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Report/Article Title	Correspondence and Notes: Testimony for EPA Hearings, 1979-1980	
Journal/Book Title		
Year	0000	
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Color	☐	
Number of Images	0	
Descripton Notes	Items were filed together under the label "Testimony for EPA Hearings."	

5 APR 1979

Mr. Mark Wine
Kirkland & Ellis Law Firm
1776 K Street NW
Washington, D.C. 20006

Dear Mark:

Per our conversation of date, please find enclosed:

1. Pkg of Abstracts/Presentations related to TCDD.
2. Four Technical Reports
3. Chapter 5 of my book on 2,4,5-T.

A. L. Young

ALVIN L. YOUNG, Major, USAF
Consultant, Environmental Sciences

LAW OFFICES
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ROBERT W. STEVENSON
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BONNIE ANN BAKER
ROBERT B. PACKER
GABRIELE MARGIT PRATER

OF COUNSEL:
MARK MULLIN

September 6, 1978

Dr. Alvin Young
5226 Prince Valiant
San Antonio, TX 78218

Re: Paul Reutershan vs. Dow Chemical Co., Hercules, Shamrock, Rohdia and North American Philips

Dear Dr. Young:

This reiterates my telephonic attempt to retain you as litigation consultant to my client, The Dow Chemical Company, in its defense against Paul Reutershan and such other Vietnam veterans as may yet file suit for injuries allegedly suffered from exposure to Agent Orange. We do not yet know what specifically Reutershan claims but anticipate allegation that he developed cancer and an assortment of other ills.

Please let me know on what basis and in what areas you will be able to consult with Dow and be assured that my client and I look forward to working with you.

Sincerely yours,

LA FOLLETTE, JOHNSON, SCHROETER & DEHAAS

BY

RUDOLF H. SCHROETER

RHS:k

Capt Young/ECE/3667/27Nov78/kb

File
14-C-1

29 NOV 1978

ECE

2,4,5-T Rebuttable Presumption Against Registration OPP 30000/26

Federal Register Section
Technical Services Division (WH-569)
Office of Pesticide Programs, EPA
Room 401, East Tower
401 M Street SW
Washington DC 20460

1. The attached Air Force Technical Report (USAF OEHL-TR-78-92) on "The Toxicology, Environmental Fate, and Human Risk of Herbicide Orange and its Associated Dioxin", is provided in reference to my letter to the Federal Register Section, dated 4 August 1978.

2. Significant data in this report that relate to the RPAR against 2,4,5-T herbicide include:

a. Data on the analysis of 492 samples of Herbicide Orange (a 50:50 mix of the n-butyl esters of 2,4-D and 2,4,5-T) for TCDD (See Chapter 1). The levels of TCDD ranged from <0.02 to 15 ppm in herbicide produced during the 1965-1968 time period. The weighted mean concentrations of TCDD in Herbicide Orange was 1.98 ppm. The samples were taken from surplus Herbicide Orange.

b. Industrial hygiene and ambient air sampling data from all land-based dedrumming/transfer operations of Project PACER HO, the 1977 USAF project to dispose of 2.22 million gallons of Herbicide Orange (see Chapter II). Results of these sampling programs revealed that under the worst case noted, the levels of 2,4,5-T (and 2,4-D) vapors were well below the time-weighted Threshold Limit Value (TLV) for each of these materials. The detected levels were at least two and, in most cases, three orders of magnitude below the TLVs. TCDD was not detected in any air samples. Approximately 200 personnel carried out the dedrumming/transfer operations. Comparisons of available pre- and post-operational medical examinations of military personnel involved have revealed no apparent physical effects as a result of these activities.

c. An assessment of the world's scientific literature on the toxicity of 2,4,5-T, 2,4-D and TCDD in selected laboratory and domestic animal species (see Chapter IV). Each chemical was critically reviewed for:

1. Acute and short-term toxicity potentials.

2. Subacute and chronic toxicity potentials.

ECF Cat 27 EC Meade 27 CV has seen 28 11 78

33 Absorption, distribution, and excretion potentials.

4. Embrvotoxic, fetotoxic, and teratogenic potentials.

5. Carcinogenic and tumorigenic potentials.

6. Mutagenic and cytogenic potentials.

d. A review of available scientific data on numerous incidents involving suspected 2,4,5-T/TCDD poisoning of humans or livestock (see Chapter V). Extensive efforts in translating over 30 major foreign documents permitted for the first time detailed accounts of 23 industrial episodes that involved exposure of over 1,100 people to TCDD. An assessment of the medical data from these industrial episodes and other episodes was made in Chapter VI. Some of the significant medical conclusions were:

1. Adverse effects of 2,4,5-T herbicide should manifest themselves shortly after exposure. Symptoms arising for the first time months to years after the last exposure are probably due to an etiology other than the herbicide.

2. The hallmark of TCDD exposure is chloracne and its absence makes it unlikely that systemic disorders present are related to TCDD. Asthenic and vegetative symptoms are often present in overexposure but are difficult to interpret. They would normally be expected to clear with time.

3. There is no conclusive evidence at this time that neither 2,4,5-T herbicide nor TCDD is mutagenic, teratogenic, or carcinogenic in man.

3. I and other Air Force scientists are continuing studies on the environmental fate of TCDD. These studies will be forwarded to the EPA Federal Register Section as they become available.

SIGNED

ALVIN L. YOUNG, Captain, USAF, Ph.D.
Environmental Sciences Consultant
USAF Herbicide Specialist

1 Atch
USAF OEHL TR-78-92 (3)

DEPARTMENT OF THE AIR FORCE
USAF OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235

REPLY TO ATTN OF: ECE

2 [illegible]

SUBJECT: Literature Requests for Studies of 2,4,5-T and TCDD

TO: Mr. James Miller
Reader's Digest
P. O. Box 366
Croton on Hudson NY 10520

1. The attached documents are provided per your request for literature on ecological studies of 2,4,5-T and TCDD.

2. More research has been conducted on the phenoxy herbicides than on any other class of herbicides. Numerous bibliographies on the phenoxy herbicides and TCDD have been published by the Texas Agricultural Experiment Station, College Station, Texas. I have attached Volumes I through IV for your information (Atch 1-4). Volumes V through VIII have been recently released and can be acquired from the Texas Agricultural Experiment Station.

3. The Council for Agricultural Science and Technology (CAST) has published an extensive review of the use and environmental fate of 2,4,5-T (Atch 5). This document includes a current appraisal of hazards involving both herbicide application and the dioxin contaminant.

4. Air Force studies of the environmental fate of 2,4,5-T and TCDD are contained in four attached Air Force Technical Reports. Three Technical Reports are pertinent studies on the fate of 2,4,5-T and its trace contaminant, TCDD, in an ecosystem treated with massive quantities of phenoxy herbicides. Technical Reports AFATL-TR-74-12 (Atch 6), AFATL-TR-75-49 (Atch 7), and AFATL-TR-75-142 (Atch 8), detail ecological studies conducted on a unique 3.0 km^2 military test area (Test Area C-52A, Eglin AFB FL) that received approximately 73,000 kg 2,4,5-T and 77,000 kg 2,4-D during the period of 1962-1970. Significant results included:

a. At the termination of spray equipment testing programs in 1970, significant levels (ppm) of 2,4,5-T soil residues were found throughout the test area. However, no residues of 2,4,5-T were detected (detection limits of 10 ppb) in any soil samples collected during 1971-1972.

b. Fifty-four soil samples were collected to a depth of 15 cm from throughout the test area and analyzed for TCDD. TCDD levels ranged from <10 to 1,500 parts per trillion (ppt). The median concentration was 30 ppt, while the mean was 165 ppt.

