogenicity Testing of Herbicide 2,4,5-Trichlorophenoxy-ethanol Containing Dioxin and of Pure Dioxin in Swiss Mice," Nature 278 at 548 (1979).

84/ Memorandum from H.W. Spencer and William Woodrow to Diana Reisa and Harvey Warnick, "TDAP Review at University of Wisconsin, TCDD in Rats" (February 8, 1979).

85/ EPA, "Decision and Emergency Order Suspending Registrations for the Forest, Rights-of-Way, and Pasture Uses of 2,4,5-T," 44 Fed. Reg. 15874, 15880, note (March 15, 1980).

86/ Dow presently seeks discovery of documents and records related to the Van Miller-Allen study and has previously detailed the known errors and defects in this study in Dow's Report to the Scientific Advisory Panel, as well as discovery pleadings filed in this case. See, The Dow Chemical Company's Report to the FIFRA Scientific Advisory Panel on 2,4,5-T and Silvex at 10-15 (August 6, 1979) (filed in these proceedings on August 16, 1979); see also, e.g., Supplemental Memorandum in Support of Compulsory Document Discovery at 16-20 (filed January 14, 1980).

The data concerning TCDD suggest a carcinogenic mechanism which operates only above a threshold level. But even assuming the conservative "no-threshold" model, extrapolations of the animal test data on 2,4,5-T show that the potential human cancer risk for exposure to TCDD through food and water, or through 2,4,5-T and silvex containing TCDD, is extremely slight.

C. Quantitative Risk Assessments Demonstrate That the Small Theoretical Risk Posed by Trace Amounts of TCDD in 2,4,5-T and Silvex Products Is Well Within Acceptable Limits.

Quantitative risk assessments using the most conservative methods, as well as conservative assumptions regarding potential TCDD exposure, show extraordinarily low risks for members of the general public and extremely low risks for pesticide applicators, all of which are acceptable under regulatory standards used by EPA and other agencies. For example, risks are significantly lower than cancer risks accepted for other carcinogens such as aflatoxin, found in peanut butter, milk, and other foodstuffs, and lower than other commonplace carcinogenic risks found acceptable by society.

The Scientific Advisory Panel found that the available monitoring data "does not suggest that TCDD derived from commercial 2,4,5-T and Silvex exhibits any tendency to accumulate in the food chain in amounts which would pose a

substantial risk,"[87] and found that the "potential oncogenic risk" from TCDD in the food chain "is judged to be small."[88] The Panel's "extreme worst case" calculations show a lifetime carcinogenic risk of only four tumors for every one million persons exposed,[89] based on what the Panel described as an "extreme exaggeration" of dietary exposure to TCDD.[90]

Similar risk calculations based on more realistic, but still conservative, figures for potential dietary exposure to TCDD show risks substantially below the "extreme worst case" assessment performed by the Scientific Advisory Panel.

As with potential dietary exposure risks, the risks calculated for applicators, and for bystanders accidentally sprayed directly in aerial operations, are extremely low. Based on the actual direct exposure data developed in the Lavy-Ramsey study, the risk even for a pesticide mixer (the most exposed applicator) working for a full career is extremely low. The risk for an incidental bystander -- even if sprayed repeatedly -- is infinitesimal.

The risk assessment performed by the Scientific Advisory Panel, and the others discussed above, all employ the "linear one-hit" model for estimating carcinogenic risk, the most

---

87/ SAP Report, Appendix I at 8.

88/ SAP Report, Appendix I at 9.

89/ SAP Report, Appendix I at 8-9.

90/ SAP Report, Appendix I at 10.

conservative feasible model for such assessments. In the few instances where sufficient human data are available to check linear one-hit risk estimates based on animal tests, this model has overestimated the real incidence of tumors by many orders of magnitude. Calculations of risk for TCDD based on other commonly accepted risk assessment models, show even lower risk estimations for dietary and direct exposure.

Even the regulation of known carcinogens in foodstuffs involves application of the "acceptable risk" concept. For example, aflatoxin, a carcinogen roughly equivalent in potency to TCDD when calculated on an absolute dose basis, is permitted by FDA regulation in foods such as peanut butter and milk at concentrations of from 0.5 ppb to 20 ppb[91] -- a level much higher than any potential exposure to TCDD. A person who drinks one pint of milk per day, or who eats an average four tablespoons of peanut butter per day, incurs an annual cancer risk from aflatoxin higher than the cancer risk for the most heavily exposed pesticide applicator.[92] TCDD risks are also lower than many other commonplace cancer risks, such as those posed by living in Denver as compared

---

91/ 21 C.F.R. § 50.285.

