DONNA TORNOE
Author, Travels of Orange and other toxins, published 2017 on Amazon
Coauthor, "Olson, K.R. and Tornoe, D. (2021) Long-Term Environmental Impacts of Pesticide and Herbicide Use in Panama Canal Zone. Open Journal of Soil Science, 11, 403-434. https://doi.org/10.4236/ojss.2021.119021
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June 15, 2025

The Honorable Donald J. Trump
President of the United States
1600 Pennsylvania Avenue
Washington, DC 20500

Subject: Urgent Request to Support Panama Canal Zone Veterans Act and Investigate VA and DoD Misconduct

June 2, 2025

Dear President Trump,

I am writing to bring to your urgent attention a grave injustice affecting veterans and residents of the Panama Canal Zone who have suffered needlessly due to the use of toxic herbicides like Agent Purple and Agent Orange, the systemic cover-up by the Department of Defense (DoD) and Department of Veterans Affairs (VA), and the misleading research of Dr. Alvin Young. These actions have denied Panama Canal Zone veterans the recognition, medical care, and justice they deserve for their exposure to dioxin-contaminated chemicals, resulting in severe health consequences including cancer, birth defects, immune suppression, and neurological disorders. My own husband, an Army veteran, waiting now almost ten years for help.

From the 1940s through the 1970s, Agent Purple (a precursor to Agent Orange with dioxin levels of 30–40 ppm, as confirmed by the 1987 Baughman and Meselson study) and Agent Orange (dioxin levels of 2–3 ppm, some batches up to 60 ppm) were used in the Panama Canal Zone for vegetation control around military bases and the canal. U.S. Commerce export records document near-monthly shipments of 2,4-D and 2,4,5-T to the Zone between 1958-1977. In fact, 1961 Exports (**Attachment 1**) Panama received almost 10X as much as Vietnam of Agent Purple, with much more dioxin being distributed in the Canal Zone than

contained in Agent Orange, later shipped. Panama received 96,510 pounds of Agent Purple and Vietnam received 1,572 pounds of Agent Purple in 1961.

While the Board of Veterans Appeals observes that 2,4-D and 2,4,5-T are included within VA's definition of "herbicide agent" for purposes of establishing presumptive in-service herbicide exposure (See 38 C.F.R. § 3.307(a)(6), Panama veterans have been left out in the cold, all because of an Orange Stripe and the words of Dr. Alvin Young, who knows and has testified in the past there was never anything special made for "Orange". Meaning it's all been a coverup to purposely ignore our veterans.

The Federal Pesticide Review Committee reported on the production and sales of these herbicides for decades and the DoD would report on these facts to the office of the budget each year (**Attachment 2**). The Federal Pesticide Review (**Attachment 4**) kept track of all production and sales of these herbicides and was under the Department of Defense Production Act. How the DoD claims they had no idea what was shipped on U.S. Commerce, reporting on same each year, seems purposeful to ignore our veterans. A document detailing a secret meeting between the Commerce Department and the DoD (**Attachment 3**) reveals their collaboration in shipping defoliants by U.S. Commerce. These "forever chemicals," including dioxin with a half-life in soil of up to 100 years (per a 2016 *Chemical & Engineering News* article), have caused generational harm, as they bioaccumulate in fatty tissues and remain in the environment, exposing military personnel, civilian workers, and local residents long after spraying ceased.

Despite this clear evidence, the DoD and VA have colluded to deny the use of these herbicides in Panama, perpetuating a cover-up that has left veterans suffering without recognition or care. The VA consistently denies Panama Canal Zone veterans' claims, citing "missing records". The DoD responded to a FOIA Request asking if the 2,4-D and 2,4,5-T shown on U.S. export records to Panama were not Agent Orange or Agent Purple, then what were they? The DoD responded that they had "nothing at all to do with what was shipped on the U.S. Commerce records," a claim directly contradicted by the secret meeting **(Attachment 3)** document and the Federal Pesticide Review Committee reports **(Attachment 4),** as well as the fact that Commerce is under the DoD since the Defense Production Act as seen in **Attachment 2**. This denial is not only misleading but a betrayal of the veterans and residents who have a right to know what they were exposed to, especially as they suffer from dioxin-related illnesses.

In 1963 the DoD responded to an inquiry about the herbicides being used in Vietnam (**Attachment 5**), responding these herbicides were no different than used anywhere else. Dr. Alvin Young, a former Air Force major and longtime DoD/VA consultant, has played a central role in this cover-up through his misleading research and selective documentation. Young's 1970 report **(Attachment 6)** proves always a commercial version with unknown amounts of dioxin used tactically was the exact same as commercially used around the world. **Attachment 7** shows that the same 2,4-D & 2,4,5-T were used at all Federal facilities since first shipped by U.S. Exports in 1958 under this nomenclature. Prior to 1958, it was shipped under its original name Weed Killer.

Prior to 1965 when Orange came about, 2,4,5-T contained significant amounts of dioxin and was shipped and used in Panama Canal Zone, as we see in the defoliation depicted by the State Department that occurred between 1952 and 1976 in the Canal Zone (**Attachment 8**).

In 2018, Young further downplayed risks, stating that "most of [Agent Orange] is not harmful" and that a "relatively heavy dose of dioxin" is required to produce symptoms, directly contradicting scientific consensus on dioxin's toxicity (per WHO data). Young's Agent Orange Collection at the USDA's National Agricultural Library, while documenting herbicide use in places like Thailand and Eglin Air Force Base, conspicuously omits any mention of Panama, despite the commerce export records and other evidence confirming its use there. This selective omission aligns with Young's broader pattern of protecting the government from liability, leaving Panama veterans without the evidence needed to prove exposure.

The DoD's two-year retention policy for records like DD 1552 pesticide use forms, military secrecy, and potential destruction of records (e.g., a 1980 GAO report notes "lost" records during declassification) have further obscured the truth. However, the commerce export records, the secret meeting between Commerce and the DoD, and the Federal Pesticide Review Committee reports provide undeniable proof of herbicide shipments to Panama, as well as the testimony by Mr. Charles Bartlett of 200 barrels of Agent Orange shipped to the Canal Zone in 1968 as no big deal; Aberdeen Report of these herbicides and many other Forever chemicals found in the soil report at Fort Davis and Corozal in 1976; pictures of leftover Agent Orange barrels being used as fencing at Fort Sherman in 2020. The DoD and VA's refusal to acknowledge this evidence, coupled with Young's misleading research, has caused Panama Canal Zone veterans to suffer needlessly, denied the medical care and benefits they are entitled to for their service and sacrifice.

Major Alvin Young testified to Congress in front of the Veterans Affairs committee in 1980 (**Attachment 9**) that Orange was commercially made and the military packaging was nothing but an orange stripe, "we color coded them only for our convenience in Vietnam." Major Alvin Young also testified in this same hearing that nobody knew dioxin even existed until about 1969. So the question is how was he paid to write reports on the issue for Panama and many other areas that Orange was made to military specifications, knowing that is utterly false?

The Smithsonian Institution operated in the Canal Zone for many years. **Attachment 10** is a report on the use of Orange in the Canal Zone. Not knowing that dioxin was or would be an issue in the future to humans until 1969 as Dr. Alvin Young as a Major in the Air Force directly involved stated, Herbicide Orange was readily available in the Federal Catalog up until January 1971 (**Attachment 11**). As a matter of fact, the Army Field Manual 3-3 found in Dr. Alvin Young's Agent Orange Collection, states that it was a "Tactical Employment of Herbicides" and lists the Rainbows as Commercially available (**Attachment 12**). Never were any such things as "tactical herbicides," was always one and the same, commercially made, used tactically in war, but still just the same contamination to our veterans.

I urge you to take immediate action to address this injustice:

1. **Investigate the Cover-Up**: Launch a congressional investigation into the DoD and VA's actions, including their coordination with the Commerce Department to ship defoliants to Panama and their subsequent denials.
2. **Support the Panama Canal Zone Veterans Act**: Advocate for the passage of the Panama Canal Zone Veterans Act (previously H.R. 2447(118) H.R. 5026 (117) to grant presumptive benefits to veterans exposed to herbicides in the Zone, ensuring they receive the care and compensation they deserve.
3. **Demand Transparency**: Require the DoD and VA to release all records related to herbicide use in Panama, including declassified export records, shipment logs, and application data, to provide veterans and residents with the truth about their exposure.
4. **Hold Alvin Young Accountable**: Examine Young's role in shaping the narrative around Agent Orange, including his misleading statements and selective curation of the Agent Orange Collection, to ensure such actions do not continue to harm veterans.

The Panama Canal Zone veterans and residents who have suffered dioxin-related illnesses have a right to know what they were exposed to and to receive the care and justice they deserve. The DoD, VA, and Alvin Young's actions have perpetuated a cover-up that must be rectified. I implore you to act swiftly to address this grave injustice and support those who have sacrificed so much for our country.

Thank you for your attention to this critical matter. I look forward to your response and am happy to provide additional information or documentation as needed.

Sincerely,

Donna Tornoe
Resident of Fort Davis, CZ 1974-1977

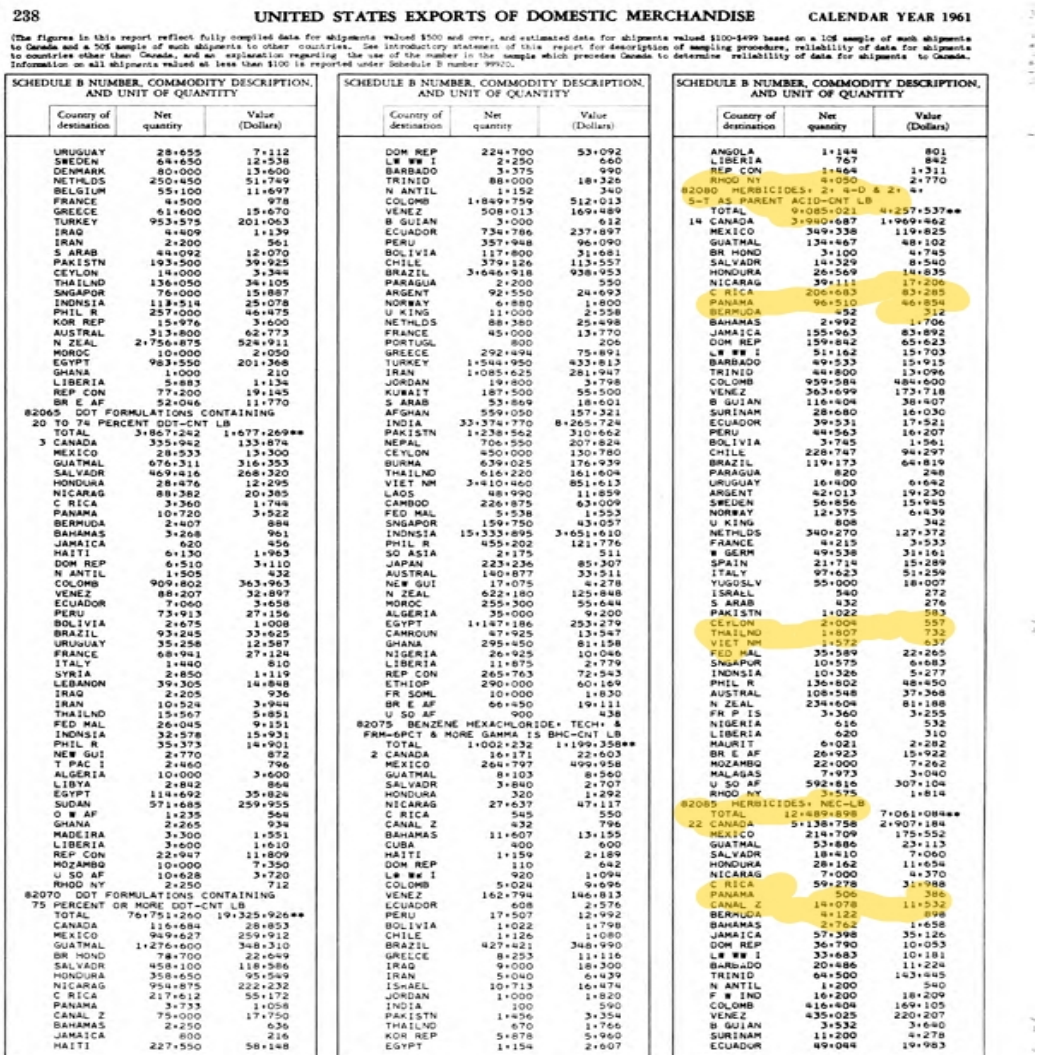
Cc: VA Secretary; Defense Secretary
Chairmen, Senate and House Veterans Affairs Committee
Rep, Maria Salazar, Rep Joaquin Castro