c. An ecological survey extending over a five-year period documented

the presence of more than 123 different plant species, 77 bird species, 71 insect families, 20 species of fish, 18 species of reptiles, 18 species of mammals, 12 species of amphibians, and 2 species of mollusks. At least 170 biological samples were analyzed for TCDD, including 30 species of animals. No TCDD was found in any of the plant species examined. However, TCDD was found in nine species of animals, including two rodent species: beachmouse (300-1,500 ppt, liver) and hispid cotton rat (10-210 ppt, liver); three species of birds: meadowlark (100-1,020 ppt, liver), mourning dove (50 ppt, liver), and Savannah sparrows (69 ppt, liver); three species of fish: spotted sunfish (85 ppt, liver), mosquitofish (12 ppt, whole body), and sailfish shiner (12 ppt, whole body), and one reptile, the six-lined racerunner (360-430 ppt, muscle). A composite sample of insects (whole bodies) contained 40 ppt TCDD.

d. Gross pathology was done on all species collected for TCDD residue analyses. Histopathological examinations were performed on over 300 beach-mice or hispid cotton rats from the test area and a control field site. Examinations were performed on the heart, lungs, trachea, salivary glands, thymus, liver, kidneys, stomach, pancreas, adrenals, large and small intestine, spleen, genital organs, bone, bone marrow, skin and brain. Initially, the tissues were examined on a random basis without the knowledge of whether the animal was from a control or test area. All microscopic changes were recorded, including those interpreted as minor or insignificant. The tissues were than reexamined on a control and test basis, which demonstrated that the test and control mice could not be distinguished histopathologically. Similar histo-pathological studies were conducted on the fish and racerunners with no significant abnormalities being found.

5. Technical Report USAFA-TR-76-18 (Atch 9) is a summary of Air Force ecological research on TCDD. It also presents analytical data on the soil degradation of TCDD when in the presence of 2,4,5-T and 2,4-D. Significant results included:

a. The half-life of TCDD in soils containing 2,4-D and 2,4,5-T appeared to be between 225 and 275 days.

b. Studies of bacteria, actinomycetes and fungi from soil plots treated with massive quantitites of 2,4-D and 2,4,5-T (5,000-40,000 ppm) confirm that these microorganisms proliferate to such an extent that they were probably using the herbicides and TCDD as metabolic carbon sources and, as such, were contributing to their degradation.

c. Movement of TCDD in the abiotic portions of the environment occurred by wind or water erosion of soil particles, but leaching by water alone did not occur.

6. Per your request, I have also attached a report on the Seveso, Italy TCDD Episode (Atch 10) by Dr. G. Reggiani, and on the Australian 2,4,5-T Episode by Aldred, et al (Atch 11).

7. If I can provide any additional copies of any of these documents or elaborate on our findings, please contact me.

8. Thank you for your inquiry.

Alvin L Young

ALVIN L. YOUNG, Captain, USAF, PhD
Environmental Sciences Consultant
USAF Herbicide Specialist

11 Atch
1. Selected Bibliography, Vol I
2. Selected Bibliography, Vol II
3. Selected Bibliography, Vol III
4. Selected Bibliography, Vol IV
5. CAST Report
6. AFATL-TR-74-12
7. AFATL-TR-75-49
8. AFATL-TR-75-142
9. USAFA-TR-76-18
10. Reggiani's Seveso Report
11. Australian Report

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TELEPHONE
(213) 666-3600

OF COUNSEL:
SAM YORTY
MARK MULLIN

February 21, 1979

Dr. Alvin Young
5226 Prince Valiant
San Antonio, Texas 78218

Re: RPAR of 2,4,5-T

Dear Dr. Young:

This reiterates my telephonic request that you obtain USAF consent to act as consultant and expert witness for The Dow Chemical Company in its preparation for, and presentation of evidence at, the hearing which will probably be held in late 1979 no matter what determination EPA makes.

I am co-counsel for Dow with the Washington, D.C. (and Chicago) law firm of Kirkland & Ellis. We would value your participation and shall await your word regarding when, where, in what areas and on what basis you will be able to consult with us and our client.

Sincerely yours,

LA FOLLETTE, JOHNSON, SCHROETER & DE HAAS

BY

RUDOLF H. SCHROETER

RHS:k

KIRKLAND & ELLIS

1776 K Street, N.W.
Washington, D.C. 20006

Washington Office
Area Code 202 857-5000

To Call Writer Direct
202 857- 5024

Chicago Office
Area Code 312 861-2000
Telex 25-4361
200 E. Randolph Drive
Chicago, Ill. 60601

April 9, 1979

To: Potential Dow Witnesses at EPA Hearing

As you may have noticed in the April 4 order of the EPA hearing panel, each of you will be required to submit sworn written statements in advance of your appearance at the hearing. To assist in the preparation of your initial drafts, a few general suggestions follow below. We anticipate working closely with you to insure that your draft testimony addresses the relevant issues as clearly and accurately as possible. We hope to receive your draft testimony in Washington as soon as possible. When ready, please send your drafts by express mail or special delivery.

(1) You should include a caption on the very first page of your testimony as indicated below:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

In re: Emergency Suspension Orders for 2,4,5-T and Silvex	FIFRA Docket Nos. 409, 410

TESTIMONY OF JOHN SMITH

(2) In many cases, a table of contents will be helpful.

(3) Your opening paragraph or page should briefly review your educational and professional background, with the details to be included by your current curriculum vitae and publication list (which should be attached as an exhibit).

(4) Except for very short testimony, a brief introduction and summary of the main points to be made are usually helpful.

(5) Since we can introduce as exhibits any published or unpublished research work relevant to your testimony, it is unnecessary to include in great detail in your written statement the experimental methodology. Emphasis should be placed on a brief review of data and the significance and conclusions that you draw from that data to the issues at hand.

(6) Often, short titles for subparts of the testimony will be useful.

(7) Since the rules require that your statement be sworn, we recommend the following language be included immeidately before your signature line:

"The above statements are, to the best of my knowledge, true and correct. April ___, 1979."

_____
John Smith

Your signature should be notarized.

If you have any questions concerning any aspect of the preparation of your written testimony, or otherwise have questions concerning your participation in the hearings, please call either John Hahn ((202) 857-5097) or me ((202) 857-5024).

I have also enclosed for your use a copy of the Appendix to the EPA rebuttal comments. Let me know if you want copies of any of the references.

Sincerely,

L. Mark Wine

L. Mark Wine

(4) Except for very short testimony, a brief introduction and summary of the main points to be made are usually helpful.

(5) Since we can introduce as exhibits any published or unpublished research work relevant to your testimony, it is unnecessary to include in great detail in your written statement the experimental methodology. Emphasis should be placed on a brief review of data and the significance and conclusions that you draw from that data to the issues at hand.

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(7) Since the rules require that your statement be sworn, we recommend the following language be included immeidately before your signature line:

"The above statements are, to the best of my knowledge, true and correct. April ___, 1979."

_____
John Smith

Your signature should be notarized.

If you have any questions concerning any aspect of the preparation of your written testimony, or otherwise have questions concerning your participation in the hearings, please call either John Hahn ((202) 857-5097) or me ((202) 857-5024).

I have also enclosed for your use a copy of the Appendix to the EPA rebuttal comments. Let me know if you want copies of any of the references.

Sincerely,

L. Mark Wine

L. Mark Wine

KIRKLAND & ELLIS

1776 K Street, N.W.
Washington, D.C. 20006

Washington Office
Area Code 202 857-5000

To Call Writer Direct
202 857- 5018

Chicago Office
Area Code 312 861-2000
Telex 25-4361
200 E. Randolph Drive
Chicago, Ill. 60601

October 24, 1979

TO: Dow Cancellation Hearing Witnesses

RE: January 22, 1980 Hearing Date

At the prehearing conference held on October 17, Administrative Law Judge Finch set January 22, 1980 as the date for beginning the 2,4,5-T and silvex cancellation hearings. While it remains possible that some delay could result from ongoing discovery activities or from the Agency's consideration of proposed hearing notices for the nonsuspended uses, we do not anticipate any prolonged postponement of the hearings.