92/ See The Dow Chemical Company's Report to the FIFRA Scientific Advisory Panel on 2,4,5-T and Silvex, Table IV-F (August 6, 1979) (filed in these proceedings on August 16, 1979) (calculations of commonplace cancer risks, prepared by Dr. Richard Wilson, Director of Harvard University's Energy and Environmental Policy Center).

to New York (high altitude exposure to cosmic rays), or by average diagnostic medical X-rays in the United States (radiation).[93/]

D. Long-Term Epidemiological Evidence Fails to Show Increased Carcinogenic Risk From High TCDD Exposure.

Despite certain inherent limitations, epidemiological data derived from actual instances of human exposure can provide extremely useful data which both sets an "upper limit" on risk, and confirms other assessments of risk. Problems not generally encountered in laboratory studies, such as uncontrollable confounding factors, the difficulty of assessing actual exposure levels, and frequent problems with incomplete data collection, render it difficult to prove with epidemiologic evidence that a specific effect is attributable to a particular substance.

Because of the long latency period for carcinogenic effects in humans, epidemiological studies of carcinogens must include data over several years. Studies of two accidental industrial exposures at manufacturing plants in the United States, in 1949 and 1964, show no increased incidence of cancer among workers exposed to levels of TCDD sufficient to produce chloracne in most of those exposed -- a level of

---

93/ Id.

TCDD exposure far beyond that which could occur today in pesticide applicators or the general public.94/

A recently completed study of workers exposed to TCDD in a 1949 accident at the Nitro, West Virginia Monsanto Chemical Plant followed the health of 121 workers, all exposed heavily enough to develop chloracne, a skin condition which is a hallmark sign of TCDD exposure.95/ The Nitro researchers concluded that "the analysis of the mortality experience of these workers indicated no apparent excess of total mortality or deaths due to malignant neoplasms or circulatory diseases."96/ In fact, mortality among these workers was below that of the general population.

Similar results were obtained in an epidemiological investigation of Dow workers in a trichlorophenol plant, many of whom developed chloracne when accidentally exposed to TCDD at some time between December 1963 and December

---

94/ OGC's December 17 witness and exhibit list adds several new epidemiological studies from Scandinavian countries, translations of which have only recently been transmitted to Dow. Although these data have not yet been fully reviewed, they appear questionable both because of the presence of confounding exposures to chemicals other than 2,4,5-T, and because they contradict the conclusions of other European and American studies which uniformly fail to demonstrate any increased cancer incidence associated with exposure to TCDD, 2,4,5-T, or indeed phenoxy herbicides as a class.

95/ Zack, J.A. and R.R. Suskind, "The Mortality Experience of Workers Exposed to Tetrachlorodibenzodioxin in a Trichlorophenol Process Plant," In Press (1979).

96/ Id. at 11.

1964.[97] In addition, epidemiologic study of workers in Dow's 2,4,5-T plant shows no increased cancer mortality.[98]

The workers examined in the Monsanto study and in the Dow trichlorophenol plant study were exposed to TCDD at concentrations far higher than those encountered by the most heavily exposed applicators today, and have suffered no excess incidence of cancer in 15 and 30 years, respectively. Accordingly, if the minute quantities of TCDD contained in 2,4,5-T and silvex products present any carcinogenic risk at all, such risk must be extremely low.

V. 2,4,5-T AND SILVEX PRODUCTS PRESENT NO REPRODUCTIVE RISK TO HUMANS UNDER CURRENT USE PRACTICES.

The Agency has based its contentions on reproductive risk on a series of unscientific theories, each of which has been thoroughly discredited in its turn.

The Alsea II study -- cornerstone of the March suspension and cancellation orders -- stands universally condemned by the scientific community. The Scientific Advisory Panel thoroughly refuted the Agency's July contentions set forth in the Section 6(b)(2) position documents, that no-effect levels have not been established for reproductive effects.

