Gagetown Harmful Chemical Study Commission

Established by Public Law 2025, Chapter 763

Materials from Public

At its onset, the Gagetown Harmful Chemical Study Commission ("Commission") aimed to continue to elevate the experiences of the members of the United States Armed Forces, as a member of the reserve component of the United States Armed Forces or as a member of the National Guard of any state who trained at Base Gagetown and who are experiencing illness(es) associated with tactical herbicide exposure.

At its second meeting on October 2, 2026, the Commission invited public comments and submission of any relevant materials (written comments, articles, images, etc.).

The following information was provided by members of the public to the Commission. Please note that submissions have not been reviewed for accuracy and are being made available only for informational purposes. *No materials herein are a statement of the Commission.*

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58128 - Disability First Application Received as of 2025-09-29

Condition Count	Chloracne	Non-Hodgkin's Lymphoma	Carcinoma of the Lung	Respiratory cancers, including cancers of the lung, larnyx, trachea and bronchus	Non-Hodgkin Lymphoma	Soft tissue sarcoma	CA Prostate	Prostate Cancer	Multiple Myeloma	Leukemias	Chronic Lymphocytic Leukemia (CLL)	Type 2 Diabetes	Leukaemia	Parkinson's Syndrome / Disease	Acute or subacute transient peripheral neuropathy	Ischemic Heart Disease	Total
2003/2004		1	20				3			4			1	6		8	**43**
2004/2005		19	135				215		7	21				26		28	**451**
2005/2006	1	66	201				315		20	62	1			28		54	**748**
2006/2007	1	22	171	2	1		169	2	13	26		8		23	1	35	**474**
2007/2008	4	30	133	42		2	111	71	12	22	4	21		20	12	44	**528**
2008/2009	3	29	108	29		2	52	71	5	20	11	24		17	8	45	**424**
2009/2010		21	118	12		3	44	67	13	10	3	31		16	2	54	**394**
2010/2011	9	21	113	12			34	63	7	13	5	44		32	4	38	**395**
2011/2012	7	15	129	5		4	46	46	4	13	5	50		19	10	35	**388**
2012/2013	5	13	80	2		1	20	41	6	10	3	42		14	5	21	**263**
2013/2014	5	18	84	2			19	32	14	15	9	40		20	4	34	**296**
2014/2015	2	9	73	1			21	24	3	8	4	20		19	4	24	**212**
2015/2016	3	12	81	2		2	45	27	9	9	2	36		22	3	20	**273**
2016/2017	14	21	43	4		1	36	18	9	6	2	37		15	2	26	**234**
2017/2018	106	15	58	8		1	27	25	10	9	1	25		26	6	27	**344**
2018/2019	68	16	63	9			24	17	5	12	2	34		28	4	22	**304**
2019/2020	11	15	70	6		1	14	27	6	12	6	29		22	1	21	**241**
2020/2021	7	20	49	3		5	18	23	10	14	3	25		30	1	20	**228**
2021/2022	6	21	68	12		3	4	56	19	21	7	65		37	6	35	**360**
2022/2023	2	26	64	20		8	10	60	21	23	11	130	1	38	3	23	**440**
2023/2024	3	40	57	23		4	16	62	27	16	4	163		51	3	15	**484**
2024/2025	3	30	60	20		3	24	82	15	14	10	209		53	5	19	**547**
2025/2026	1	10	20	12			3	35	8	5	1	72		33		10	**210**
Total	**261**	**490**	**1,998**	**226**	**1**	**40**	**1,270**	**849**	**243**	**365**	**94**	**1,105**	**2**	**595**	**84**	**658**	**8,281**

Reporting and Analysis Unit - Centralized Operations Division

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58128 - Disability First Application Denied Decisions as of 2025-09-29