At present, we are engaged in completing discovery initiated by Dow and EPA in July. In addition, we are conducting discovery related to a limited number of EPA witnesses, in accordance with the Administrative Law Judge's directions at the October 17 prehearing conference.

The opponents of continued registration, including EPA, the Environmental Defense Fund, and the Northwest Coalition for Alternatives to Pesticides, will present their witnesses first during the hearings. Nevertheless, it is important that the written witness statements of Dow witnesses be available in substantially final form prior to January 22, so that we may turn our full attention to cross-examination of opposing witnesses at the hearings themselves, and with your assistance prepare to meet the allegations made by EPA, EDF, and NCAP. We will be working closely with many of you in the coming weeks in order to facilitate completion of your statements.

The next prehearing conference has been set for December 4. We will continue to advise you of developments in the proceedings and will attempt to provide you with a rough estimate of scheduling for Dow's case as soon as possible.

Sincerely yours,

Edward W. Warren

Edward W. Warren

Counsel for The Dow Chemical Company

Memorandum to Dr Welch 29 October 1979

1. On Friday, 26 Oct 1979, Bill Morrison, SAF/GC, called to discuss Al Young's role in the upcoming 2,4,5-T cancellation hearings. He indicated that the issue on health effects and environmental fate, where Al will be expected to testify, is not expected prior to the 22nd of January. He reaffirmed that Agriculture will request Al as a witness. The USDA attorney, Margaret Brienholt, needs a one paragraph synopsis of the general nature of Al's testimony. It should be caveated, at the beginning, with words to the effect, "this testimony does not represent the official position of the Air Force, but rather represents the personal views of Major Al Young as an individual expert."

2. Mr Morrison indicated that he would be pleased to review the full text of Al's testimony. He will call Mr Schroder, the DOW attorney, to inform him that Major Young will be a government witness. I asked Mr Morrison if Al should continue to have dialogue with the DOW Company. He advised that Al should have no more substantive discussions with DOW, and that he should start to have dialogue with the USDA lawyer, Margaret Brienholt. He emphasized that Al should be sure that USDA knows what the bottom line is. Mr Morrison also indicated that he would appreciate a briefing from Al at the earliest opportunity. He would appreciate your advising Al so that he can take care of the above requirements.

3. As a matter of interest, I have told both Grant and Bill that Al is now working for you, but I guess it is just easier for them to reach me. I certainly don't mind, but I'm not up to speed enough in what you are doing to make suggestions when appropriate. I hope the above does not create any heartburn.

Bill

WILLIAM E. MABSON, Colonel, USAF, BSC
Commander

Al —
1) Please note para - 1 & 2
2) Please contact Morrison & then prepare a M/R that we will send to AMD & AFSC to keep them in the loop.
3) Keep me posted - Get on my calendar for 2 or 5 Nov
Bill

BRIEF DESCRIPTION OF TESTIMONY*
31 October 1979

Alvin L. Young, Ph.D.
5226 Prince Valiant Drive
San Antonio, TX 78218

Dr. Young, a United States Air Force scientist who has extensively studied 2,4,5-T, will testify on the persistence, environmental fate and toxicology of 2,4,5-T and TCDD. Dr. Young will present results of his seven-year study, at Eglin Air Force Base, Florida, on an area where plant and animal populations were continuously and heavily exposed to massive amounts of phenoxy herbicides applied in the course of developing aerial spray equipment for military use.

EXHIBITS

Sturrock, T. T., and A. L. Young. 1970. A histological study of Yucca filamentosa L. from Test Area C-52A, Eglin Reservation, Florida. Technical Report AFATL-TR-70-125, Air Force Armament Laboratory, Eglin AFB, Florida. 9 p.

Hunter, J. H. and A. L. Young. 1972. Vegetative succession studies on a defoliant - equipment Test Area, Eglin AFB Reservation, Florida. Technical Report AFATL-TR-72-31, Air Force Armament Laboratory, Eglin AFB, Florida. 23 p.

Young, A. L. 1974. Ecological studies on a herbicide - equipment Test Area (TA C-52A), Eglin AFB Reservation, Florida. Technical Report AFATL-TR-74-12, Air Force Armament Laboratory, Eglin AFB, Florida. 146 p.

Young, A. L., C. E. Thalken, and W. E. Ward. 1975. Studies of the ecological impact of repetitive aerial applications of herbicides on the ecosystem of Test Area C-52A, Eglin AFB, Florida. Technical Report AFATL-TR-75-142, Air Force Armament Laboratory, Eglin AFB, Florida. 127 p.

* Testimony for the 2,4,5-T Administrative Hearings before EPA, January 1980. This testimony does not represent the official position of the Air Force, but rather represents the personal views of Dr. Alvin L. Young (USAF, Major) as an individual expert.

Young, A. L., C. E. Thalken, E. L. Arnold, J. M. Cupello, and L. G. Cockerham. 1976. Fate of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in the environment: summary and decontamination recommendations. Technical Report USAFA-TR-76-18, United States Air Force Academy, Colorado. 41 p.

Arnold, E. L., and A. L. Young. 1976. A rapid gas chromatographic method for the determination of several phenoxyalkanoic acid herbicides in soil samples. Technical Memorandum FJSRL(NC)TM-76-5, Frank J. Seiler Research Laboratory, United States Air Force Academy, Colorado. 16 p.

Young, A. L., J. A. Calcagni, C. E. Thalken, and J. W. Tremblay. 1978. The toxicology, environmental fate, and human risk of Herbicide Orange and its associated dioxin. Technical Report OEHL-TR-78-92. USAF Occupational and Environmental Health Laboratory, Brooks AFB, Texas. 247 p.

Cockerham, L. G., A. L. Young, and C. E. Thalken. 1979. Histopathological and ultrastructural studies of liver tissue from TCDD-exposed beach mice (Peromyscus polionotus). Technical Report, Frank J. Seiler Research Laboratory (AFSC), United States Air Force Academy, Colorado. 46 p.

DEPARTMENT OF AGRICULTURE
OFFICE OF THE GENERAL COUNSEL
WASHINGTON, D.C. 20250

OCT 25 1979

Phone: 202-447-2713

William B. Morrison, Esquire
Air Force General Counsel's Office
Pentagon
Room 4C-927
Washington, D.C. 20550

Dear Mr. Morrison:

As we discussed on October 23, 1979, we are pleased to sponsor Major Alvin L. Young, USAF, as a witness in the 2,4,5-T administrative hearings which will be held under the Federal Insecticide, Fungicide and Rodenticide Act, (FIFRA), as amended 7 U.S.C. §136, et seq., before the Environmental Protection Agency.

I plan to file a pleading very soon which will list Major Young as a witness on behalf of the Secretary of Agriculture. I will send a rough draft of this paper when it is prepared. Enclosed is a copy for your information of the initial request for a hearing filed by the Secretary, our tentative witness list for the risk and exposure portion of the presentation of evidence, and a proposed list of topics for the agenda of the third prehearing conference held on September 19, 1979, which sets forth the Secretary's position in these proceedings. I would appreciate any comments or suggestions you have on the description of Major Young's testimony.

I look forward to working with you and Major Young. The hearing record should benefit greatly from Major Young's expertise, research, and experience.