97/ Ott, M.G., "A Followup Study of Health Exam Parameters and Mortality on 61 Employees Presumably Exposed to TCDD in a Trichlorophenol Process During 1964," Unpublished, The Dow Chemical Company (1974) (Confidential).

98/ Ott, M.G., et al., "A Longevity Survey of Employees Exposed to 2,4,5-T" (Unpublished), The Dow Chemical Company (1978) (Confidential).

At present, OGC's case is based largely on the highly questionable work performed by Dr. Allen, and on the hope that new evidence will establish the adverse effects which the Agency repeatedly has alleged.

Contrary to the Agency's contentions, however, no-effect levels are firmly established for 2,4,5-T, silvex, and TCDD. And, because potential exposure levels are far below these no-effect levels, 2,4,5-T, silvex, and TCDD present no fetotoxic or teratogenic risk to humans.

A. EPA's Alsea II Study Supplies No Evidence Whatsoever of Adverse Reproductive Effects in Humans.

As set forth in Part I of this memorandum, the Alsea II study on which EPA based the rash "emergency" suspension orders has been thoroughly discredited in every scientific review conducted since its surprise publication in March, 1979. Reviewing bodies including the Environmental Health Sciences Center at Oregon State University, at least three foreign governments, a June scientific conference on 2,4,5-T sponsored by the American Farm Bureau Federation, and an independent epidemiologist retained by Dow to review the study have all concluded that the claimed relationship between herbicide spraying and the rate of miscarriage is spurious and utterly unsupported by the Alsea II data.[99/]

99/ See pp. 7-9, supra.

The severe deficiencies in study design and execution which render the Alsea II results meaningless are essentially of three types. First, the Agency's collection of data for herbicide spraying, for miscarriages, and for live births was grossly incomplete.[100/] As Deputy Assistant Administrator Edwin Johnson admitted at the Scientific Advisory Panel hearings, the "hospitalized" miscarriage data used in Alsea II accounted for only ten to twenty percent of actual miscarriages.[101/]

Second, the Agency failed to account for numerous confounding factors, such as differences in medical pratices among areas; the possibility of miscarriage-inducing disease due to unpasteurized milk, wild game, and untreated well-water, all known to be used in the Study area; sociological differences such as average maternal age among areas; and possible use of miscarriage-inducing drugs or native plants.[102/]

Finally, the data actually collected were subjected to extensive and inappropriate statistical manipulations. The Alsea II researchers ignored the results of the appropriate statistical tests -- all showing no relation between pesticide use and miscarriage -- and through statistical sleight-of-hand,

---

100/ Oregon State Critique at 52, 15, and 20-23; Lamm, S.H., "An Epidemiologic Assessment of the Alsea II Report", at 6-12 (August 6, 1979) (hereinafter "Lamm Assessment").

101/ SAP Tr. at 14 (August 15, 1979).

102/ Oregon State Critique at 16-20; Lamm Assessment at 6-12.

converted a single group of 10 miscarriages in June 1976 into a complex seasonal pattern extending for six years.[103/]

The Alsea II study simply is not sound scientific work, and the study fails to support any of the claims made by the Agency in March. The Agency's scant mention of Alsea II in its position documents issued this past summer[104/] is tacit admission that Alsea II, which was the foundation for the March suspensions, is utterly worthless.

B. Well-Established No-Effect Levels for 2,4,5-T, Silvex, and TCDD Show Substantial Margins of Safety for Applicators and the Public.

Following the embarassing spectacle of Alsea II, OGC attempted to resurrect its case on reproductive effects through ill-conceived reinterpretations of the extensive animal test data on 2,4,5-T, silvex, and TCDD. The allegations made by EPA in its proposed Section 6(b)(2) position documents, however, were discarded by the Scientific Advisory Panel following thorough review of the evidence.

As shown below, no-effect levels have been established for 2,4,5-T, silvex, and TCDD in laboratory animals. These test data, in conjunction with the available data on potential human exposure, demonstrate broad margins of safety for

---

103/ Agresti, A., "Analysis of Association Between 2,4,5-T Exposure and Hospitalized Spontaneous Abortions," Supplement to a Scientific Critique of the EPA Alsea II Study and Report (November 16, 1979); Lamm Assessment at 12-18.