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2003/2004			7		1								1	2		1	**12**
2004/2005		9	25		1		22		1	7			1	16		23	**105**
2005/2006		31	54				96		13	26				22		38	**280**
2006/2007		37	84		1		136		14	35				20		42	**369**
2007/2008	3	25	40	11			50	6	8	16	1	16		14	3	21	**214**
2008/2009	4	26	33	22			31	42	6	14	7	19		18	8	22	**252**
2009/2010		20	46	2		3	19	40	8	11	6	25		16	2	22	**220**
2010/2011	6	19	34	6		1	14	32	9	12	5	27		25	2	32	**224**
2011/2012	4	12	51	3		4	20	34	3	8	3	47		17	4	22	**232**
2012/2013	5	8	41	1			17	17	3	3	4	33		13	4	13	**162**
2013/2014	2	15	32	2			10	10	11	16	4	34		13		16	**165**
2014/2015	3	5	16				9	8	2	1	2	17		14	1	11	**89**
2015/2016	1	6	40			2	24	15	4	6	3	30		20	3	14	**168**
2016/2017	1	11	26	1		1	28	9	3	4	2	16		13	1	6	**122**
2017/2018	5	8	17	2			18	12	8	3	1	18		10	1	20	**123**
2018/2019	7	9	13	1		1	17	10	4	5		20		14	3	12	**116**
2019/2020	14	3	19	3			11	13	2	2		13		16		10	**106**
2020/2021	6	8	46	6		3	19	22	4	10	1	11		19	2	11	**168**
2021/2022	3	8	25	5			3	20	4	8		36		28	2	18	**160**
2022/2023	2	6	25	1		3	7	24	6	5	4	62	1	28		15	**189**
2023/2024		7	12	4		5	7	30	8	4	6	88		26	2	12	**211**
2024/2025	3	15	26	6		1	16	57	4	15	5	85		42		7	**282**
2025/2026		5	9	1			4	22	2	6		59		15		9	**132**
Total	**69**	**293**	**721**	**77**	**3**	**24**	**578**	**423**	**127**	**217**	**54**	**656**	**3**	**421**	**38**	**397**	**4,101**

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58128 - Disability First Application Decisions as of 2025-09-29

Conditions Filtered in Report

Medical Code	Condition	Medical Key
219	Soft tissue sarcoma	219-5
406	Hodgkin`s Disease	406-1
23800	Multiple Myeloma	23800-1
219	Non-Hodgkin Lymphoma	219-2
311	Type 2 Diabetes	311-2
1205	Chloracne	1205-3
203	Carcinoma of the Lung	203-1
20280	Non-Hodgkin's Lymphoma	20280-1
23340	CA Prostate	23340-1
203	Respiratory cancers, including cancers of the lung, larnyx, trachea and bronchus	203-2
23340	Prostate Cancer	23340-2
27020	Chronic Lymphocytic Leukemia (CLL)	27020-2
617	Parkinson's Syndrome / Disease	617-1
662	Acute or subacute transient peripheral neuropathy	662-13
708	Ischemic Heart Disease	708-6
27020	Leukemias	27020-1
405	Leukaemia	405-1

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58128 - Disability First Application Received for New Brunswick Clients as of 2025-09-29

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2004/2005			3			7								1	**11**
2005/2006		13	34			60		7	10	1		3		15	**143**
2006/2007		3	17			18		2	4		1	2		6	**53**
2007/2008	2	1	14	1		7	11	2	1	1	6	2		6	**54**
2008/2009		1	9	2		2	6	2			2	2		6	**32**
2009/2010		1	5			1	9	2			1			4	**23**
2010/2011		3	4	1		1	12				8	2	2	6	**39**
2011/2012	3	1	11	1		2	3		2		10	2	1	5	**41**
2012/2013		2	7	2	1	2	6	1	1		4	1		2	**29**
2013/2014	1	2	3			2	2		1	1	5		1	6	**24**
2014/2015		1	4			3					1			4	**13**
2015/2016	1	2	7			5	5	1	2		5	4		3	**35**
2016/2017		1	2		1	4	2	1	1		6			3	**21**
2017/2018	13	2	1	2	1	4	4		2		2	2		1	**34**
2018/2019	5	1	2	1		5	4		1		12	1		4	**36**
2019/2020	1		5						1	1	2	3		4	**17**
2020/2021		2	7			2	2	1	4		3			5	**26**
2021/2022			1	2			8	4	2	1	5	3	1	7	**34**
2022/2023		5	5	2	1		2	2	4		16	5		2	**44**
2023/2024		3	5		2		12	10	1		15	7			**55**
2024/2025	1	3	5		1	3	6				13	2		3	**37**
2025/2026			2	2			2	1			8	4			**19**
Total	**27**	**47**	**153**	**16**	**7**	**128**	**96**	**36**	**37**	**5**	**125**	**45**	**5**	**93**	**820**