Sincerely,

Margaret M. Breinholt

MARGARET M. BREINHOLT
Attorney

Enclosure

DEPARTMENT OF AGRICULTURE
OFFICE OF THE GENERAL COUNSEL
WASHINGTON, D.C. 20250

December 6, 1979

Alvin L. Young, Major, USAF, Ph.D.
Consultant, Environmental Sciences
USAFSAM/EK
Brooks AFB, Texas 78235

Dear Major Young:

I am planning to sponsor you, on behalf of the Secretary of Agriculture for the United States, as an expert witness in the 2,4,5-T/silvex administrative hearings which are being held under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), as amended, 7 U.S.C. §136, et seq., before the Environmental Protection Agency (FIFRA Docket No. 415, et al.).

Your appearance in these hearings has been discussed with William Morrison, Esquire, Air Force General Counsel's Office, and he informs me that the Office of General Counsel has no objections to your appearing to testify in the proceedings.

Would you please confirm in writing your availability to present this testimony. At this stage in the hearings it is very difficult to estimate a time when you would be needed in Washington to give your statement. I will keep you informed on the progress of the proceedings to enable you to plan your schedule at your convenience.

Sincerely,

Margaret M. Breinholt

MARGARET M. BREINHOLT
Attorney

cc: William B. Morrison, Esq.
Air Force General Counsel's Office
Pentagon

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

12 DEC 1979

MEMORANDUM FOR AF/SG

SUBJECT: Cancellation Hearings on Herbicide 2,4,5-T

The Environmental Protection Agency (EPA) is conducting administrative hearings on the cancellation of the use of 2,4,5-T, pursuant to the Federal Insecticide, Fungicide and Rodenticide Act, as amended, 7 U.S.C., §136 et seq.

The Air Force General Counsel's Office was notified on October 25, 1979, that the United States Department of Agriculture (USDA) is listing Major Alvin L. Young as a private expert witness on behalf of the Secretary of Agriculture, and not as a spokesman or representative of the United States Air Force. The Dow Chemical Company also expressed their desire to list Major Young as a witness. However, Dow did not pursue the matter once they were informed that the Department of Agriculture intended to sponsor Major Young.

The Air Force General Counsel's Office advised me that any party to the administrative hearing has the power to request the Administrative Law Judge to issue a subpoena compelling the testimony of Major Young under 7 U.S.C. §136(d). Therefore, given Major Young's outstanding credentials and the Administrative Law Judge's subpoena power, Major Young has no real alternative but to testify at the hearing. I am pleased that he is being called as a witness for a Federal agency, rather than a private party, since most of his research has been performed with Federal funds during his service in the Air Force.

Although the administrative hearing schedule is still uncertain, the Department of Agriculture has stated that Major Young will probably not be required to testify before May 1980. I am aware that Major Young's participation may impose certain hardships on not only himself, but on your staff functions as well. Nevertheless, I would greatly appreciate it if you would take the necessary action to assure that he is available for the hearings. Unless you advise me otherwise, I will instruct the General Counsel's Office to inform the USDA on or about January 2, 1980, that Major Young will be available.

Joe Meis

JOE F. MEIS
Acting Assistant Secretary
of the Air Force
(Manpower, Reserve Affairs
and Installations

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
BOLLING AFB, D.C. 20332

15 JAN 1980

REPLY TO ATTN OF: SGES

SUBJECT Cancellation Hearings on Herbicide 2,4,5-T

TO: HQ AFSC/SG

1. Request that action be taken to insure that Major Young is available to the Department of Agriculture as outlined in the attached memorandum.

2. It is my understanding that the referenced hearings have now moved from May 1980 to April 1980.

FOR THE CHIEF OF STAFF

PHILLIP G. BROWN, Major US, BSC
Assistant for Bioenvironmental Engineering
Office of the Surgeon General

1 Atch
OAS/M,RA&L) Memo, 12 Dec 79

1st Ind, AFSC/SGP

22 JAN 1980

TO: AMD/SG

1. Maj Al Young has been committed by Maj Gen Dettinger and SAF MI to testify in the administrative cancellation hearings on herbicide 2, 4, 5-T. Maj Young's testimony is expected to be requested in the April-May 1980 time frame.

2. Attached are memos containing related background material.

FOR THE COMMANDER

RONALD D. BURNETT, Lt Colonel, USAF, BSC
Command Bioenvironmental Engineer
Office of the Command Surgeon

2 Atch
1. nc
2. (Added) HQ USAF/SG Ltr, 15 Jan 80

MEMORANDUM FOR RECORD 15 Jan 80

SUBJECT: 2,4,5-T Administrative Hearings

1. On 5 Nov 79, I briefed Dr. Welch (SAM/CD) on my potential participation in the EPA Administrative Hearings on 2,4,5-T Herbicide. Dr. Welch suggested that I prepare a memorandum to him for forwarding to AFSC/SG.

2. Following the meeting with Dr. Welch, I contacted Mr. Bill Morrison (SAF/GC) and informed him of the proposed action. He recommended that I wait to forward such a memorandum until after he investigated the ramifications of my potential participation as a witness for USDA. He indicated that he would call USDA/GC and discuss the situation. On 16 November, he called to inform me that on my next TDY to Washington I should plan an additional day for coordinating my testimony with both SAF/GC and USDA/GC.

3. On 4 December, I visited with Mr. Morrison and Ms. Breinholt (USDA/GC) at the USDA, Washington, DC. I outlined my area of testimony and she discussed USDA's plans and the time table for the hearings. I should have my testimony to her NLT 28 February 1980. She will officially send a letter to SAF/GC and USAFSAM/CD requesting my participation in the hearings. Mr. Morrison will coordinate a letter from SAF/MI to USAF/SG encouraging my participation in the hearings.

A. L. Young

ALVIN L. YOUNG, Major, USAF
Consultant, Environmental Sciences

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pl

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
BOLLING AFB, D.C. 20332

15 JAN 1980

MEMORANDUM FOR ACTING ASSISTANT SECRETARY OF THE AIR FORCE
(MANPOWER, RESERVE AFFAIRS AND INSTALLATIONS)

SUBJECT: Cancellation Hearings on Herbicide 2,4,5-T

Per your request, Major Young's schedule will be arrange so as to accommodate the needs of the Department of Agriculture.

GARTH B. DETTINGER
Maj General, USAF, MC
Deputy Surgeon General

DEPARTMENT OF THE AIR FORCE
USAF SCHOOL OF AEROSPACE MEDICINE (AFSC)
BROOKS AIR FORCE BASE, TEXAS 78235

REPLY TO ATTN OF: CD

16 JAN 1980

SUBJECT: Update on Various Herbicide Orange Activities

TO: SAM/CC
AMD/SG
AMD/CC
IN TURN

1. Major Young, SAM/EK, has been requested to act as an expert witness for the USDA in an EPA hearing regarding continued use of 2,4,5-T. Attachment 1 contains the background correspondence on this. I have asked Major Young to coordinate all requests for information through my office prior to dispatch of this information to the General Counsel's Office. At the time of dispatch, we will forward an info copy of the letter of transmittal and a listing of documents provided to AMD/SG, AFSC/SG and AF/SGPES. If you wish something different, let me know.

2. Also for your information is an input to the DoD representative on the VA Advisory Committee regarding potential exposure to Orange in Vietnam (Atch 2). Finally, I would call your attention to page 6 of HR 3892 (Atch 3) which was signed into law on 20 Dec 79 (PL 96-151). This directs VA to study the dioxin question. Presumably the VA does not consider the Ranch Hand study to be in conflict with their responsibility.

BILLY E. WELCH, Ph.D.
Deputy Director

3 Atch
1. EPA Document w/2 Atch
2. Position Paper
3. H.R. 3892

Cy to: EK/Col Lathrop
EK/Maj Young ✓

RECEIVED
8 JAN 1980

THE UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY

In re: Notice of Intent To Cancel Certain Registrations for 2,4,5-T And Silvex	FIFRA Docket Nos. 415, et seq.