104/ EPA, "2,4,5-T: Position Document 2/3 "(July 9, 1979); EPA, "Silvex: Position Document 1/2/3" (July 9, 1979).

in Dow's Report to the Scientific Advisory Panel.[108] As set forth in the Report, various fetotoxic effects were observed at higher doses in many studies, but no-effect levels were established in most individual studies as well as collectively for every species.[109] Teratogenic effects were observed in mice, a species particularly susceptible to such effects.[110]

In long-term reproduction studies, the Scientific Advisory Panel explicitly stated that Dow's three-generation study in rats establishes a no-effect level of 3 mg/kg/day,[111] which should be used for evaluating the risk of long-term chronic exposure.

In light of the no-effect levels recognized by the Scientific Advisory Panel, the extremely low potential for human exposure to 2,4,5-T or silvex through residues in food, water, or other environmental substrates presents no reproductive risk to humans. Indeed, on the ultimate issues posed by the Agency, the Panel determined that residues and potential exposure from the nonsuspended uses do not even suggest "the possibility of significant risk."[112]

108/ Dow Report at 23-26 (2,4,5-T); 28-29 (Silvex).

109/ Dow Report at 24 (2,4,5-T); 28-29 (Silvex).

110/ Dow Report at 25 (2,4,5-T); 28-29 (Silvex).

111/ SAP Report, Appendix I at 4.

112/ SAP Report at 6.

Even for applicators with direct daily exposure, the Panel found only a "potential" for reproductive risk, and determined that such risks would be acceptable with the use of simple protective clothing.[113] Even without such protective clothing, however, substantial safety margins exist for all applicators, including those with the highest measured exposures.[114]

The Panel concluded that the potential reproductive risk to those living in the immediate spray area "does not appear to be substantial, except as they may be directly exposed on a chronic basis."[115] The calculated margin of safety for an individual accidentally sprayed in a single aerial pass is 80,000.[116]

Thus, 2,4,5-T and silvex pose no teratogenic or fetotoxic risk to the general population or to pesticide applicators. Broad margins of safety exist for all individuals, including the most highly exposed applicators.

2. TCDD.

EPA's July Section 6(b)(2) proposals, as well as the final 6(b)(2) notices issued in December, depend critically

---

113/ SAP Report, Appendix I at 4 (2,4,5-T); Appendix I at 5 (Silvex).

114/ Dow Report at 64 and Table IV-A.

115/ SAP Report, Appendix I at 4 (2,4,5-T) (emphasis added). See SAP Report, Appendix I at 5-6 (Silvex).

116/ Dow Report at 64.

on the Agency's contentions that no-effect levels have not been established in Dow's three-generation reproductive study with TCDD in rats, and in Dr. Allen's studies of TCDD in monkeys. The Scientific Advisory Panel expressly rejected the Agency's tortured construction of the data from the Dow rat study, and suggested that an equivalent no-effect level might be found in the 25 ppt Allen monkey study.

The Panel expressly recognized no-effect levels for TCDD in mice, rats, and monkeys for short-term teratology studies.[117/] The results of these studies, showing no-effect levels for all species and no teratogenic effects in species other than mice, are set forth in Dow's Report to the Panel.[118/]

Evaluating EPA's contentions with respect to the lowest dose level in Dow's three-generation rat study, the Panel rejected the Agency's reliance on isolated data "suggestive" of embryotoxicity, concluding that "the inconsistency of the effects from generation to generation and in relation to the higher dose . . . suggests that the 0.001 mg/kg/day dose is for all practical purposes a no-effect level."[119/] Significantly, one of the Agency's key witnesses on reproductive

---

117/ SAP Report, Appendix I at 9.

118/ Dow Report at 30-31.

119/ SAP Report, Appendix I at 9-10 (emphasis supplied).

effects, Dr. Diane Courtney, conceded almost as much in her testimony before the Panel.[120/]

The remaining leg of OGC's argument regarding no-effect levels for TCDD depends on the reproduction studies in monkeys conducted at the University of Wisconsin by Dr. James Allen and his associates. As set forth in pleadings already filed in these proceedings, Dr. Allen's work with TCDD is subject to serious question.[121/] EPA's own laboratory auditors have criticized severely Dr. Allen's laboratory practices,[122/] and the Agency's Carcinogen Assessment Group has rejected much of the reported results of his carcinogenicity study in rats.[123/] If this were not enough, tissues taken from Dr. Allen's 500 ppt monkeys were found to contain high levels of toxic PCBs, suggesting serious cross-contamination in Dr. Allen's laboratory.[124/]

The Scientific Advisory Panel strongly recommended that the full details of Dr. Allen's 25 ppt monkey study be

---

120/ SAP Tr. at 20 (September 20, 1979) ("I don't doubt that we are close to a no-effect level, and it isn't going to take much").