Attachments:

1. 1961 U.S. EXPORTS showing Panama got almost 10X more than Vietnam that year alone
2. 1961 Activities of Defense Production
3. Secret Meeting DoD and Commerce re defoliants shipped by U.S. Commerce
4. Federal Pesticide Review pages showing 2,4-D & 2,4,5-T shipped by U.S. Commerce to Vietnam and other military bases
5. 1963 DOD LETTER claiming what was used in Vietnam was just a Commercial herbicide
6. Alvin Young's 1970 Military Use report Page V-III shows commercial and Agent Orange and Agent Purple are the same

7. OH-210A (2,4,5-T made for all installations, never any different
8. Defoliation depicted by the State Department 1952-1976 in the Canal Zone
9. 1980 Congressional hearing where Major Alvin Young tells congress agent orange was formulated commercially and color coded for Vietnam and where Major Alvin Young tells the VA Committee wasn't a known before Vietnam, and yet he was paid to write Agent Orange was specially formulated to military specifications for Vietnam, knowing that is not true
10. Smithsonian Report showing Agent Orange was used in the Canal Zone
11. Federal Catalog showing Herbicide Orange available to all facilities
12. FM 3-3 showing all Rainbows were available commercially

ATTACHMENT 1
1961 U.S. EXPORTS SHOWING 96,910 POUNDS TO PANAMA VS 2,572 POUNDS TO VIETNAM OF AGENT PURPLE

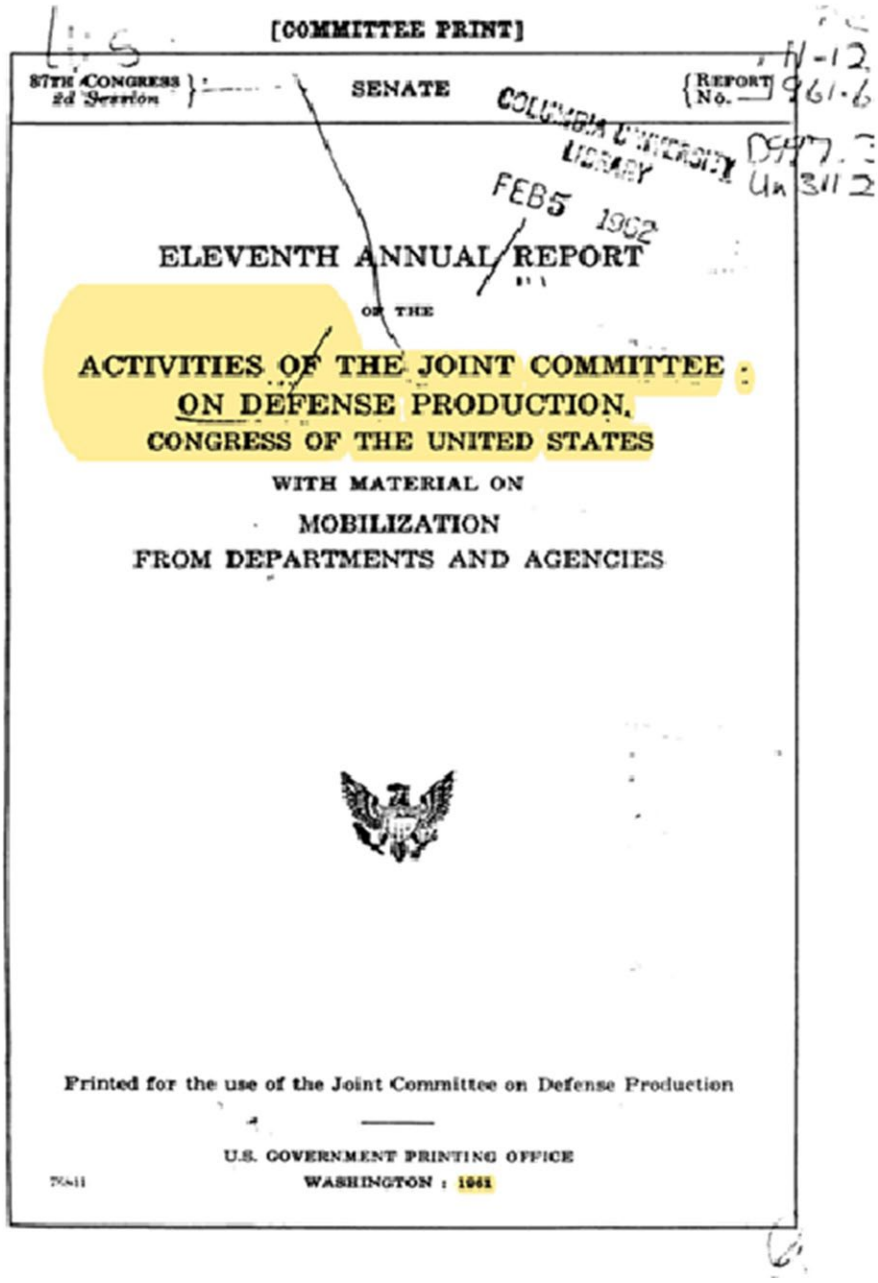


238 UNITED STATES EXPORTS OF DOMESTIC MERCHANDISE CALENDAR YEAR 1961

(The figures in this report reflect fully compiled data for shipments valued $500 and over, and estimated data for shipments valued $100-$499 based on a 10% sample of such shipments to Canada and a 50% sample of such shipments to other countries. See introductory statement of this report for description of sampling procedure, reliability of data for shipments to countries other than Canada, and an explanation regarding the use of the number in the sample which precedes Canada to determine reliability of data for shipments to Canada. Information on all shipments valued at less than $100 is reported under Schedule B number 99920.

SCHEDULE B NUMBER, COMMODITY DESCRIPTION, AND UNIT OF QUANTITY

Country of destination	Net quantity	Value (Dollars)
URUGUAY	28•655	7•112
SWEDEN	64•650	12•538
DENMARK	80•000	13•600
NETHLDS	250•450	51•749
BELGIUM	55•100	11•697
FRANCE	4•500	978
GREECE	61•600	15•670
TURKEY	953•575	201•063
IRAQ	4•409	1•139
IRAN	2•200	561
S ARAB	44•092	12•070
PAKISTN	193•500	39•925
CEYLON	14•000	3•344
THAILND	136•050	34•105
SNGAPOR	76•000	15•887
INDNSIA	118•514	25•078
PHIL R	257•000	46•475
KOR REP	15•976	3•600
AUSTRAL	313•800	62•773
N ZEAL	2•756•875	524•911
MOROC	10•000	2•050
EGYPT	983•550	201•368
GHANA	1•000	210
LIBERIA	5•883	1•134
REP CON	77•200	19•145
BR E AF	52•046	11•770
82065 DDT FORMULATIONS CONTAINING		
20 TO 74 PERCENT DDT-CNT LB		
TOTAL	3•867•242	1•677•269••
3 CANADA	335•942	133•876
MEXICO	28•533	13•300
GUATMAL	676•311	316•353
SALVADR	469•416	268•320
HONDURA	28•476	12•295
NICARAG	88•382	20•385
C RICA	3•360	1•744
PANAMA	10•720	3•522
BERMUDA	2•407	884
BAHAMAS	3•268	961
JAMAICA	620	456
HAITI	6•130	1•963
DOM REP	6•510	3•110
N ANTIL	1•505	432
COLOMB	909•802	363•963
VENEZ	88•207	32•897
ECUADOR	7•060	3•658
PERU	73•913	27•156
BOLIVIA	2•675	1•008
BRAZIL	93•245	33•625
URUGUAY	35•258	12•587
FRANCE	68•941	27•124
ITALY	1•440	810
SYRIA	2•850	1•119
LEBANON	39•305	14•848
IRAQ	2•205	936
IRAN	10•524	3•944
THAILND	15•567	5•851
FED MAL	26•045	9•151
INDNSIA	32•578	15•931
PHIL R	35•373	14•901
NEW GUI	2•770	872
T PAC I	2•460	796
ALGERIA	10•000	3•600
LIBYA	2•842	864
EGYPT	114•692	35•824
SUDAN	571•685	259•955
O W AF	1•235	564
GHANA	2•265	934
MADEIRA	3•300	1•551
LIBERIA	3•600	1•610
REP CON	22•947	11•809
MOZAMBQ	10•000	7•350
U SO AF	10•628	3•720
RHOD NY	2•250	712
82070 DDT FORMULATIONS CONTAINING		
75 PERCENT OR MORE DDT-CNT LB		
TOTAL	76•751•260	19•325•926••
CANADA	116•684	28•853
MEXICO	949•627	259•912
GUATMAL	1•276•600	348•310
BR HOND	78•700	22•649
SALVADR	458•100	118•586
HONDURA	358•650	95•549
NICARAG	954•875	222•232
C RICA	217•612	55•172
PANAMA	3•733	1•058
CANAL Z	75•000	17•750
BAHAMAS	2•250	636
JAMAICA	800	216
HAITI	227•550	58•148
DOM REP	224•700	53•092
L W WW I	2•250	660
BARBADO	3•375	990
TRINID	88•000	18•326
N ANTIL	1•152	340
COLOMB	1•849•759	512•013
VENEZ	508•013	169•489
B GUIAN	3•000	612
ECUADOR	734•786	237•897
PERU	357•948	96•090
BOLIVIA	117•800	31•681
CHILE	379•126	113•557
BRAZIL	3•646•918	938•953
PARAGUA	2•200	550
ARGENT	92•550	24•693
NORWAY	6•880	1•800
U KING	11•000	2•558
NETHLDS	88•380	25•498
FRANCE	45•000	13•770
PORTUGL	800	206
GREECE	292•494	75•891
TURKEY	1•544•950	433•813
IRAN	1•085•625	281•947
JORDAN	19•800	3•798
KUWAIT	187•500	55•500
S ARAB	53•869	18•601
AFGHAN	559•050	157•321
INDIA	33•374•770	8•265•724
PAKISTN	1•238•562	310•662
NEPAL	706•550	207•824
CEYLON	450•000	130•780
BURMA	639•025	176•939
THAILND	616•220	161•604
VIET NM	3•410•460	851•613
LAOS	48•990	11•859
CAMBOD	226•875	63•009
FED MAL	5•538	1•553
SNGAPOR	159•750	43•057
INDNSIA	15•333•895	3•651•610
PHIL R	455•202	121•776
SO ASIA	2•175	511
JAPAN	223•236	85•307
AUSTRAL	140•877	33•511
NEW GUI	17•075	4•278
N ZEAL	622•180	125•848
MOROC	255•300	55•644
ALGERIA	35•000	9•200
EGYPT	1•147•186	293•279
CAMROUN	47•925	13•547
GHANA	295•450	81•158
NIGERIA	26•925	10•046
LIBERIA	11•875	2•779
REP CON	265•763	72•543
ETHIOP	290•000	60•169
FR SOML	10•000	1•830
BR E AF	66•450	19•111
U SO AF	900	438
82075 BENZENE HEXACHLORIDE• TECH• &		
FRM•60PCT & MORE GAMMA IS BHC-CNT LB		
TOTAL	1•002•232	1•199•358••
2 CANADA	16•171	22•603
MEXICO	264•797	499•958
GUATMAL	8•103	8•560
SALVADR	3•840	2•707
HONDURA	320	1•292
NICARAG	27•637	47•117
C RICA	545	550
CANAL Z	432	796
BAHAMAS	11•607	13•155
CUBA	400	600
HAITI	1•159	2•189
DOM REP	110	642
L W WW I	920	1•694
COLOMB	5•024	9•696
VENEZ	162•794	146•813
ECUADOR	608	2•576
PERU	17•507	12•992
BOLIVIA	1•022	1•798
CHILE	1•126	1•080
BRAZIL	427•421	348•990
GRELCE	8•253	11•116
IRAQ	9•000	18•300
IRAN	5•040	6•439
ISRAEL	10•713	16•474
JORDAN	1•000	1•820
INDIA	100	590
PAKISTN	1•456	3•354
THAILND	670	1•766
KOR REP	5•878	5•960
EGYPT	1•154	2•607
ANGOLA	1•144	801
LIBERIA	767	842
REP CON	1•464	1•311
RHOD NY	4•050	2•770
82080 HERBICIDES• 2• 4•D & 2• 4•		
S-T AS PARENT ACID-CNT LB		
TOTAL	9•085•021	4•257•537••
14 CANADA	3•940•687	1•969•462
MEXICO	349•338	119•825
GUATMAL	134•467	48•102
BR HOND	3•100	4•745
SALVADR	14•329	8•540
HONDURA	26•569	14•835
NICARAG	39•111	17•206
C RICA	206•683	83•285
PANAMA	96•510	46•854
BERMUDA	452	312
BAHAMAS	2•992	1•706
JAMAICA	155•963	83•892
DOM REP	159•842	65•623
L W WW I	51•162	15•703
BARBADO	49•533	15•915
TRINID	44•800	13•096
COLOMB	959•584	484•600
VENEZ	363•699	173•718
B GUIAN	116•404	38•607
SURINAM	28•680	16•030
ECUADOR	39•531	17•521
PERU	44•563	16•207
BOLIVIA	3•745	1•561
CHILE	228•747	94•297
BRAZIL	119•173	64•819
PARAGUA	820	248
URUGUAY	16•400	6•692
ARGENT	42•013	19•230
SWEDEN	56•856	15•945
NORWAY	12•575	6•439
U KING	808	342
NETHLDS	340•270	127•372
FRANCE	4•215	3•533
W GERM	49•538	31•161
SPAIN	21•714	15•289
ITALY	97•623	51•259
YUGOSLV	55•000	18•007
ISRAEL	540	272
S ARAB	432	276
PAKISTN	1•022	583
CEYLON	2•004	557
THAILND	1•807	732
VIET NM	1•572	237
FED MAL	35•589	22•265
SNGAPOR	10•575	6•683
INDNSIA	10•326	5•277
PHIL R	136•802	48•450
AUSTRAL	108•548	37•368
N ZEAL	234•604	81•188
FR P IS	3•360	3•255
NIGERIA	616	532
LIBERIA	620	310
MAURIT	6•021	2•282
BR E AF	26•923	15•922
MOZAMBQ	22•000	7•262
MALAGAS	7•973	3•040
U SO AF	592•816	307•104
RHOD NY	3•575	1•814
82085 HERBICIDES• NEC-LB		
TOTAL	12•489•898	7•061•084•••
22 CANADA	5•138•758	2•907•184
MEXICO	214•709	175•552
GUATMAL	53•886	23•113
SALVADR	18•410	7•060
HONDURA	28•162	11•654
NICARAG	7•000	4•370
C RICA	59•278	31•988
PANAMA	506	386
CANAL Z	14•078	11•532
BERMUDA	4•122	898
BAHAMAS	2•762	1•658
JAMAICA	57•398	35•126
DOM REP	36•790	10•053
L W WW I	33•683	10•181
BARBADO	20•486	11•224
TRINID	64•500	143•495
N ANTIL	1•200	540
F W IND	16•200	18•209
COLOMB	416•404	169•105
VENEZ	435•025	220•207
B GUIAN	3•532	3•640
SURINAM	11•200	4•278
ECUADOR	49•044	19•983