SUPPLEMENTARY ADDITION TO THE TENTATIVE WITNESSES LIST
PROPOSED ON BEHALF OF THE SECRETARY OF
AGRICULTURE FOR THE UNITED STATES

The Secretary of Agriculture for the United States wishes to submit an addition to the proposed tentative witness list filed on his behalf on July 17, 1979, in this proceeding.

A brief summary of the subjects which the witness will discuss is included below.

Name: Alvin L. Young, Major, USAF
Consultant, Environmental Sciences
United States Air Force
Occupational & Environmental Health Laboratory
USAF OEHL
Brooks, AFB, Texas 78235

Background:

Dr. Young received his Ph.D. in Agronomy (Herbicide Physiology) from Kansas State University in 1968. He has been engaged in studies concerned with phenoxy herbicides and their effects from 1968 to the present. In addition to wide-ranging responsibilities concerned with phenoxy herbicides and other materials Dr. Young has conducted ecological studies on the fate of TCDD.

Subject Area of Testimony:

Dr. Young, a United States Air Force scientist who has extensively studied 2,4,5-T, will testify on the persistence, environmental fate and toxicology of 2,4,5-T and TCDD. Dr. Young will present results of his seven-year study, at Eglin Air Force Base, Florida, on an area where plant and animal populations were continuously and heavily exposed to massive amounts of phenoxy herbicides applied in the course of developing aerial spray equipment for military use.

Atch 1

Exhibits:

We are in the process of reviewing Dr. Young's publications and plan to submit a list of proposed exhibits soon.

Respectfully submitted,

MARGARET M. BREINHOLT
JUDITH A. WENKER
TERRENCE G. JACKSON

By: Margaret Breinholt
Attorneys
Office of the General Counsel
U.S. Department of Agriculture
Washington, D.C. 20250
(202) 447-4733

DEPARTMENT OF THE AIR FORCE
WASHINGTON 20330

OFFICE OF THE ASSISTANT SECRETARY

12 DEC 1979

MEMORANDUM FOR AF/SG

SUBJECT: Cancellation Hearings on Herbicide 2,4,5-T

The Environmental Protection Agency (EPA) is conducting administrative hearings on the cancellation of the use of 2,4,5-T, pursuant to the Federal Insecticide, Fungicide and Rodenticide Act, as amended, 7 U.S.C., §136 et sec.

The Air Force General Counsel's Office was notified on October 25, 1979, that the United States Department of Agriculture (USDA) is listing Major Alvin L. Young as a private expert witness on behalf of the Secretary of Agriculture, and not as a spokesman or representative of the United States Air Force. The Dow Chemical Company also expressed their desire to list Major Young as a witness. However, Dow did not pursue the matter once they were informed that the Department of Agriculture intended to sponsor Major Young.

The Air Force General Counsel's Office advised me that any party to the administrative hearing has the power to request the Administrative Law Judge to issue a subpoena compelling the testimony of Major Young under 7 U.S.C. §136(d). Therefore, given Major Young's outstanding credentials and the Administrative Law Judge's subpoena power, Major Young has no real alternative but to testify at the hearing. I am pleased that he is being called as a witness for a Federal agency, rather than a private party, since most of his research has been performed with Federal funds during his service in the Air Force.

Although the administrative hearing schedule is still uncertain, the Department of Agriculture has stated that Major Young will probably not be required to testify before May 1980. I am aware that Major Young's participation may impose certain hardships on not only himself, but on your staff functions as well. Nevertheless, I would greatly appreciate it if you would take the necessary action to assure that he is available for the hearings. Unless you advise me otherwise, I will instruct the General Counsel's Office to inform the USDA on or about January 2, 1980, that Major Young will be available.

JOE F. MEYS
Acting Assistant Secretary
of the Air Force
(Manpower, Reserve Affairs
and Installations)

DEPARTMENT OF AGRICULTURE
OFFICE OF THE GENERAL COUNSEL
WASHINGTON, D.C. 20250

December 6, 1979

Alvin L. Young, Major, USAF, Ph.D.
Consultant, Environmental Sciences
USAFSAM/EK
Brooks AFB, Texas 78235

Dear Major Young:

I am planning to sponsor you, on behalf of the Secretary of Agriculture for the United States, as an expert witness in the 2,4,5-T/silvex administrative hearings which are being held under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), as amended, 7 U.S.C. §136, et seq., before the Environmental Protection Agency (FIFRA Docket No. 415, et al.).

Your appearance in these hearings has been discussed with William Morrison, Esquire, Air Force General Counsel's Office, and he informs me that the Office of General Counsel has no objections to your appearing to testify in the proceedings.

Would you please confirm in writing your availability to present this testimony. At this stage in the hearings it is very difficult to estimate a time when you would be needed in Washington to give your statement. I will keep you informed on the progress of the proceedings to enable you to plan your schedule at your convenience.

Sincerely,

Margaret M. Breinholt

MARGARET M. BREINHOLT
Attorney

cc: William B. Morrison, Esq.
Air Force General Counsel's Office
Pentagon

Provided to the
Advisory Committee
Dec 1979

POSITION PAPER

Advisory Committee on Health-Related Effects of Herbicides

Question #10: Can criteria be established for determining the level of exposure of military personnel to dioxin during the Vietnam war based on spraying tapes and unit histories?

Coordinator: COL J. W. Thiessen, M.D.

CRITERIA FOR ESTIMATING EXPOSURE LEVELS OF MILITARY PERSONNEL TO DIOXIN AND HERBICIDE ORANGE DURING THE VIETNAM WAR

Any attempt to determine exposure levels of military personnel to Herbicide Orange and its associated dioxin must be predicated on events that occurred at least 10 years ago. Since there were no routine occupational or environmental sampling programs associated with the handling or dissemination of the herbicides in South Vietnam, a quantitative determination of exposure can only be subject to speculation. In addition, since specific no-effect criteria for comparison with actual or derived values do not exist, the calculation of theoretical exposure levels might provide data in the absence of a means to assess their significance. The approach taken in this document is to develop data points for determining "relative" exposures to Herbicide Orange and dioxin (TCDD). The population at risk certainly did not include all military personnel who served in South Vietnam. Moreover, within the military population at risk, the range in magnitude of exposure must have been great. Therefore, it is important to evaluate those factors which would have influenced the potential for a given individual to be "at risk" and those which would have influenced the magnitude of that exposure. The following factors for determining relative exposures are proposed:

<u>Time</u>

When was the individual in South Vietnam?

<u>Duty</u>

What job(s) did the individual perform?

<u>Exposure</u>

What was the situation at the time of exposure?

What aircraft/vehicle was involved in the exposure?

How did the exposure occur?

Each of these questions will be discussed and available data will be provided in order to evaluate the magnitude of exposure.

I. WHEN WAS THE INDIVIDUAL IN VIETNAM?

This issue of time is very important. Not all of the herbicides used in South Vietnam were used throughout the entire 10 years (1962-1971) encompassed by the Department of Defense (DOD) defoliation program. In addition, 2,4,5-T formulations used early in the program are believed to have contained higher levels of TCDD than did the formulations used in the later years. The three time periods shown in Table 1 can be differentiated on the basis of specific herbicides used and the mean dioxin content.

TABLE 1. THE DIFFERENTIATION OF THREE TIME PERIODS DURING THE US MILITARY DEFOLIATION PROGRAM IN SOUTH VIETNAM*

Period	Herbicides Used (Code Names)	Mean Dioxin Content (parts per million)†
January 1962 - June 1965	Purple, Pink, Green	~32†
	Blue	0
July 1965 - June 1970	Orange	~2 §
	White, Blue	0
July 1970 - October 1971	White, Blue	0

* Source: Young et al.[3]
† Found only in 2,4,5-T containing formulations.
† Value based on analyses of five samples.
§ Value based on the analyses of 488 samples.