121/ See, e.g., The Dow Chemical Company's Reply to Respondent's Opposition to Dow's Motion to Compel Discovery (filed January 8, 1980); Supplemental Memorandum in Support of Compulsory Document Discovery (filed January 14, 1980).

122/ Memorandum from H.W. Spencer and W. Woodrow to Diana Reisa and Harvey Warnick, "TDAP Review at University of Wisconsin, TCDD in Rats" (February 8, 1979).

123/ EPA "2,4,5-T Decision and Emergency Order Suspending Registrations for Certain Uses," 44 Fed. Reg. 15874, 15880 (March 15, 1979).

124/ Letter from R.J. Kociba to John Van Miller (May 8, 1978).

"obtained and evaluated,"[125] and observed that "[i]f no reproductive toxicity is seen in the monkeys exposed to TCDD in the diet at 25 ppt, then the no effect level in the monkey will be similar to that seen in the rat."[126] Thus, there is good reason to believe that a no-effect level will be established for monkeys.

Based on the no-effect level established in the Dow three-generation rat study, and exposure assumptions representing an "extreme exaggeration of exposure to TCDD," the Panel calculated a safety margin of approximately 500 for "worst case" dietary exposures to TCDD.[127] Thus, the Panel concluded that "the current monitoring data do not indicate that there is a substantial reproductive or teratogenic risk posed by the accumulation of TCDD in the human food chain."[128]

Calculated safety margins for TCDD are very high for applicators exposed to 2,4,5-T or silvex on a daily basis, and are extraordinarily high for accidentally sprayed bystanders, due to the minute concentrations of TCDD found in 2,4,5-T. For example, even assuming a TCDD concentration of 0.05 ppm -- twice the highest concentration detected by EPA in recent tests of commercial 2,4,5-T and silvex samples[129]

125/ SAP Report at 2.

126/ SAP Report, Appendix I at 10.

127/ Id.

128/ SAP Report, Appendix I at 10-11.

129/ 2,4,5-T Position Document 2/3 at 8, note (July 9, 1979); Silvex Position Document 1/2/3 at 9, note (July 9, 1979).

-- mixers have a safety margin of 8,200, and bystanders a safety margin of 2,400,000 for TCDD.[130/]

Accordingly, TCDD poses no fetotoxic or teratogenic risk to humans, including applicators exposed daily to 2,4,5-T or silvex at current levels of TCDD.

C. Data Generated Following the Seveso Accident Confirms the Absence of Reproductive Risk From TCDD Exposure.

Despite the limitations which often attend epidemiological studies,[131/] observations made in Seveso, Italy and surrounding areas following a 1976 industrial accident provide important evidence confirming the absence of reproductive risk from the minute TCDD exposures which might result from herbicide use. At Seveso, the general population was exposed to high levels of TCDD produced in the explosion of a reactor used to produce sodium trichlorophenate. Extensive health monitoring programs instituted by Italian authorities demonstrate no confirmed increase in adverse reproductive effects, even at exposure levels sufficient to produce chloracne.

While reported levels of birth defects at Seveso increased slightly following the accident, no unusual pattern of defects was observed, and researchers have attributed the increase to the mandatory government health surveillance

---

130/ See Dow Report at 64-66.

131/ See p 44, supra.

system initiated after the accident.[132] No significant increase could have occurred, as the rates for the Seveso contamination zones are consistent with the average reported for all occidental countries and for the Milan region.[133] The absence of excess birth defects is consistent with laboratory analyses, showing no indication of mutagenic, teratogenic, or fetotoxic effects.

Reported miscarriage rates also increased following the accident, again probably due to the mandatory health statistics reporting system, but appeared to be unrelated to levels of TCDD contamination in the area.[134] The miscarriages were within the expected 15% to 25% incidence of miscarriage worldwide, strongly suggesting that no real increase occurred.[135]

The Seveso data demonstrates that high environmental concentrations of TCDD producing mild toxicity (chloracne)

132/ Homberger, E., et al., "The Seveso Accident: Its Nature, Extent & Consequences, "Givaudan Research Co., Ltd. (Unpublished) (1979).