[COMMITTEE PRINT]

87TH CONGRESS
2d Session

SENATE

REPORT
No.

ELEVENTH ANNUAL REPORT

OF THE

ACTIVITIES OF THE JOINT COMMITTEE ON DEFENSE PRODUCTION,

CONGRESS OF THE UNITED STATES

WITH MATERIAL ON

MOBILIZATION

FROM DEPARTMENTS AND AGENCIES

Printed for the use of the Joint Committee on Defense Production

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1961

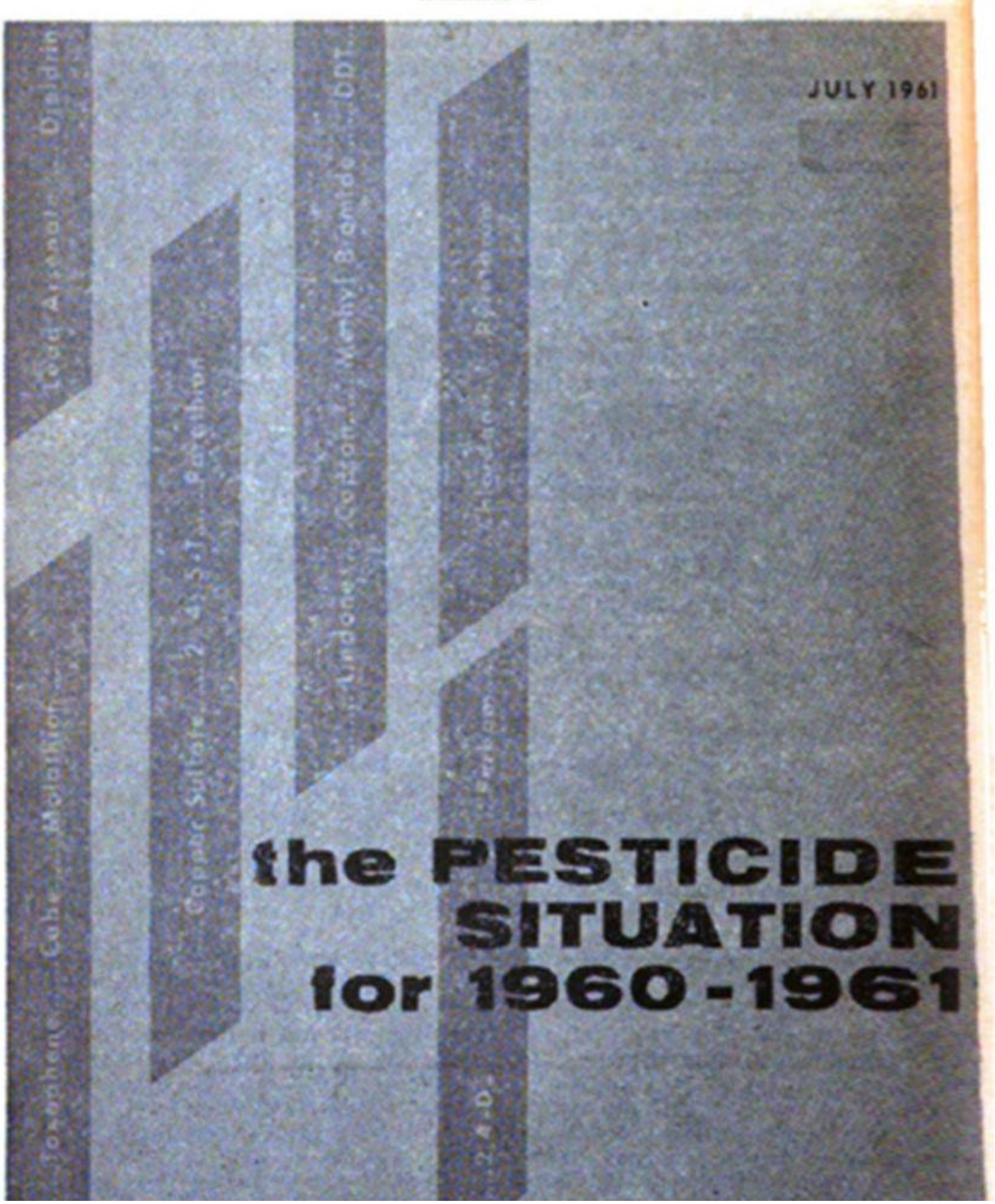
ATTACHMENT 2

PAGE 2 OF 4

DEFENSE PRODUCTION REPORT

CONTENTS

EXHIBIT 2



A REPORT OF THE AGRICULTURAL CHEMICALS STAFF, HAROLD H. SHEPARD, IN CHARGE; JOHN N. MAHAN, FERTILIZER SPECIALIST; CHARLOTTE A. GRAHAM, ADMINISTRATIVE ASSISTANT; AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE, FOOD AND MATERIALS DIVISION, U.S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D.C.

THE PESTICIDE SITUATION FOR 1960–61—GENERAL SITUATION AND OUTLOOK

Low temperatures for long periods during the spring of 1961 slowed the sale and use of insecticides. This situation, however, will be reversed if the summer months should be hot and moist. Increased use of herbicides last year, owing to product improvement and rising cost of manual weed control, is likely to continue this year. Occasional shortages of some pesticides, mostly temporary, were reported in 1960 and may occur again in 1961.

The volume of pesticide usage is determined largely by weather conditions during the crop season. Wet weather was general in 1960, favoring the growth of weeds and the development of fungus diseases. As a consequence, the use of fungicides and herbicides rose over 1959 while insecticide sales were somewhat lower. The National Agricultural Chemicals Association reported sales of pesticidal chemicals at the basic manufacturers' level to be up 3 percent over 1959 to $285 million.

In 1960 for the third successive year U.S. production of DDT was higher than ever before. Both 2,4–D and 2,4,5–T were manufactured in larger quantities than in any previous year. Several other major pesticidal chemicals were in larger production than in 1959 (table 1). Total volume of synthetic organic pesticidal chemicals produced rose 9.2 percent and dollar value 7.6 percent in 1960 over 1959 (table 2).

TABLE 1.—*U.S. production of some major pesticidal chemicals by calendar years, 1958–60*

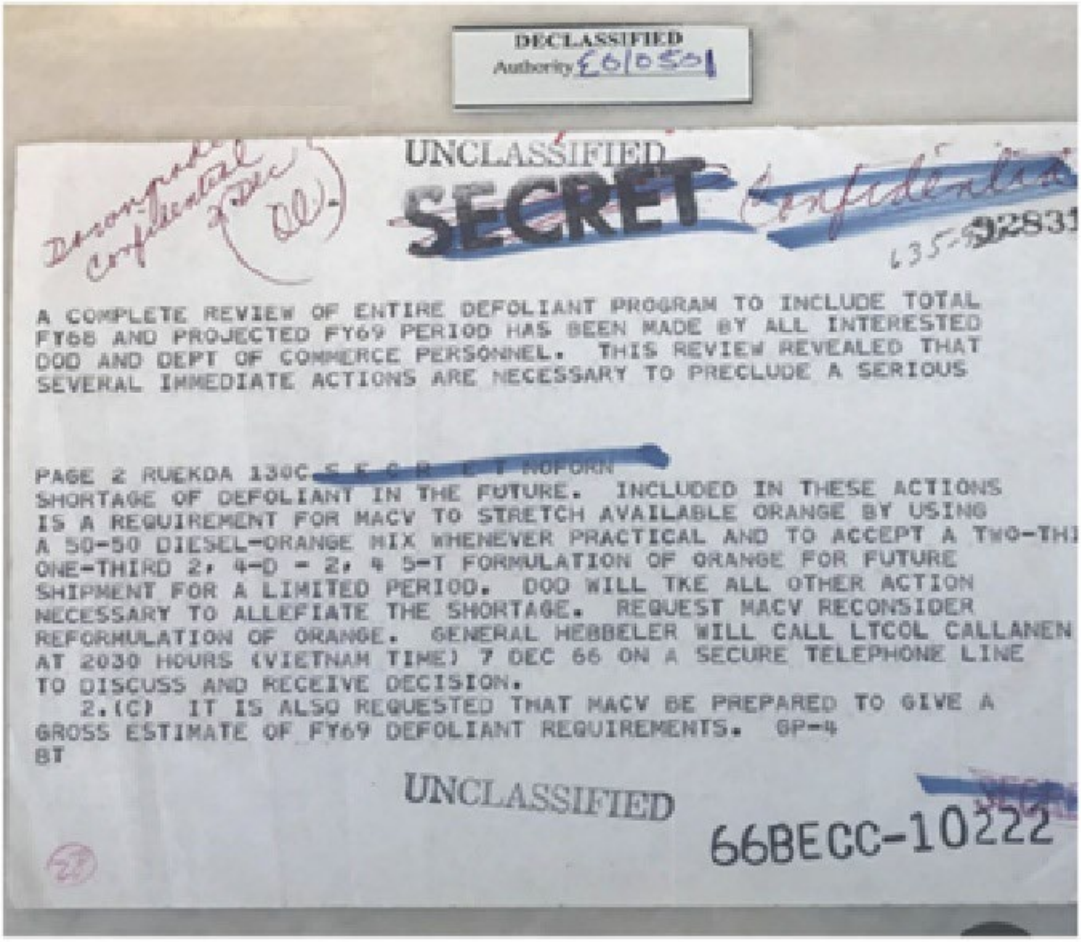
[Thousands of pounds]

Chemical	1958	1959	1960 [1]
Aldrin-toxaphene group [2]	98,280	86,868	90,671
Benzene hexachloride (gross) [3]	30,797	27,574	37,444
Benzene hexachloride (gamma equivalent) [3]	6,500	5,500	6,900
Calcium arsenate	10,432	6,424	(5)
Copper naphthenate	1,853	1,887	1,893
Copper sulfate	97,192	80,584	116,000
2,4–D acid	30,944	29,282	36,185
2,4–D acid esters	21,938	24,672	34,031
2,4–D acid salts [4]	2,964	2,749	
DDT	145,328	156,741	163,582
Ferbam	(5)	(5)	2,434
Lead arsenate	14,938	12,904	(5)
Methyl bromide	10,224	11,193	11,264
Methyl parathion	5,048	5,987	11,794
Nabam	(5)	3,350	2,978
Parathion	5,439	9,180	7,448
Pentachlorophenol	35,177	38,814	39,336
Phenyl mercuric acetate	1,056	943	(5)
Sodium chlorate	134,498	[6] 176,600	182,368
2,4,5–T acid	3,678	5,547	6,337
2,4,5–T acid esters and salts	5,230	8,033	7,924
Ziram	1,178	757	982

[1] Preliminary.
[2] Includes aldrin, chlordane, dieldrin, endrin, heptachlor, and toxaphene.
[3] Includes lindane.
[4] Sodium and amine salts.
[5] Figure not available.
[6] Revised figure.