Herbicide Orange was the most extensively used herbicide in South Vietnam. Orange accounted for approximately 10.7 million gallons of the total 17.7 million gallons of herbicide used (Table 2). It was used from mid-1965 to June 1970. However, as noted in Table 2, Orange was not the only 2,4,5-T containing herbicide used in the defoliation program. Small quantities of Purple, Pink, and Green, all containing 2,4,5-T were used from 1962 through mid-1965. In subsequent sections of this document, the term "Herbicide Orange" will refer to all of the 2,4,5-T containing herbicides used in Vietnam (Purple, Pink, Green, and Orange).

TABLE 2. NUMBER OF GALLONS OF MILITARY HERBICIDE PROCURED BY THE US DEPARTMENT OF DEFENSE AND DISSEMINATED IN SOUTH VIETNAM DURING JANUARY 1962 - OCTOBER 1971*

Code Name	Herbicide	Quantity	Period of Use
Orange	2,4-D; 2,4,5-T	10,646,000	1965-1970†
White	2,4-D; Picloram	5,633,000	1965-1971‡
Blue	Cacodylic Acid	1,150,000	1962-1971‡
Purple	2,4-D; 2,4,5-T	145,000	1962-1965
Pink	2,4,5-T	123,000	1962-1965
Green	2,4,5-T	8,200	1962-1965
	Total	17,705,200	

* Source: Young et al.[3]
† Last fixed-wing mission of Orange 16 April 1970; last helicopter mission of Orange 6 June 1970.
‡ Last fixed-wing mission 9 January 1971; all herbicides under US control stopped 31 October 1971.

II. WHAT JOB(S) DID THE INDIVIDUAL PERFORM DURING HIS TOUR(S) IN SOUTH VIETNAM?

There were relatively few military operations that involved the handling of herbicides by military personnel. It is, thus, appropriate to examine both the functions, or jobs, where individuals would have been at risk, and to estimate the size of the population at risk.

a. Populations at Risk.

A review of operations involving Herbicide Orange in South Vietnam from January 1962 to April 1970 revealed that there were essentially three groups of US military personnel potentially exposed to Herbicide Orange and its associated dioxin contaminant. These three groups were:

1. "Operation RANCH HAND" personnel actively involved in the defoliation program. This group included aircrew members and maintenance and support personnel directly assigned to the RANCH HAND squadrons.

2. Personnel assigned to selected support functions that may have resulted in exposure to Herbicide Orange. This group included, for example, personnel who sprayed herbicides, using helicopters or ground application equipment; personnel who may have delivered the herbicides to the units performing the defoliation missions; aircraft mechanics who were specialized and occasionally provided support to RANCH HAND aircraft; or, personnel who may have flown contaminated C-123 aircraft, but were not assigned to RANCH HAND (e.g., during the Tet Offensive, all RANCH HAND aircraft were reconfigured to transport supplies and equipment, and were assigned to non-RANCH HAND squadrons).

3. Ground personnel who may have been inadvertently sprayed by defoliation aircraft or who, during combat operations, may have entered an area previously sprayed with Herbicide Orange.

b. Population Estimates.

The total number of US military personnel exposed to Herbicide Orange is not known. Approximately 1,200 RANCH HAND personnel were exposed in direct support of the defoliation operations; however, there are no data on the number of non-RANCH HAND personnel who may have been exposed. The actual number of people may be in the thousands since at least 100 helicopter spray equipment units were used in South Vietnam, and most military bases had vehicle-mounted and backpack spray units available for use in routine vegetation control programs. The number of military ground personnel who may have inadvertently been sprayed by RANCH HAND aircraft, or who may have entered areas recently sprayed with Herbicide Orange during combat operations is not known. Approximately 10 percent of South Vietnam was sprayed with herbicides, and most of this area was contested and/or controlled by enemy forces. As estimated frequency of occurrence for selected exposure scenarios is given in Table 3.

TABLE 3. ESTIMATED FREQUENCY OF EVENTS WHERE MILITARY GROUND PERSONNEL MAY HAVE BEEN EXPOSED TO HERBICIDE ORANGE

Event	Frequency
Direct application of herbicide on ground troops	Rare
Ground troops moving into area treated within 24 hours	Seldom
Ground troops entering a defoliated area (1 month or more after herbicide application)	Frequent

Discussions with RANCH HAND aircrew members confirmed that in at least one instance in 1967, direct application of herbicide onto a Marine patrol did occur. The basic concept for the major use of the defoliation program, i.e., the use of chemicals to remove foliage to enhance visibility, supports the contention that it was unlikely that troops would be in areas to be treated, or would move into the areas immediately after treatment since the desired effect would not be evident until 3 to 6 weeks after the herbicides were applied. However, the occurrence of the first two scenarios in Table 3 cannot be ruled out.

III. WHAT WAS THE SITUATION AT THE TIME THE INDIVIDUAL WAS EXPOSED?

There are a number of exposure scenarios in which an individual was more likely to have been significantly exposed to a specific herbicide or even another pesticide, including:

1. Guards at a base perimeter.
2. An individual at a Special Forces camp in the inland forest.
3. An individual on combat patrol in the Rung Sat Special Zone.
4. An individual repairing contaminated aircraft.
5. A supply clerk or depot aide handling drums of chemicals.

These different situations could have exposed individuals to varying amounts of different herbicides and insecticides since the use patterns of these chemicals differed markedly.

Use Patterns of Individual Herbicides.

Each of the three major herbicides (Orange, White, and Blue) had specific uses. Ninety-nine percent of Herbicide White was applied in defoliation missions. It was not recommended for use on crops because of the persistence of Picloram in soils. Because the herbicidal action on woody plants was usually slow, full defoliation did not occur for several months after spray application. Thus, it was an ideal herbicide for use in the inland forests in areas where defoliation was not immediately required, but where it did occur it would persist longer than if the area were sprayed with Orange or Blue.

Herbicide Blue was the herbicide of choice for crop destruction missions involving cereal or grain crops. Approximately 50 percent of all Blue was used in crop destruction missions in remote or enemy controlled areas with the remainder being used as a contact herbicide for control of grasses around base perimeters.

Ninety percent of all Herbicide Orange was used for forest defoliation and it was especially effective in defoliating mangrove forests. Eight percent of Herbicide Orange was used in the destruction of broadleaf crops (beans, peanuts, ramie, and root or tuber crops). The remaining 2 percent was used around base perimeters, cache sites, waterways, and communication lines.

Table 4 shows the number of acres in South Vietnam within the three major vegetational categories.

TABLE 4. THE NUMBER OF ACRES TREATED IN SOUTH VIETNAM, 1962-1971, WITH MILITARY HERBICIDES WITHIN THE THREE MAJOR VEGETATIONAL CATEGORIES

Vegetational Category	Areas Treated*
Inland forests	2,670,000
Mangrove forests	318,000
Cultivated crops	260,000
Total	3,248,000

* Areas receiving single or multiple coverage. Source: NAS[1]

Certain portions of South Vietnam were more likely to have been subjected to defoliation. Herbicide expenditures for the four Combat Tactical Zones of South Vietnam are shown in Table 5. These data were obtained from the HERBS tape[2] and total volume is not in complete agreement with the actual procurement data shown in Table 2 because volume was calculated via sprayline data (an estimate of rate of application and area sprayed).