133/ Tuchmann-Duplessis, H., "Pollution of the Environment and Offspring Apropos of the Accident of Seveso," Medecine, et al. Hygiene 36 at 1758-66 (1978).

134/ Bisanti, L., et al., "Experiences of the Accident of Seveso," European Teratology Society, 6th Conference, September 4-7, 1978, published by Akademiai Kiadó, Budapest at 11 (1979).

135/ Homberger, E., et al., "The Seveso Accident: Its Nature, Extent and Consequences," Unpublished (1979); Tuchmann-Duplessis, H., "Pollution of the Environment and Offspring Apropos of the Accident of Seveso," Medecine et Hygiene 36 at 1758-66 (1978).

in the population do not produce any significant increase in the incidence of birth defects or miscarriages, and that humans are less sensitive to TCDD than are laboratory animals. While environmental concentration and exposure data from Seveso are not precise, the doses to which the Seveso population were exposed are many orders of magnitude higher than the environmental residues or human exposure levels which might result from the use of 2,4,5-T and silvex at current levels of TCDD. Accordingly, the Seveso observations strongly confirm the extensive evidence showing that TCDD from herbicide use poses no adverse reproductive risk to humans.

CONCLUSION

As shown above, there is no scientific basis for any regulatory action concerning 2,4,5-T and silvex, much less the severe and unprecedented "emergency" suspension orders issued in March. OGC's intransigent refusal to acknowledge the safety of these useful products, despite the universal scientific rejection of the Alsea II study on which the suspensions were based and despite the Scientific Advisory Panel's utter rejection of OGC's subsequent theories regarding the risk evidence, conflicts sharply with responsible scientific opinion, with the actions of other governments, and with EPA's own regulatory practices.

The 1971 National Academy of Sciences Committee, the 1974 Scientific Workshop on 2,4,5-T, the 1979 Scientific

Dispute Resolution Conference, and EPA's own Scientific Advisory Panel have found no reason whatsoever to curtail or eliminate the use of these pesticides. Indeed, the Scientific Advisory Panel, after a comprehensive review of the Agency's position and the relevant scientific data, concluded that these hearings should not even be held. Similarly, Great Britain, Australia, and New Zealand have considered and rejected EPA's position in reviews conducted after the March suspension actions.

OGC's contentions regarding 2,4,5-T and silvex represent an extraordinary aberration in EPA's overall regulatory program. Even the extremely conservative analysis favored by OGC, including the no-threshold linear model for carcinogenesis, "worst case" exposure calculations, and the use of high margins of safety -- all of which are designed to account for any uncertainties in the available data -- shows an extremely low potential risk from 2,4,5-T and silvex. EPA, as well as other federal agencies, routinely approve the use of other substances known to entail far greater risk.

In short, the use of 2,4,5-T and silvex presents no unreasonable risk to man or the environment. Accordingly,

all registered uses should be restored and continued as required by law.

Respectfully submitted,

Edward W. Warren

Edward W. Warren
L. Mark Wine
Richard L. McConnell
John A. Zackrison

KIRKLAND & ELLIS
1776 K Street, N.W.
Washington, D.C. 20006
(202) 857-5000

Of Counsel:

John Scriven
Mark Tucker
Dow Chemical U.S.A.
2030 Dow Center
Midland, Michigan 48640

Rudolf H. Schroeter

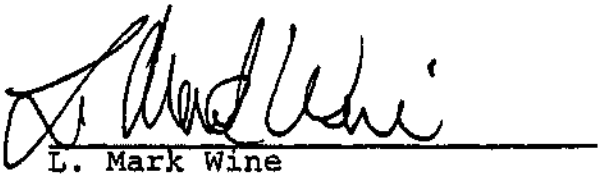
LA FOLLETTE, JOHNSON, SCHROETER,
& DE HAAS
320 North Vermont Avenue
Los Angeles, California 90004

Counsel for The Dow Chemical Company

January 25, 1980

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that copies of The Dow Chemical Company's Pretrial Risk Brief were delivered by hand or mailed first class postage prepaid on January 25, 1980, to the persons on the attached list.



L. Mark Wine