Sources: U.S. Tariff Commission; U.S. Bureau of the Census; U.S. Bureau of Mines; chemical industry.

ATTACHMENT 3
SECRET MEETING BETWEEN
DOD AND COMMERCE RE SHIPMENT OF DEFOLIANTS
BY U.S. COMMERCE



DECLASSIFIED
Authority E.O. 10501

UNCLASSIFIED

~~SECRET~~ ~~Confidential~~

635-92831

A COMPLETE REVIEW OF ENTIRE DEFOLIANT PROGRAM TO INCLUDE TOTAL FY68 AND PROJECTED FY69 PERIOD HAS BEEN MADE BY ALL INTERESTED DOD AND DEPT OF COMMERCE PERSONNEL. THIS REVIEW REVEALED THAT SEVERAL IMMEDIATE ACTIONS ARE NECESSARY TO PRECLUDE A SERIOUS

PAGE 2 RUEKDA 130C [redacted]
SHORTAGE OF DEFOLIANT IN THE FUTURE. INCLUDED IN THESE ACTIONS IS A REQUIREMENT FOR MACV TO STRETCH AVAILABLE ORANGE BY USING A 50-50 DIESEL-ORANGE MIX WHENEVER PRACTICAL AND TO ACCEPT A TWO-THI ONE-THIRD 2, 4-D - 2, 4 5-T FORMULATION OF ORANGE FOR FUTURE SHIPMENT FOR A LIMITED PERIOD. DOD WILL TKE ALL OTHER ACTION NECESSARY TO ALLEFIATE THE SHORTAGE. REQUEST MACV RECONSIDER REFORMULATION OF ORANGE. GENERAL HEBBELER WILL CALL LTCOL CALLANEN AT 2030 HOURS (VIETNAM TIME) 7 DEC 66 ON A SECURE TELEPHONE LINE TO DISCUSS AND RECEIVE DECISION.
2.(C) IT IS ALSO REQUESTED THAT MACV BE PREPARED TO GIVE A GROSS ESTIMATE OF FY69 DEFOLIANT REQUIREMENTS. GP-4
BT

UNCLASSIFIED

66BECC-10222

The DoD and the Department of Commerce coordinated all shipments for the Military through the U.S. Exports according to the reporting of the Pesticide Review.

ATTACHMENT 4 PAGE 1 OF 2
PESTICIDE REVIEW PAGES
SHOWING SHIPMENTS TO VIETNAM
THROUGH U.S. COMMEERCE

Production of pentachlorophenol in 1968 amounted to 49 million pounds, up 10 percent from 1967. The average annual growth for the previous five years was a moderate 3 percent. Annual production capacity of the primary producers is estimated at about 56 million pounds. Some pentachlorophenol is used by farmers and others not connected with the wood-preserving industry. A large amount goes into the manufacture of sodium pentachlorophenate.

HERBICIDES

The suppression of unwanted vegetation has always been a major part of the farming effort. With the advent of selective herbicides, this effort has become less laborious, less time consuming, and less expensive. Increased yields have resulted. Herbicides are now available for use on nearly all major and many minor crops, as well as commercial forests, orchards, rangelands, and pasturelands. Few modern developments equal herbicides in reducing human toil and contributing to productivity.

Discovery and use of herbicides have been rapid indeed, considering the fact that about half of the present commercial herbicides were unknown even 10 years ago. Herbicide production has grown at a rate of 26 percent a year during the last five years compared with 9 percent for all synthetic organic pesticides.

Production of nearly 375 million pounds of herbicides in 1968 accounted for 34 percent of all synthetic organic pesticides produced in the United States (table 3). Sales of herbicides outstripped insecticides for the first time in 1967 and represented nearly 55 percent of all pesticide dollar sales. The gap widened to 57 percent in 1968. A recent USDA survey revealed that in 1966 herbicides were applied one or more times on about 94 million acres. The acreage so treated only 17 years earlier was estimated at 23.3 million acres.

Because herbicide use is such a basic part of modern agriculture, it will undoubtedly increase rapidly in the years ahead. The nonpersistent, highly selective, special-purpose herbicides, such as those in the thiocarbamate family, are playing a leading role in spurring this growth.

The United States exported nearly $66 million worth of herbicides in 1968, 44.5 percent above the previous year (tables 8 and 9). Every export grouping showed an increase except that for technical 2,4-D and 2,4,5-T. Nearly 80 percent of the increase was herbicide formulations. The herbicide share of the pesticide export market in 1968 amounted to 27 percent compared with 23 percent in 1967.

Producer's stocks of 2,4-D and 2,4,5-T were sufficient in 1968 to last through the year according to industry sources. Even though the Government continued to procure 2,4-D and 2,4,5-T in 1968 for use in Vietnam, enough materials remained available for essential civilian use. 2,4-D was more easily available than 2,4,5-T as the Government procured a smaller portion of the total quantity.

ATTACHMENT 4 PAGE 2 OF 2
PESTICIDE REVIEW PAGES
SHOWING SHIPMENTS TO VIETNAM
THROUGH U.S. COMMEERCE

Production of 2,4-D in 1969 was 47 million pounds, down 41 percent from 1968 (tables 2 and 26). For the previous 5 years, however, it increased at an average rate of 12 percent per year. Production of 2,4,5-T in 1969 was little more than one-fourth that in 1968. However, for the previous 5 years, it had increased an average of 15 percent per year.

Table 26.--2,4-D and 2,4,5-T (acid basis): Production, exports, and producers' domestic disappearance, United States, 1959-69

Year	Production		Exports 1/	Domestic disappearance 2/	
	2,4-D	2,4,5-T	2,4-D & 2,4,5-T	2,4-D	2,4,5-T
	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds	1,000 pounds
1959	29,282	5,547	5,760	34,102	5,508
1960	36,185	6,337	8,796	31,131	5,859
1961	43,392	6,909	9,085	31,067	5,444
1962	42,997	8,369	10,192	35,903	8,102
1963	46,312	9,090	14,657	33,199	7,179
1964	53,714	11,434	13,037	43,986	8,912
1965	63,320	11,601	6,924	50,535	7,244
1966	68,182	15,489	5,419	63,903	17,080
1967	77,139	14,552	4,410	66,955 3/	15,381 3/
1968	79,263	17,530	3,391	68,404 3/	15,804 3/
1969	47,077	4,999	7,287	49,526	3,218

1/ Excludes military shipments abroad; these are not considered exports.
2/ Includes military shipments abroad.
3/ Revised.

(Production) Tariff Commission.
(Exports) Bureau of the Census.

Exports of technical grade 2,4-D and 2,4,5-T together picked up sharply beginning about the middle of 1968 following a decline in Government purchases. In 1969 they amounted to 7,287,000 pounds, more than double that for 1968 and more than for any year since 1964. Exports had steadily declined since 1963 at an average annual rate of 24 percent (tables 11 and 26).

The United States imported some 2,4,5-T in 1969, but only about one-seventh that of the previous year. No imports were recorded for 2,4-D (table 9).

ATTACHMENT 5
LETTER FROM DOD IN REPLY TO WHAT HERBICIDES WERE BEING USED IN VIETNAM
ANSWER: NO DIFFERENT THAN WHAT WAS USED ELSEWHERE

EXECUTIVE (3)
ND19/CO312

CONGRESSIONAL ND20-1
CO312

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON 25, D.C.

Refer to I-3553/63
INTERNATIONAL SECURITY AFFAIRS

Robert W.

16 MAR 1963

Dear Mr. Kastenmeier:

Your letter of March 7, 1963 to President Kennedy has been referred to this office for reply.

In the Republic of Vietnam, the use of chemical and biological weapons has not occurred, and the compromise of moral principles has not been at issue. The Government of Vietnam (GVN) has, with US technical and logistic assistance, employed chemical weed-killers to clear foliage along routes of communication, including roads and railroads, and in areas around Vietnamese military bases. The purpose of these operations has been to reduce the susceptibility of the areas to ambush by the Viet Cong communists.

Operations have also been carried out by the GVN to destroy Viet Cong crops. This has been accomplished manually and, in a few cases, by employment of chemical weed-killers. Viet Cong crops and food caches are routinely seized and, if necessary, destroyed by the Vietnamese security forces. There has been no U.S. participation in crop destruction operations, except in providing weed-killers.

No poisons or chemical warfare agents have been employed by the GVN. As you are aware, chemical warfare as defined by international law requires injury to the physical person of the enemy. The chemicals that have been used are weed-killers of the same types (known as 2, 4-D; 2, 4, 5-T; and cacodylic acid) used -- especially by farmers -- in the United States and other countries. They are commercially available in many countries. They are not injurious to man, animals, or the soil. Over 400,000,000 acres of land have been sprayed in the United States with 2, 4-D and 2, 4, 5-T since 1947.

In each case of employment of herbicides by the GVN, extreme precautions were taken to destroy only crops which are established beyond doubt as part of the Communist food supply, and advance provision has been made for any refugees from affected areas. In some cases, the local people have requested that their crops be destroyed in order to prevent their seizure by the Viet Cong.

Denial of food and ambush is a wholly normal procedure in counter-insurgency warfare, as in other forms of warfare. It is proving to be of value in Vietnam as it has in previous anti-Communist campaigns such as that conducted in Malaya.

RECEIVED
MAR 26 1963
CENTRAL FILES

ATTACHMENT 6
PAGE V-III OF DR. ALVIN YOUNG'S 1970 REPORT
STATING THE RAINBOW HERBICIDES
WERE THE SAME AS THE COMMERCIAL HERBICIDES

DEFOLIANT NOMENCLATURE

Military Code	Trade Name	Common Name	Scientific Name
Orange or Purple	Brush Killer	2,4-D, 2,4,5-T	2,4-dichlorophenoxyacetic acid, 2,4,5-trichlorophenoxyacetic acid
Pink	2,4,5-T	2,4,5-T	2,4,5-trichlorophenoxyacetic acid
White	Tordon 101	picloram, 2,4-D	4-amino-3,5,6-trichloropicolinic acid, 2,4-dichlorophenoxyacetic acid
Blue	Phytar 560 G	cacodylic acid, sodium cacodylate	dimethylarsinic acid, sodium salt of dimethylarsinic acid

2,4,5-T WITH UNKNOWN AMOUNTS OF DIOXIN USED AT ALL FACILITIES (FOUND IN DR. ALVIN YOUNG AO COLLECTION)

Item ID Number	00247
Author	
Corporate Author	Federal Supply Service, General Services Administratio
Report/Article Title	Federal Specification: Herbicide, 2,4, 5-Trichlorophenoxyacetic Acid (2,4,5-T) (Salts and Esters), O-H-210a
Journal/Book Title	
Year	1958
Month/Day	September 5
Color	[ ]
Number of Images	7
Description Notes	Found in a file labeled: "Correspondence Concerning the Use of Defoliants in SEA and the Role of Air Force Personnel, Nov 1962 - Oct 1967"; supersedes O-H-00210

O-H-210a
SEPTEMBER 5, 1958
SUPERSEDING
Int. Fed. Spec. O–H–00210 (AGR–ARS)
July 1, 1957

FEDERAL SPECIFICATION

HERBICIDE, 2,4,5—TRICHLOROPHENOXYACETIC ACID (2,4,5-T) (SALTS AND ESTERS)

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. — 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T) is an organic acid relatively insoluble in water or oil. It is normally compounded before being used as an herbicide. 2,4,5-T is a selective herbicide. When applied in the same manner as 2,4-dichlorophenoxyacetic acid (2,4-D) it has similar effects on most plants. As a post-emergence spray it will kill many broad-leaved weeds and woody plants, with little or no injury to many grasses, sedges, and other monocotyledonous plants. As a pre-emergence spray or as a foliage spray on seedlings, 2,4,5-T can also be used to control many annual grasses. However, 2,4,5-T is more effective on many woody plants and will control certain species not effectively controlled by 2,4-D. This specification covers two general types of 2,4,5-T.