TABLE 5. US HERBICIDES EXPENDITURES IN SOUTH VIETNAM, 1962-1971: A BREAKDOWN BY COMBAT TACTICAL ZONE*

Combat Tactical Zones	Herbicide Expenditure (gallons) Orange	White	Blue
CTZ I	2,250,000	363,000	298,000
CTZ II	2,519,000	729,000	473,000
CTZ III (includes Saigon)	5,309,000	3,719,000	294,000
CTZ IV	1,227,000	435,000	62,000
Subtotals	11,305,000	5,246,000	1,127,000
Grand total		17,678,000	

* Source: HERBS tape[2]

In addition to the herbicides, numerous other chemicals were shipped to South Vietnam in 55-gallon drums. These included selected fuel additives, cleaning solvents, cooking oils, and a variety of other pesticides. The

insecticide Malathion was widely used for control of mosquitoes and at least 400,000 gallons of it were used from 1966 through 1970. In addition, much smaller quantities of Lindane and DDT were used in ground operations throughout the war in Southeast Asia. The distribution of the herbicides within Vietnam after their arrival did not occur randomly. About 65 percent was shipped to the 20th Ordnance Storage Depot, Saigon, and 35 percent was shipped to the 511th Ordnance Depot, Da Nang.

IV. WHAT MILITARY AIRCRAFT/VEHICLE WAS INVOLVED IN THE EXPOSURE?

Numerous aircraft were used in the air war in Vietnam, but only a few of these aircraft were used for aerial dissemination of herbicides. The "work horse" of Operation RANCH HAND was the C-123/UC-123, "Provider." This cargo aircraft was adapted to receive a modular spray system for internal carriage. The module (the A/A 45 Y-1) consisted of a 1,000-gallon tank, pump, and engine which were all mounted on a frame pallet. An operator's console was an integral part of the unit, but was not mounted on the pallet. Wing booms (1.5 inches in diameter, 22 feet long) extended from the outboard engine nacelles toward the wing tips. A short tail boom (3 inches in diameter, 20 feet long) was positioned centrally near the aft cargo door. Each aircraft normally had a crew of three men: the pilot, co-pilot (navigator), and flight engineer (console operator). During the peak activity of RANCH HAND operations (1968-1969), approximately 30 C-123/UC-123 aircraft were employed. However, many other squadrons of non-RANCH HAND C-123 aircraft were routinely used throughout South Vietnam in transport operations.

The control of malaria and other mosquito-borne diseases in South Vietnam necessitated an extensive aerial insecticide application program in order to control these vector insects. From 1966 through 1972, three C-123 aircraft were used to spray Malathion, an organophosphate insecticide. These aircraft could be distinguished from the Herbicide-spraying aircraft because they were not camouflaged. These aircraft routinely sprayed insecticide adjacent to military and civilian installations, as well as in areas where military operations were in progress, or about to commence.

Approximately 10 to 12 percent of all herbicides used in South Vietnam was disseminated by helicopter or ground application equipment. Generally, helicopter crews were not assigned to herbicide spray duties on a full-time basis and rotated the spraying duties with other mission requirements. The military UH-1 series of helicopters, deployed by the Air Force, the Army, and Navy units, generally sprayed the herbicides. The most common spray system used was the AGRINAUTICS unit. This unit was installed in or removed from the aircraft in a matter of minutes because it was "tied down" to installed cargo shackles and aircraft modifications were not required for its use. The unit consisted of a 200-gallon tank and a collapsible 32-foot spray boom. The unit was operated by manual controls to control the flow valve and a windmill brake. Generally, each helicopter had three crew members.

A summary of the aircraft used in herbicide and insecticide operations is shown in Table 6. Ground crews that maintained these aircraft were also at risk for exposure to the herbicides and insecticides.

TABLE 6. US MILITARY AIRCRAFT USED IN THE DISSEMINATION OF HERBICIDES AND INSECTICIDES IN SOUTH VIETNAM*

Aircraft	Camouflaged	Chemical Disseminated
C-123/UC-123	Yes	All Herbicides
C-123	No	Malathion
Helicopter		
Air Force UH-F		
Army UH-1B/UH-1D	Yes	Orange, Blue
Navy UH-1E		

* Source: Young et al.[3]

Various ground delivery systems were also used in South Vietnam for control of vegetation in limited areas. Most of these units were towed or mounted on vehicles. One unit that was routinely used was the Buffalo turbine. It developed a wind blast with a velocity up to 150 mph at 10,000 ft^3/minute volume. When the herbicide was injected into the air blast, it was essentially "shot" at the foliage. The Buffalo turbine was useful for roadside spraying and applications of perimeter defenses. The herbicides of choice in these operations were Blue and Orange.

V. HOW DID THE EXPOSURE OCCUR?

As previously noted, the population at highest risk was the RANCH HAND group since these individuals were exposed to herbicides on a daily basis. Non-RANCH HAND support personnel who handled herbicides and performed secondary level maintenance were also at risk. Beyond these limited populations, the likelihood of other individuals being heavily exposed to herbicides was significantly less. The exposure of personnel could have occured by essentially three routes:

1. Percutaneous absorption and inhalation of vapors/aerosols by direct exposure to sprays.

2. Percutaneous absorption and inhalation of vapors by exposure to treated areas following spray application, and

3. Ingestion of foods contaminated with the material.

As previously discussed, the use of Herbicide Orange in South Vietnam was for the purpose of denying the enemy the cover of dense jungle foliage. The areas normally sprayed were remote, unpopulated, forested areas where very few, if any, US military personnel were located and the exposure to direct spray of Herbicide Orange would have been unlikely. In addition, because of the dense canopy cover, the target of the defoliation operation, the amount of herbicide penetrating to the forest floor would have been small. The chemical and physical characteristics of Herbicide Orange and the spray, as it would have occurred following dissemination from a C-123, are important factors in assessing relative exposures to the Herbicides and TCDD.

Table 7 reviews the pertinent chemical and physical characteristics of Herbicide Orange. Table 8 reviews both the application parameters of the spray system used in the C-123 aircraft and the characteristics of the spray itself. Generally, herbicides were sprayed in the early morning or late afternoon, so as to minimize the effects of air movement on particle dispersion.

TABLE 7. PERTINENT CHEMICAL AND PHYSICAL CHARACTERISTICS OF HERBICIDE ORANGE

Formulation Concentrated	(8.6 lb ai/gal)*
Water Insoluble	Density = 1.28
Vapor Pressure	3.6×10^{-4} mm Hg at 30°C
NBE† 2,4-D : 1.2×10^{-4}	
NBE 2,4,5-T : 0.4×10^{-4}	
TCDD : 1×10^{-4}	
Viscous	40 centipoises at 20°C
Noncorrosive to metal	
Deleterious to paints, rubber, neoprene	
Long shelf life	

* Pounds active ingredient (2,4-D and 2,4,5-T) per gallon.
† NBE = Normal butyl ester

TABLE 8. APPLICATION PARAMETERS AND SPRAY CHARACTERISTICS OF THE C-123 MODULAR INTERNAL SPRAY SYSTEM

Aircraft speed	130 KIAS*
Aircraft altitude	150 ft
Tank volume	1,000 gal
Spray time	3.5-4 min
Particle size:	
<100μ 1.9%	
100-500μ 76.2% >500μ 21.9%	
87% impacted within 1 min	
13% drifted or volatilized	
Mean particle volume	0.61 μl
Spray swath	260 ±20 ft
Mean deposition	3 gal/acre
Total area/tank	340 acres

* Knots indicated air speed.

Ground combat forces normally would not have been expected to have entered a previously treated area for several weeks after treatment, during which time numerous environmental factors would have reduced the potential for exposure to military personnel. Young et al.[3] have conducted an indepth review of the environmental fate of Herbicide Orange and TCDD. The following is a summary from that report:

> *. . . Available data indicate that the vast majority of the phenoxy herbicides would impact forest canopy, the intended target. Rapid uptake (e.g., within a few hours) of the ester formulations of 2,4-D and 2,4,5-T would occur. Most of the herbicide probably would undergo rapid degradation (weeks) within the cellular matrix of the vegetation. However, some of herbicide may remain unmetabolized and would be deposited on the forest floor at the time of leaf fall. Soil microbial and/or chemical action would likely complete the degradation process.*

Herbicide droplets that impacted directly on soil or water would probably hydrolyze rapidly (within hours). Biological and nonbiological degradative processes would further occur to significantly reduce these residues. Some violatilization of the esters of 2,4-D and 2,4,5-T would occur during and immediately after application. The volatile material most likely would dissipate within the foliage of the target area. Photodecomposition of TCDD would minimize the amount of biologically active volatile residues moving downwind of the target area.

Accumulation of phenoxy herbicides in animals may occur following ingestion of treated vegetation. The magnitude of this accumulation would likely be at nontoxic levels. Herbicide residues in animals would rapidly decline after withdrawal from treated feed.

Most TCDD sprayed into the environment during defoliation operations would probably photodegrade within 24 hours of application. Moreover, recent studies suggest that even within the shaded forest canopy, volatilization and subsequent photodecomposition of TCDD would occur. Since translocation into vegetation would be minimal, most TCDD that escaped photodegradation would enter the soil-organic complex on the forest floor following leaf fall. Soil chemical and microbial processes would further reduce TCDD residues. Bioconcentration of the remaining minute levels of TCDD may occur in liver and fat of animals ingesting contaminated vegetation or soil. However, there are no field data available that indicate that the levels of TCDD likely to accumulate in these animals would have a biological effect.

The environmental generation of TCDD from 2,4,5-T residues, through thermal or photolytic processes, would be highly unlikely and of no consequence. . . .

VI. CONCLUSIONS.

While a precise determination of herbicide exposure cannot be achieved, the five factors discussed in this document might permit both a characterization and a relative estimate of the magnitude of the exposure. In the preparation of a total exposure for a given individual, answers to the five questions must be determined for <u>each</u> exposure incident, and a summary exposure estimate developed.

LITERATURE CITED

1. Committee on the Effects of Herbicides in South Vietnam 1974. Part A: Summary and Conclusions. National Academy of Science, Washington, DC, 398 p.

2. HERBS tapes. 1971. Computer data on herbicide missions in Vietnam, 1965-1971. Department of Defense, Washington, DC.

3. Young, A. L., J. A. Calcagni, C. E. Thalken, and J. W. Tremblay. 1978. The Toxicology and Environmental Fate, and Human Risk of Herbicide Orange and its Associated Dioxin. Technical Report OEHL-TR-78-92. USAF Occupational and Environmental Health Laboratory, Brooks Air Force Base, TX 78235, 247 p.

2d Ind to HQ USAF/SGES Ltr, 15 Jan 80, Cancellation Hearings on Herbicide 2,4,5-T

HQ AMD/SG 29 JAN 1980

TO: USAFSAM/CC

Forwarded for your information and action.

FOR THE COMMANDER

JOHN R. WATSON
Colonel, USAF, MSC
Director of Medicine & Education

2 Atch
nc

31 Jan 80

EK -
Previous guidance on review of testimony still in effect.

	INFO	ACTION	INITIALS / DATE
CEA			
SGT MAJ	X		JL 30 Jan 80
CE	X		
CD	X		31 Jan
CC	X		30 Jan
EK	X		
Copy to: EK 30 Jan 80			

DEPARTMENT OF AGRICULTURE
OFFICE OF THE GENERAL COUNSEL
WASHINGTON, D.C. 20250

APR 10 1980

Dr. Rodney W. Bovey
USDA - SEA
Department of Range Science
Texas A & M University
College Station, Texas 77843

Dear Rod:

This is to follow-up on my telephone request for your appearance as a witness at the 2,4,5-T/silvex cancellation hearings. The hearing opened on March 14 when EPA witnesses began testifying. It is difficult to estimate when witnesses will be presented on behalf of the Secretary of Agriculture but we will follow EPA's witnesses in the schedule. Therefore, we need to prepare for your appearance at the hearings very soon. We will need a written statement from you either pertaining to your inputs to the USDA-EPA-States joint assessment report titled "The Biologic and Economic Assessment of 2,4,5-T" or (if you did not work with the team or contribute information to them) detailing your expertise on matters such as 2,4,5-T or silvex application, evaluation, chemical analysis, or field use.

Our effort in the cancellation hearing will be directed toward identifying and presenting relevant scientific data. These facts will be the foundation of our case. Your statement should fully describe the facts known to you and identify what document or other supporting materials, such as personal experience and discussions with other knowledgeable observers, can provide the basis for each fact. We will need a copy of each document which is an exhibit or reference in support of your statement. If you can anticipate questions that may be raised by others, please feel free to discuss them with me and how you believe they can be addressed. Reference documents such as field data, reports, or letters to the file prepared at the time will add to your expert credibility when you are describing your data and experience. I have enclosed for your use a list of items needed in the preparation of our presentation. In order to be prepared for the hearing, I will need your draft witness statement and supporting material by May 1.

I have enclosed an outline of evidence which may be presented by the Department at the hearings. If you have experience or knowledge relating to these subjects, you should consider including that information in your draft statement. These topics are somewhat general, and we would appreciate your comments about specific topics which should be considered also. Please feel free to call me at 447-2713 or Judith Wenker at 447-2286 or Al Rivas at 447-2714 to discuss these matters.

If you have questions regarding the preparation of your statement, please contact us. Your efforts in helping us prepare for the hearings are greatly appreciated.

Sincerely,

Margaret M. Breinholt

MARGARET M. BREINHOLT
Attorney
Litigation Division

Enclosure

We sent you a more specific letter earlier, but I thought this general information might also be of interest to you. MMB

DEPARTMENT OF AGRICULTURE
OFFICE OF THE GENERAL COUNSEL
WASHINGTON, D.C. 20250

APR 15 1980

Major Alvin L. Young
Consultant, Environmental Sciences
USAFSAM / EK
Brooks AFB, Texas 78235

Dear Major Young:

For your information, I am enclosing a copy of the letter which has been sent to USDA employees who are scheduled to be witnesses in the "risk" portion of the 2,4,5-T/silvex administrative hearings.

If you are close to finishing a draft of your proposed testimony, I would appreciate receiving a copy as soon as possible. If you prefer, you could send a copy to Mr. Heady, and he can arrange to provide it to me and discuss it at his convenience.

It is difficult to tell you exactly when you may be scheduled to appear for cross-examination on your written direct testimony. It is possible that USDA may be required to present witnesses soon after June 1, and the written statements must be filed at least two weeks before a witness can appear.

Sincerely,

Margaret M. Breinholt

MARGARET M. BREINHOLT
Attorney, Litigation Division

Enclosure

cc: D. Heady, w/enc.

with Government Contract.

* Walt Carpenter.

FAA

Thru Dow.

1. Consult but not Testify

2.

* Plaintiffs

Defendants

Tompkins (Hayward)

Hercules

Shamrock

Rhodia

1st Dow

Union Am.

→ Preparing Defense

→

586000

TCDD — Dow

— Her

Mid - April :

Issue —
Vietnam Data and What It shows.

Environmental Fate
Tissue Residues
Feeding Studies

Prepare an Outline

- Logan Norris
- Phil Kearney
- Don Crosby

Hearing Panel (Lawyer, Water Aquatic Biologist, Economist)

Support Panel — Epid Biostatistician

Kirkland & Ellis
1776 K St NW
Wash. 20006

Kirkland
~~Cocktail~~ Ellis
1776 ~~Cocktail~~ Street NW

Injunction — Schwartz
Council

Testimony

Video — late April

Preparation —
Suspension Hearing

Prepare Testimony

Washington ~~NW~~ DC

202-857-5024

June Pet — 1 month in 1996
10 miscarriages

front Rose & Eli Alia Women —
Coastal Towns

Produced Pat

3 Florence
1 Matt Karp
2 Newport
1 Toledo
2 Lincoln City
1 Siltz

Word from NW → E
away from Tower
Friday