1.2 Classification.

1.2.1 *Types.*—Formulations of 2,4,5–T covered by this specification shall be of two general types as specified:

Type I.—Liquid amine salt forms which are usually less effective on plants per pound of 2,4,5-T acid equivalent than the ester forms.

Type II.—Liquid ester forms which are the most toxic forms of 2,4,5-T to plants per pound of 2,4,5-T acid equivalent.

Class 1.—Volatile alkyl esters of 2,4,5-T (see 6.2.3).

Class 2.—Low volatile esters of 2,4,5-T.

2. APPLICABLE SPECIFICATIONS, STANDARDS, AND OTHER PUBLICATIONS

2.1 The following specifications and standards, of the issues in effect on date of invitation for bids, form a part of this specification:

Federal Specifications:

PPP–B–636—Boxes, Fiber.

PPP–C–96 — Cans, Metal 28 Gage and Lighter.

PPP–D–729 — Drums: Metal, 55-Gallon (For Shipment of Noncorrosive Materials).

PPP–D–760—Drums and Pails, Metal (5 and 16.64 Gallon).

Federal Standards:

Fed. Std. No. 102—Preservation, Packaging, and Packing Levels.

Fed. Std. No. 123—Marking for Domestic Shipment (Civilian Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications, Standards, and Handbooks and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a sub-

scription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications, Standards, and Handbooks from established distribution points in their agencies.)

Military Standards:

MIL–STD–105 — Sampling Procedures and Tables for Inspection by Attributes.

MIL–STD–129—Marking for Shipment and Storage.

(Copies of Military Standards referenced above, required by contractors in connection with specific procurement functions, should be obtained from the procuring agency or as directed by the contracting officer.)

2.2 **Other publications.** — The following documents form a part of this specification. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply:

Governmental:

Federal Insecticide, Fungicide, and Rodenticide Act.

(Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. Prices may be obtained from the Superintendent of Documents.)

Nongovernmental:

Association of Official Agricultural Chemists:

Official Methods of Analysis. Eighth Edition. 1955.

(Official Methods of Analysis is published by the Association of Official Agricultural Chemists, P. O. Box 540, Benjamin Franklin Station, Washington 4, D. C.)

3. REQUIREMENTS

3.1 **Type I.**—The liquid amine salt forms of 2,4,5-trichlorophenoxyacetic acid shall contain a minimum of four pounds of 2,4,5-T acid per gallon of formulation at 68° F., as determined in 4.4.1. The amine in this formulation shall be either the alkyl or alkanolamine or mixtures of these types. The product shall be soluble in hard or soft water at the concentrations specified in the directions for use, nonfoaming, disperse easily, making a solution that contains no ingredients which will inhibit the application of the material at the concentrations normally used for weed and woody plant control. The product shall contain no ingredients which will coagulate with water. The material shall contain sequestering agents which facilitate its application in hard or soft water.

3.2 **Type II.** — The liquid ester forms of 2,4,5-trichlorophenoxyacetic acid.

3.2.1 *Class 1, the volatile esters of 2,4,5-trichlorophenoxyacetic acid.*—The alkyl liquid esters of 2,4,5-T shall contain a minimum of four pounds of 2,4,5-T acid per gallon of formulation at 68° F. as determined in 4.4.2. The esters in this class shall belong to the alkyl group such as methyl, ethyl, propyl, isopropyl, butyl, amyl, and pentyl, or mixtures of these alkyl esters. The formulation shall be a clear solution readily miscible with oil and emulsifiable when mixed with water. It shall contain the necessary solvents and emulsifying agents, such that the emulsion formed with water required a minimum of agitation to maintain intimate mixture with the diluent during the mixing and application period. The oil carrier for the formulation shall be of such gravity and viscosity, not detracting from the killing power of the active ingredients, to offer maximum penetration and spread of the spray solution. The combination of solvents and emulsifiers used in the formulation shall not contain more than 0.1 mg. of organic chlorine per gram when analyzed according to 4.4.2. The product shall

remain free of solid material when held at a temperature of 25° F. for a period of 5 days.

3.2.2 *Class 2, the low volatile esters.*—These include the glycol, polyglycol and their ether ester derivatives of 2,4,5-T as well as other heavy molecular weight esters of 2,4,5-T that are known to be low volatile. The low volatile esters of 2,4,5-T shall contain a minimum of four pounds of 2,4,5-T acid per gallon of formulation at 68° F., as determined in 4.4.2. This class shall not include esters of the lower alkyl group such as methyl, ethyl, propyl, isopropyl, butyl, amyl, and pentyl, or mixtures of these alkyl esters. The formulation shall be readily miscible with oil and emulsifiable with water. The product shall be a clear solution, nonfoaming and shall include the necessary solvents, and emulsifying agents, such that the emulsion formed with water requires a minimum of agitation to maintain intimate mixture with the diluent during the mixing and application period. The oil carrier for the formulation shall be of such gravity and viscosity, not detracting from the killing power of the active ingredients, to offer maximum penetration and spread of the spray solution. When tested for volatility as described in 4.4.3 the product shall have an average response of less than 4.0. The combination of solvents and emulsifiers used in the formulation shall not contain more than 0.1 mg. of organic chlorine per gram when analyzed according to 4.4.2. The product shall remain free of solid material when held at a temperature of 25° F. for a period of 5 days.

3.4 **Workmanship.**—The finished products shall be clean and uniform, and free from any defects which might impair their utility.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Sampling for lot acceptance.

4.1.1 *Inspection lot.*—For purposes of sampling, a lot shall consist of all material offered for inspection at one time. In case material is produced by a continuous-run process the lot shall contain material from only one continuous run. Material in the inspection lot shall be identified by order of production (in case of a continuous-run process) or by batch number (in case of batch process) until ultimate action is taken by the Government inspector as to the acceptance or rejection of the lot.

4.1.2 *Sampling for inspection of filled containers.*—A random sample of filled containers shall be taken from each lot by the inspector in accordance with MIL–STD–105 at inspection level I, and acceptable quality level (A.Q.L.) = 2.5 percent defective to verify compliance with all stipulations of this specification regarding fill, closure, marking, and other requirements not involving tests.

4.1.3 *Sampling for tests.*—From each inspection lot the inspector shall take three separate 1-pound acid equivalent or 1-pint samples. In case the material is produced by a batch process, and the inspection lot contains more than 2 batches, the three samples shall normally be taken from different batches, from time to time; however, at the discretion of the inspector, two or three of the samples shall be taken from the same batch, in which case the samples shall be obtained in a manner calculated to disclose any nonuniformity of the material within the batch. Where material is produced by a continuous-run process the three samples shall be taken so as to represent respectively, the first part, the middle part, and the last part of the run which produced the inspection lot. Each sample shall be thoroughly mixed and divided into three equal portions. The portions shall be placed in separate, clean, dry, metal or glass containers, which shall be sealed and carefully marked. One of the portions of each sample shall be forwarded to a Government Laboratory designated by the bureau or agency concerned, one shall be delivered to the contractor, and one shall be held by the Government Inspector to be used for retests in case of dispute.

4.2 **Inspection.**

4.2.1 *Inspection of filled containers.*—Each sample filled container selected in accordance with 4.1.2 shall be examined by the inspector for defects of the container and the closure, for evidence of leakage, and for unsatisfactory markings. Each sample filled container shall also be weighed to determine the amount of the contents. Any container in the sample having one or more defects, or under required fill, shall be rejected, and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan of MIL–STD–105 the lot represented by the sample shall be rejected. Rejected lots may be resubmitted for acceptance tests provided that the contractor has removed or repaired all nonconforming containers.

4.3 **Lot acceptance tests.** — The sample specimens selected in accordance with 4.1.3 shall be subjected separately to the tests specified in 4.4. If either specimen fails in one or more of the tests the lot shall be rejected. Rejected lots may be resubmitted for acceptance tests provided the contractor has removed or repaired all nonconforming products.

4.4 **Test procedures.**

4.4.1 *2,4,5-Trichlorophenoxyacetic acid content in amine salts of 2,4,5-trichlorophenoxyacetic acid.* — Transfer a sample equivalent (or a suitable aliquot of a sample diluted with water) to about 1 g. of 2,4,5-T acid to a 250-ml. separatory funnel. Neutralize if necessary with 10 percent H_2SO_4, and add 10 ml. in excess. Extract the aqueous phase twice with 75-ml. portions of ether. Wash the combined ether extracts free from mineral acid with 3 portions of water exactly 10 ml. each. Avoid slight emulsification by excessive shaking. Filter the ether solution through a funnel containing a small piece of cotton previously saturated with ether into a 400-ml. beaker, rinsing the separatory funnel with ether. Add 25 ml. of water, a few boiling chips, and evaporate off the ether layer on a steam bath until approximately 25 ml. of ether remains. Remove the beaker from the steam bath and evaporate off the remaining portion of ether at room temperature by means of a current of air. Dissolve the aqueous mixture in 100 ml. of neutral ethyl alcohol and titrate with 0.1 *N* NaOH using 1 ml. of indicators* (1 g. in 100 ml. of alcohol).

*Either phenolphthalein or thymolphthalein may be used in the titration provided the one selected is used in the standardization of the sodium hydroxide.

Each ml. of 0.1 *N* NaOH is equivalent to *0.02555* g. of 2,4,5-trichlorophenoxyacetic acid. Calculate the percent 2,4,5-T acid found to the specific amine present in the sample. Ref: Methods of analysis, A.O.A.C., 8th Ed., par. 5.133(c), page 75.

4.4.2 *Esters of 2,4,5-trichlorophenoxyacetic acid by determination of total chlorine.* — Weigh and mix 1.5 g. of boric anhydride (Eastman Kodak Co., Cat. #2685 or equivalent), 1.0 g. finely powdered potassium nitrate, and 0.4 g. finely powdered sucrose. Transfer approximately one-fourth of this mixture to a 42-ml. Parr bomb, electric ignition type, and add from a small weighing buret about 0.25–0.30 g. of sample containing from 0.030–0.035 g. chlorine. (When a sample larger than 0.30 g. is required, 2.5 g. of boric anhydride should be used. In no cases should a sample larger than 0.6 g. be taken.) Mix well with a thin stirring rod. Add the remainder of the boric anhydride, potassium nitrate and sucrose mixture in small portions and thoroughly mix after each addition. Measure 15 g. of calorimetric grade sodium peroxide in a standard measuring dipper, add a small portion to the contents of the bomb, and stir. Add the balance of sodium peroxide and thoroughly mix by stirring with the rod. Withdraw the rod and brush free of adhering particles. Quickly cut or break off the lower 1½ inches of the stirring rod and imbed it in the fusion mixture. Sprinkle on the top of the fusion mixture a small quantity of finely ground sucrose. Prepare the head by heating

the fuse wire momentarily in a flame and immersing it into a small quantity of sucrose. One milligram of the substance is sufficient to start the combustion. Assemble the bomb and ignite in the usual manner with a satisfactory shield between the operator and apparatus.

Place about 100 ml. of distilled water in a 600-ml. beaker and heat nearly to boiling. After cooling of the bomb, dismantle it and dip the cover in the hot water to dissolve any of the fusion which may be adhering to its under side. Wash cover with a fine jet of distilled water catching the washings in the beaker. With a pair of tongs lay the fusion cup on its side in the same beaker of hot water, covering it immediately with a watch glass. After the fused material has been dissolved, remove the cup and rinse with hot water, cool the solution, add several drops of phenolphthalein indicator, neutralize with concentrated nitric acid and add 5 ml. in excess. From this point, the chlorine may be determined by electrometric titration or by the Volhard procedure as directed in the Methods Of Analysis A.O.A.C., 8th. Ed., page 80, par. 5.153 (a) (c).

Note 1.—The combination of materials used in a sodium peroxide bomb has explosive properties if wrongly handled, and the operator should remain fully aware at all times of the precautions that must be observed and the steps which must be taken to avoid damage to the apparatus and possibly personal injury. It is suggested that the instructions and precautions given in the "Parr Manual Number 121—Peroxide Bomb Apparatus and Methods," Parr Instrument Company, Moline, Illinois, be observed.

Note 2.—A flame fired bomb may be used in place of the electric ignition type, but in case of dispute the electric ignition type will govern.

4.4.3 *Volatility test (Relative Vapor Activity).*—The vapor activity test is conducted with gastight polyethylene cases approximately 4 x 4 x 18 inches in size. Young rapidly growing Pinto bean plants about 4 inches in height are used as test plants. A single bean plant growing in a 3-inch pot is placed in each polyethylene case just prior to testing the ester.

4.4.3.1 Two milligrams of acid equivalent as the ester is dissolved in 10 milliliters of 95 percent ethyl alcohol and a Whatman No. 1 filter paper (9 cm. diameter) is thoroughly moistened by dipping in the solution. (Do not reuse the container used in this impregnation.) The alcohol is then allowed to evaporate and the filter paper impregnated with the ester is inserted into the polyethylene case containing the bean and fastened to the inside of the case 6 inches above the leaves of the test plant. The open end of the polyethylene case is then sealed.

4.4.3.2 The case containing the test plant and treated filter paper is then placed in a dark room for a period of 24 hours. The temperature range of the room should be 80° F. Control plants are also sealed in separate cases. The experimental design is a randomized block with three replications and each test is repeated three times. The evaluation shall be made following an exposure period of 24 hours.

4.4.3.3 Observation of the effect of the vapors on test plants should take into consideration whether or not the plant is slightly, moderately or severely injured, including such symptoms as degree of stem curvature, terminal bud inhibition and degree of leaf curl. The relative vapor activity of an ester can be numerically designated as follows: 0 — no visible effects; 1,2,3—slight injury—plants usually recovered with little or no reduction in growth, slight epinasty present, stem curvature slight; 4, 5, 6 — moderate injury — plant usually recovered, moderate epinasty, moderate terminal bud inhibition and moderate stem curvature present; 7,8,9—severe injury—plant usually does not recover, pronounced epinasty, together with pronounced stem curvature; 10—plant killed.

4.4.3.4 Chemically pure 2,4,5-T acid and the butyl ester of 2,4,5-T are used as standards. The 2,4,5-T acid under most conditions is rated 0 while the butyl ester has a high vapor

activity with a rating of 9.0. Esters receiving the following ratings would be classed as follows:

0	no vapor activity
1,2,3	very low vapor activity
4,5,6	low to moderate vapor activity
7,8,9	high vapor activity
10	very high vapor activity

Esters must receive a vapor activity rating of less than 4 to be designated low volatile.

5. PREPARATION FOR DELIVERY

For civil agencies, the definitions and applications of the levels of packaging and packing shall be in accordance with Federal Standard No. 102.

5.1 Packaging.

5.1.1 *Level A.*—When specified in the contract or order to be packaged in cans, the material shall be packaged in 1-gallon containers conforming to type V, class 4, oblong, of Federal Specification PPP–C–96. Containers shall not affect or be affected by the material contained.

5.1.2 *Level B.*—When specified in the contract or order to be packaged in cans, the material shall be packaged as specified in 5.1.1.

5.2 Packing.

5.2.1 *Level A.*

5.2.1.1 *Packaged material.*—When the material is required to be packaged in cans, six cans of material shall be packed in a snug-fitting container conforming to Federal Specification PPP–B–636.

5.2.1.2 *Bulk material.*—When specified in the contract or order to be packed in drums, the material shall be packed in 5-gallon or 55-gallon drums, as specified. Five-gallon drums shall conform to type I, class 1 of Federal Specification PPP–D–760, fifty-five-gallon drums shall conform to type II of Federal Specification PPP–D–729. Containers shall not affect nor be affected by the material contained.

5.2.2 *Level B.*—Material shall be packed as specified in 5.2.1.

5.2.3 *Level C.*—The product shall be packed in containers which are acceptable by common or other carriers for safe transportation to point of destination specified in shipping instructions at the lowest transportation rate for such supplies.

5.3 Marking.

5.3.1 *Civil agencies.*—In addition to any special marking required by the contract or order, marking for shipment shall be in accordance with Federal Standard No. 123.

5.3.1.1 *Labeling.*—Unless otherwise specified, each container of 2,4,5-T formulation shall be labeled with instructions for use and marked in compliance with The Federal Insecticide, Fungicide, and Rodenticide Act and other applicable existing Federal laws. Date of pack and lot number shall appear on the label. In addition, the cover shall have the stock number and item nomenclature shall be embossed on a metal plate and wired securely to the individual container.

5.3.2 *Military.*—In addition to the marking specified in 5.3.1.1, and any special marking required in the contract or order, all containers shall be marked in accordance with Military Standard MIL–STD–129.

6. NOTES

6.1 Net content. — Statements of liquid measure shall be in terms of the United States gallon at 68° F.

6.2 Intended use.

6.2.1 *Type I.*—The liquid amine forms of 2,4,5-T are highly soluble in water, making a

relatively clear solution. They are quite stable and are effective for easy-to-kill or moderately easy-to-kill weeds and woody plants. The amine salts of 2,4,5-T are much less volatile than the ester forms of 2,4,5-T and are somewhat better adapted for spraying for weed control near plants sensitive to 2,4,5-T. However, the amine salts of 2,4,5-T are usually less effective on old, semiresistant weeds and woody species than the esters of 2,4,5-T per pound of acid equivalent.

6.2.2 *Type II.*—The liquid ester forms of 2,4,5-trichlorophenoxyacetic acid.

6.2.3 *Class 1.*—Not authorized for Air Force use. The lower alkyl esters of 2,4,5-trichlorophenoxyacetic acid are comparatively volatile. When the lower alkyl esters of 2,4,5-T are used for weed and woody plant control they may be used at lower acid equivalent rates than the amine salts of 2,4,5-T. The lower alkyl esters of 2,4,5-T are better adapted for the control of harder-to-kill weeds and older semiresistant weed and woody species than the amine salts of 2,4,5-T. The lower alkyl esters of 2,4,5-T should not be used in areas near sensitive crops such as cotton, grapes, tomatoes, tobacco, and other sensitive crops.

6.2.4 *Class 2.*—The low volatile esters of 2,4,5-T have the same intended use as the ester forms specified in class 1. However, in areas where sensitive crops are grown such as cotton, etc., if an ester form of 2,4,5-T is necessary, the esters specified in class 2 should be used to reduce the hazard of volatility.

6.3 Ordering data.—Purchasers should exercise any desired options offered herein (see 1.2, 5.1, 5.2, 5.3) (also see 6.4 for basis of award).

6.4 Basis of award.

6.4.1 *Type I and type II (classes 1 and 2).*—Bids should be evaluated and the award made primarily on the basis of computing the price per pound of 2,4,5-T acid equivalent contained in each gallon of preparation or concentrate (supplier should be requested to furnish 2,4,5-T acid equivalent data).

MILITARY INTERESTS:
Army—Q C M E
Navy—Y
Air Force.

★ U. S. GOVERNMENT PRINTING OFFICE: 1958

ATTACHMENT 8

PAGE 1 OF 2 PAGES
DEFOLIATION IN THE CANAL ZONE STATE DEPARTMENT DEPICTION 1952

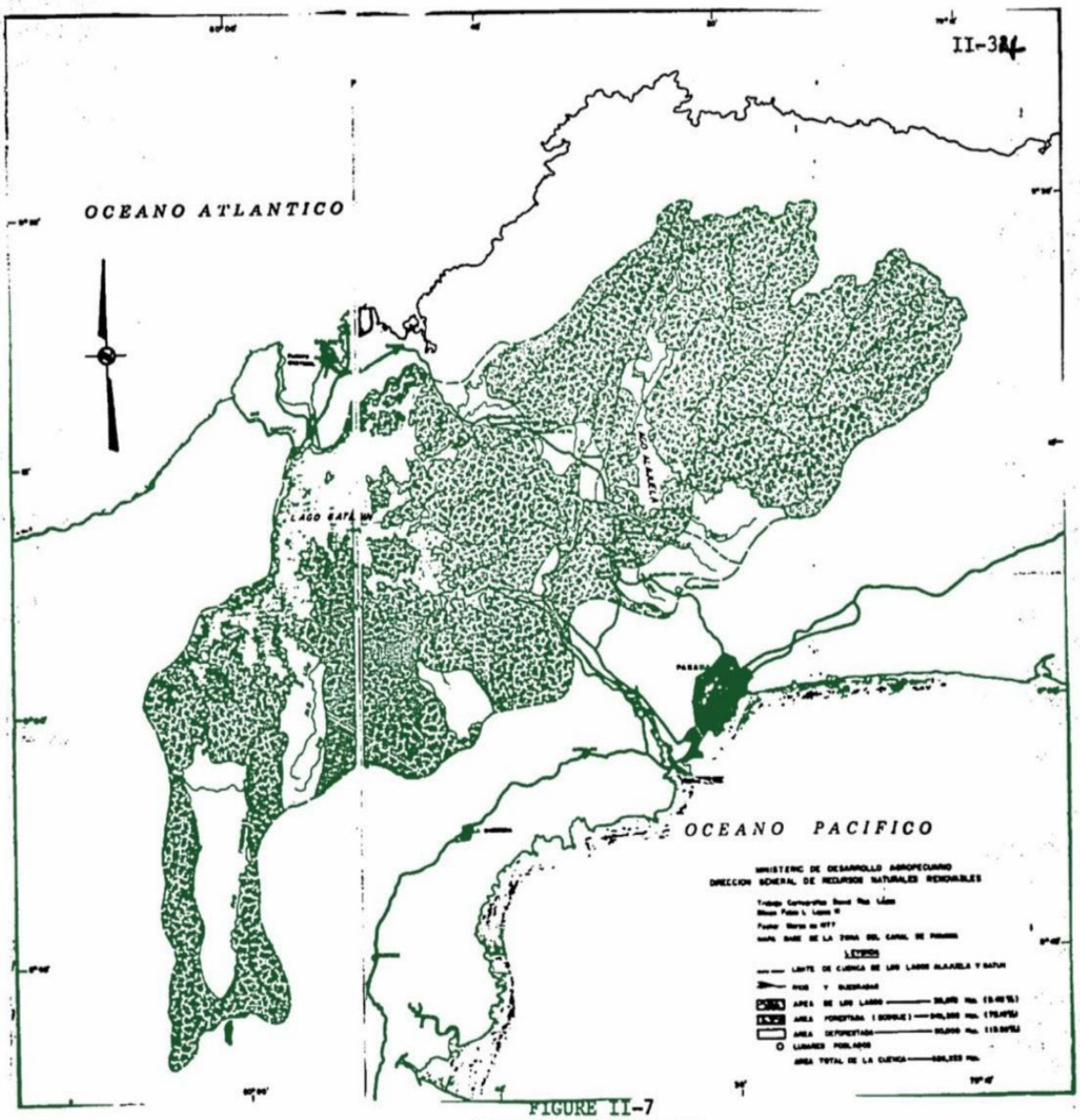


FIGURE II-7
DEFORESTATION IN THE
CANAL WATERSHED, 1952.

ATTACHMENT 8
PAGE 2 OF 2 PAGES
DEFOLIATION IN THE CANAL ZONE
STATE DEPARTMENT DEPICTION 1976

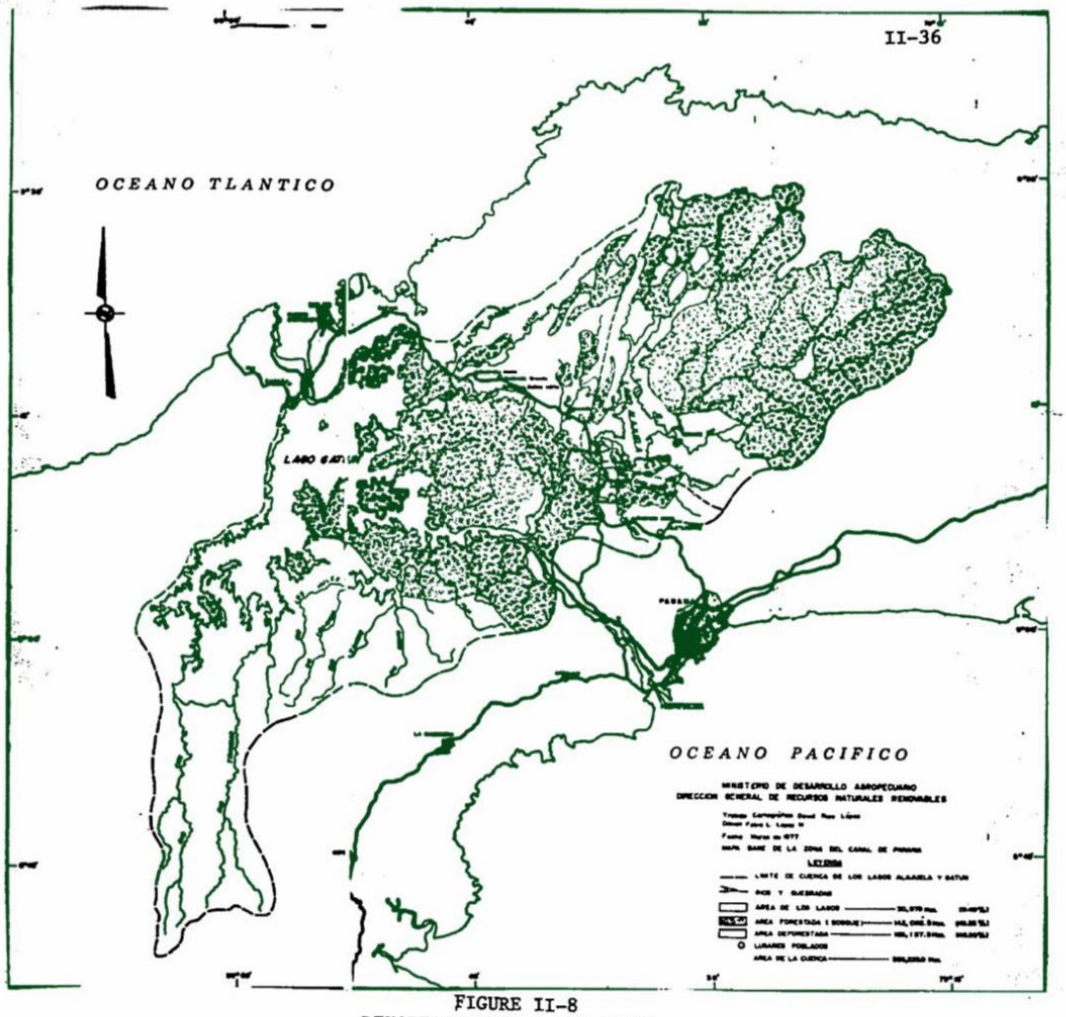


FIGURE II-8
DEFORESTATION IN THE CANAL
WATERSHED, 1976

PAGE 2 OF 2 PAGES
DEFOLIATION IN THE CANAL ZONE
STATE DEPARTMENT DEPICTION 1976

ATTACHMENT 9 PAGE 1 OF 4 PAGES

1980 HEARING WHERE ALVIN YOUNG CLAIMS DIDN'T KNOW DIOXIN EXISTED UNTIL 1969

HOW COULD THE VA, DOD AND ALVIN YOUNG CLAIM THERE WAS MORE DIOXIN IN THE SO-CALLED TATICAL HERBICIDE IF THEY DIDN'T KNOW DIOXN EXISTED IN 1961?

ALVIN YOUNG ALSO TESTIFIES IT WAS COMMERCIALLY MADE WITH AN ORANGE STRIPE

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Scientific community report on agent orange : hearing before the Subcommittee on Medical Facilities and Benefits of the Committee on Veterans' Affairs, House of Representatives, Ninety-sixth Congress, second session, September 16, 1980

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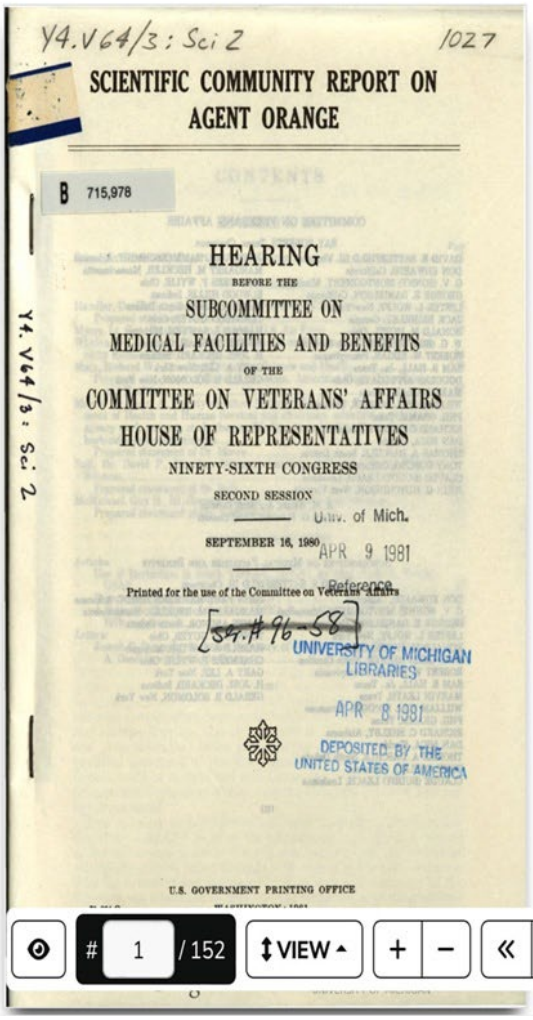


tural science and his master of science degree in crop physiology. His first assignment with the U.S. Air Force in 1968 was as a project scientist assigned to investigate the ecological impact of repetitive applications of phenoxy herbicides. I think it would be helpful to the committee, Mr. Chairman, if we asked Major Young to give a briefing on the use of herbicide orange and then I will follow with a status report on the Ranch Hand study.

Major YOUNG. Thank you, Mr. Chairman. I have some slides I would like to show you. I need to turn the lights off, however, to do this. I am sorry for the inconvenience.

There has been a lot of discussion of how herbicides were used in Vietnam. I have been asked to give you an overview of that use. So what I would like to do by the use of slides is take you back in time to Vietnam and show you the use of herbicides.

There are exceptions to everything, as you well know. I am going to try to give you the general picture as we experienced it and as we have written in many military reports.

As you are all aware, the phenoxy herbicides were developed in the early 1940 time period and extensively used in the fifties and early sixties within the United States. We developed the use of herbicides as a technology for removing vegetation. This slide shows a prime example of the use of herbicides. Here is a brush infected right-of-way in the United States. This is the same right-of-way 1 year after a 2-pound-per-acre application of 2,4-D and 2,4,5-T. It was the proposed use of this technology that was brought

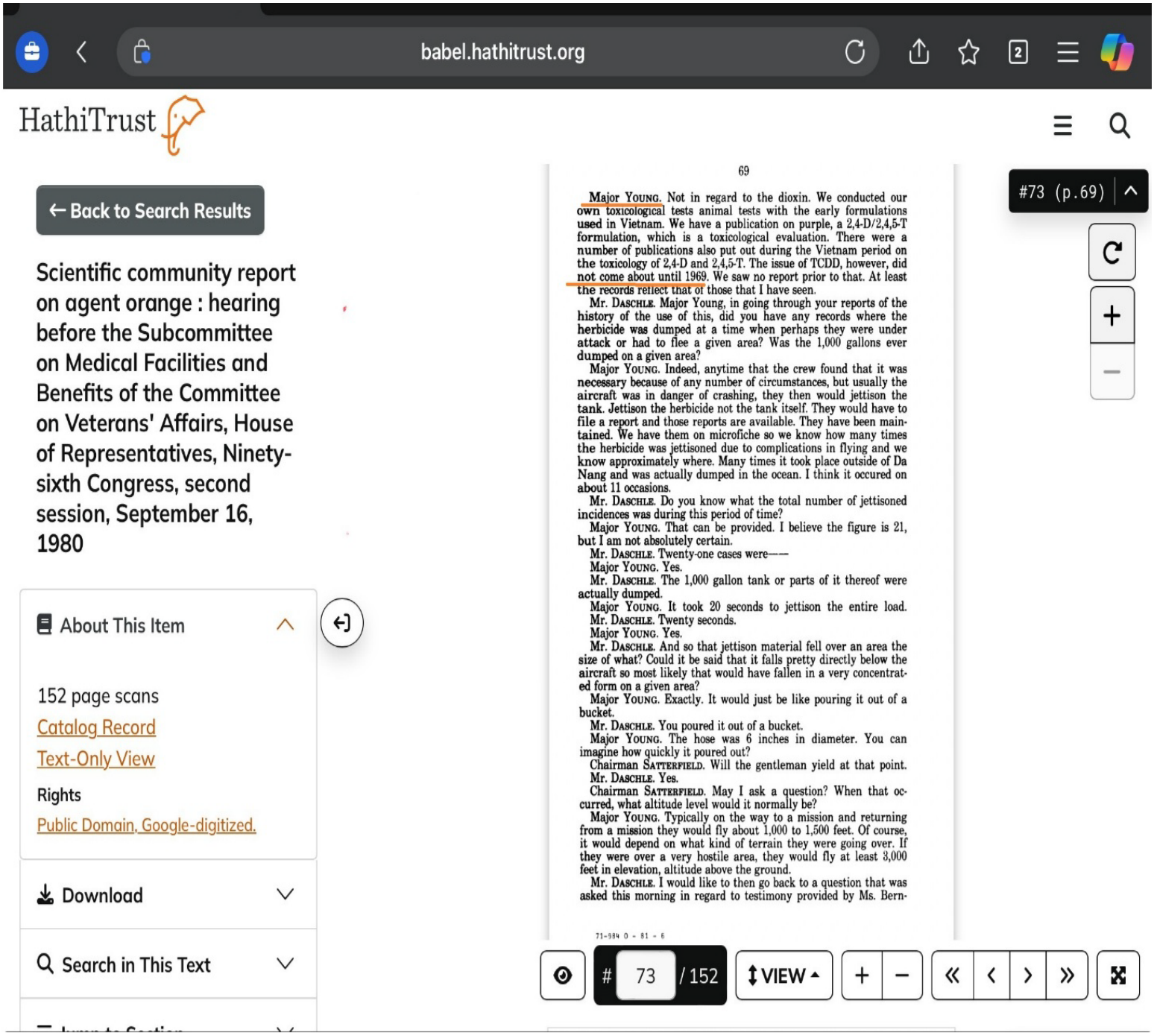
It was this idea, that we could control vegetation by the use of chemicals, that prompted us to take chemicals to Vietnam, especially the defoliants, the phenoxy herbicides.

The program began January 9, 1962. It was approved by President Kennedy, and I would just point out that many Presidents after that continued to approve its use up until 1970. The project consisted of sending 55-gallon drums of herbicides to Vietnam. These were variously painted with stripes for the simple reason of keeping our personnel informed of what herbicide they contained. It was good to have a code ring around them. If you mixed orange with white, for example, a percipitant was developed and this could cause severe problems in terms of handling, in terms of logistics, since it clogged the aircraft spray nozzles. So it was important that we have a color code. Although these materials were formulated commercially in the United States, we color coded them only for our convenience in Vietnam.

The chemical arrived in 55-gallon containers, was put on flat bed trucks and transported to the units that were responsible for spraying. Here is a slide of a pumping operation transferring the herbicide to what we call the F-6 trailer. Please note the ground around these F-6 trailers you will see a great deal of indication of herbicide spill.

This is another slide. The herbicide could not all be placed into the F-6 trailer. That which remained was simply stacked in rows. The drums that were pumped into the F-6 trailer were then drained. There was always a little bit of residue left in them. They were drained and that drained material was frequently used by our personnel to control the vegetation around the base perimeter camps. Most of the residual orange that would have been used in the base perimeter operations would have been for those perim-

ATTACHMENT 9 PAGE 4 OF 4 PAGES WHERE ALVIN STATES DIOXIN WAS NOT KNOWN UNTIL ABOUT 1969



ATTACHMENT 10
PAGE 1 OF 2 PAGES
SMITHSONIAN REPORT STATING
AGENT ORANGE WAS USED IN THE PANAMA CANAL ZONE
#3 - The San Lorenzo protected area : Panama's Caribbean treasure ... - Full View | HathiTrust Digital Library

United States
Department of
Agriculture

Forest Service

International Institute
of Tropical Forestry

General Technical
Report IITF-23

The San Lorenzo Protected Area:

Panama's Caribbean Treasure

Peter L. Weaver, Gerald P. Bauer, and Belkys Jiménez

Slide 23. Army jungle training

Starting in 1943, Fort Sherman was used as a training site for the Pacific Theater because of its rugged terrain, notably the Piña Range. In 1953, the U.S. Army designated Fort Sherman as the Jungle Warfare Training Center, later called the Jungle Operations Training Center. The first trainees were from Panama, but training for outside units was initiated in 1957. The Center normally ran 10 training cycles of 3 weeks duration each year. Training during the Vietnam War increased from 1,700 trainees in 1961 to 9,145 in 1967. A normal training cycle involved individual soldier, small unit, and company skills. Soldier skills included jungle survival, camouflage, navigation, mines and booby traps, and information about jungle plants. Small unit training involved patrol, attack, and ambush tactics. Once the small unit was proficient in jungle operations, field training moved to company, and occasionally to battalion level exercises. In the mid-1970s, Fort Sherman was designated as the training area for the U.S. Army School of the Americas Jungle Operations Training Center based at Fort Gulick in Panama. Training programs involved instruction on battalion level techniques of jungle survival and operations for units from the continental United States.

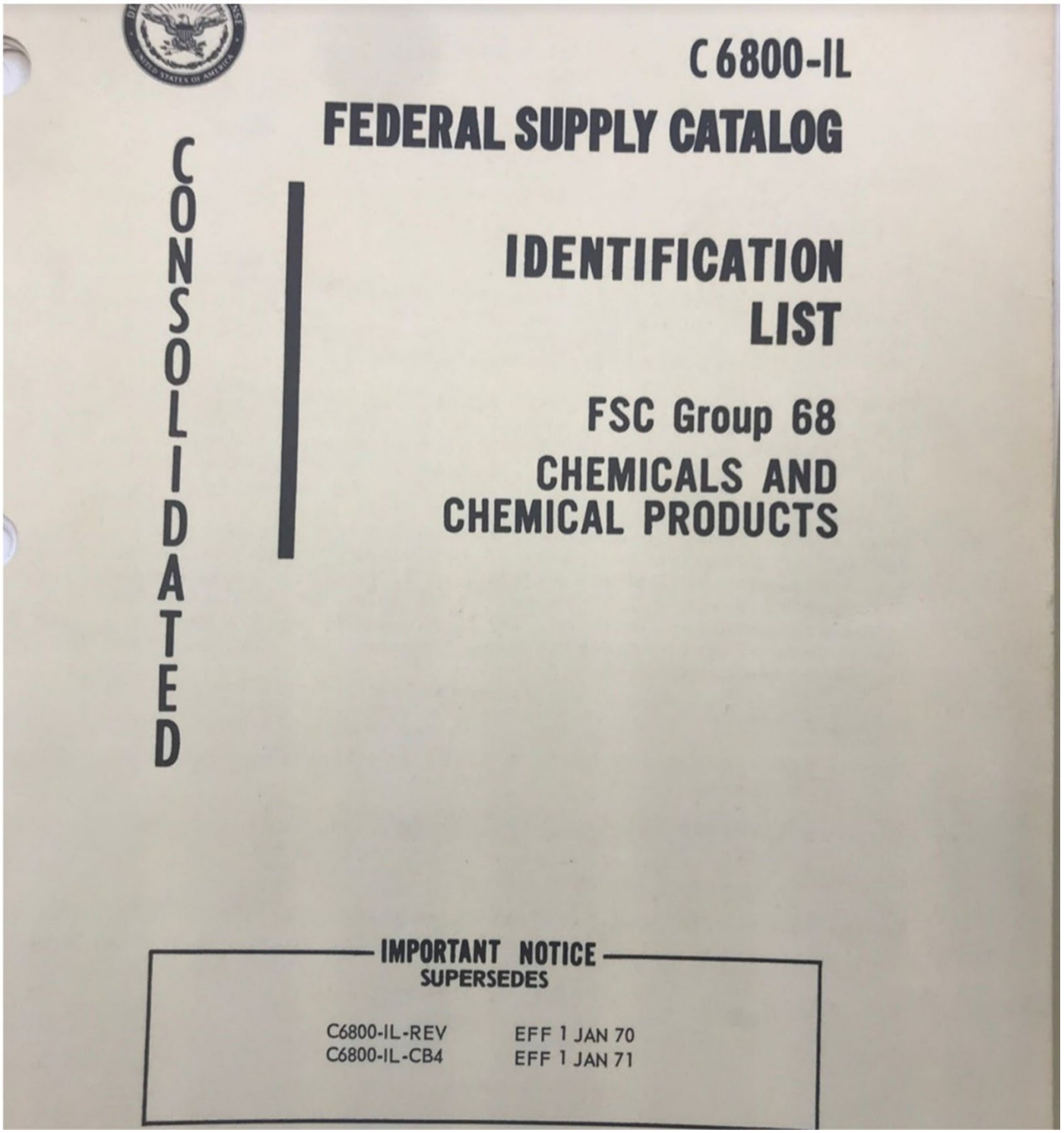
(slide: U.S. Army)

Slide 24. Firing ranges: unexploded ordnance

Since World War I, the Piña range has been used by U.S. and Panamanian forces for live fire training and munitions testing. Because not all munitions explode on impact, the Piña range contains unexploded ordnance (UXO), which over the past three-quarters of a century, have claimed several lives. The U.S. Defense Department argues that it is impossible to completely clear the range because of the steep hills and dense jungle foliage. Both the presence of UXOs and the legacy of chemical weapons testing (mustard gas, phosgene, sarin nerve gas, and Agent Orange herbicide) are safety concerns for the area. United States laws and policies govern the closure of domestic military bases (the National Environmental Policy Act (NEPA), and the Comprehensive Environmental Response Cleanup and Liability Act (CERCLA)). U.S. Department of Defense policy also calls for detailed investigations of environmental conditions for domestic bases slated for closure. It has been suggested that, legally and morally, these laws should apply to the closure of bases in Panama. Presently, the Piña range remains officially under separate management from the SLPA, although the forests are contiguous. The range is off limits to visitors.

(slide: Gerald P. Bauer)

ATTACHMENT 11
PAGE 1 OF 2
FEDERAL CATALOG SHOWING HERBICIDE ORANGE AVAILABLE TO ALL FACILITIES UP UNTIL 1970 WHEN THEY WERE JUST FINDING OUT TOXIC



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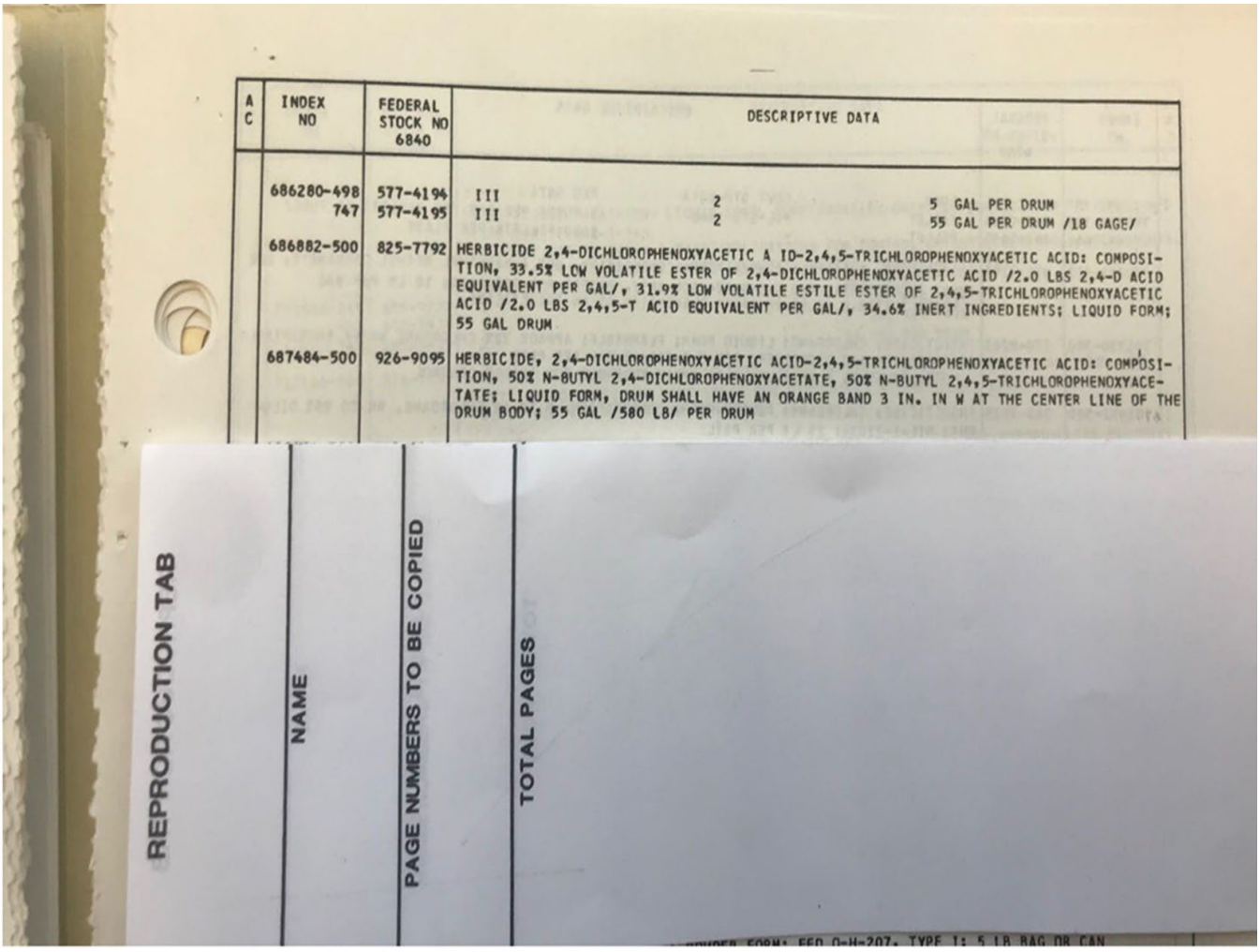

A C	INDEX NO	FEDERAL STOCK NO 6840	DESCRIPTIVE DATA
	686280-498	577-4194	III 2 5 GAL PER DRUM
	747	577-4195	III 2 55 GAL PER DRUM /18 GAGE/
	686882-500	825-7792	HERBICIDE 2,4-DICHLOROPHENOXYACETIC A ID-2,4,5-TRICHLOROPHENOXYACETIC ACID: COMPOSITION, 33.5% LOW VOLATILE ESTER OF 2,4-DICHLOROPHENOXYACETIC ACID /2.0 LBS 2,4-D ACID EQUIVALENT PER GAL/, 31.9% LOW VOLATILE ESTILE ESTER OF 2,4,5-TRICHLOROPHENOXYACETIC ACID /2.0 LBS 2,4,5-T ACID EQUIVALENT PER GAL/, 34.6% INERT INGREDIENTS; LIQUID FORM; 55 GAL DRUM
	687484-500	926-9095	HERBICIDE, 2,4-DICHLOROPHENOXYACETIC ACID-2,4,5-TRICHLOROPHENOXYACETIC ACID: COMPOSITION, 50% N-BUTYL 2,4-DICHLOROPHENOXYACETATE, 50% N-BUTYL 2,4,5-TRICHLOROPHENOXYACETATE; LIQUID FORM, DRUM SHALL HAVE AN ORANGE BAND 3 IN. IN W AT THE CENTER LINE OF THE DRUM BODY; 55 GAL /580 LB/ PER DRUM

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FOUND IN ALVIN YOUNG'S AGENT ORANGE COLLECTION
SHOWING ALL RAINBOWS WERE AVAILABLE COMMERCIALLY

9

Dept. of Army. 12 71.

Military FM 3-3
Herbicides

FIELD MANUAL

TACTICAL EMPLOYMENT OF HERBICIDES

HEADQUARTERS, DEPARTMENT OF THE ARMY
DECEMBER 1971
FOR TRAINING DEPARTMENT USE