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2004/2005			1			1								1	**3**
2005/2006		2	9			20		4	5			2		10	**52**
2006/2007		7	11			26		4	3			1		7	**59**
2007/2008	1		5	1		8	1	2	3		5	1		4	**31**
2008/2009		1	3	1		2	6			2	2	3		4	**24**
2009/2010		1	3				6	2			3	1		1	**17**
2010/2011		3	3	1			7				1	2	2	6	**25**
2011/2012		1	5	1		2	7		1		10	1		3	**31**
2012/2013		1	4			2	4		1		4	2			**18**
2013/2014		2				1	2	1	2	1	2			2	**13**
2014/2015	1	2				1					1			3	**8**
2015/2016		1	4			3	2				5	1		3	**19**
2016/2017		1			1	5	2		1		2	2		1	**15**
2017/2018	1	1	1			3		1	1		3			2	**13**
2018/2019		1			1	2	4				6				**14**
2019/2020			1			1					2	1			**5**
2020/2021	2		4	1		3	3		1		3			5	**22**
2021/2022			2	2		1	1	1			5	2	1	6	**21**
2022/2023			2		1		1	1	1		3	5		1	**15**
2023/2024		1			1		6	2			9	2		1	**22**
2024/2025		1	2			1	7		2		7	5			**25**
2025/2026		1	1				1	1			5				**9**
Total	**5**	**27**	**61**	**7**	**4**	**82**	**60**	**19**	**21**	**3**	**78**	**31**	**3**	**60**	**461**

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27020	Leukemias	27020-1
405	Leukaemia	405-1

Provided by Gary Goode

SECTION 1 — What Is Agent Orange? (Foundational Science)

Q: What is Agent Orange, and what chemical components made up its formulation?
Agent Orange (AO) consisted of two herbicides … 2,4-D and 2,4,5-T.

- Follow-up: What role did 2,4-D and 2,4,5-T play in its mixture?
These two herbicides killed vegetation when applied aerially or by other means.

- Follow-up: What was the military purpose behind this formulation?
The purpose of using AO was to reduce the overstory cover of jungles where Viet Cong where active as this over cover provided excellent non-visibility to US forces.

Q: Why is the dioxin TCDD the most dangerous component of Agent Orange?
TCDD was the most toxic congener of all the dioxins and the most toxic.

- Follow-up: How is toxicity created during chemical manufacturing?
TCDD was created during the manufacturing process where temperatures were in excess of guidelines.

- Follow-up: How does TCDD differ from other herbicide byproducts?
TCDD differs in that is persists longer in the environment relative to other herbicide products.

Q: Why does dioxin persist for so long in soils, sediments, and food chains?
TCDD persists in the environment, particularly buried in soils due to the presence of the chlorine bond in the 2,3,7,8 position on the two benzene rings. These bonds are very difficult to break naturally in the environment.

- Follow-up: What environmental conditions slow its breakdown?
Being buried in soil retards breakdown of TCDD.

- Follow-up: Why does it continue cycling through ecosystems decades later?
The strength of the chlorine bond in TCDD retains its longevity.

Q: How does dioxin behave inside the human body?
TCDD is lipophilic, meaning it is attracted to fatty tissue and is bound therein.

- Follow-up: How long does it remain stored in fat tissue?
It can remain stored for years dependant on the metabolic characteristics of the individual.

- Follow-up: Which biological systems does it impact most severely?
TCDD can accumulate in liver and other fatty organs in the body. It can also be stored in the fat of mother's milk, which can then be passed on to nursing children.

Q: Why is it scientifically impossible to detox dioxin from the human body?
There are no methods to remove TCDD from the human body.

- Follow-up: What detox myths have you seen over the years?
Scientology introduced a 'removal protocol' which consisted of heat exposure in saunas and elixers. It was useless.

- Follow-up: Why are those claims dangerous for exposed people?

One never knows how someone will react to bogus treatments.

SECTION 2 — Exposure Pathways (Veterans & Civilians)

Q: What are the most scientifically supported pathways of Agent Orange exposure?
Through foods, inhalation, and dermal absorption.

- Follow-up: Which veteran cases provided the strongest technical evidence?
A US soldier was exposed to AO while his base in Thailand was perimeter sprayed. He won compensation after I submitted an opinion on his exposure. He was initially denied compensation by the Dept. of Veterans affairs.

- Follow-up: What exposure pathways surprised you the most?
A sailor on the aircraft carrier USS RANGER would fly to Da Nang to pick up mail bags for the carrier, the fly back for distribution on board. He was exposed to AO which accumulated on the mail bags that could sit for days near a Rand Hand site where they loaded AO onto spray planes. Prop was could send contaminated soil particles toward the area of the mail bags. As he carried these mail bags to and from the plane he was contaminated. He also won compensation from the DVA following my submission of his exposure potential. He too was initially denied compensation.

Q: What lesser-known exposure routes have you documented?
The aircraft carrier example was one I never expected. However, when all the facts were presented, it became quite logical that the mail bag route was highly probably.

- Follow-up: Contaminated aircraft interiors or equipment?
I do know of some family members trying to receive compensation for their father who worked on contaminated (my opinion) chopper interiors. However, they were refused compensation.

- Follow-up: Food-chain contamination in Vietnam?
This was on of the major routes of contamination: soil, runoff to fish ponds, people eating fish and ducks that used the ponds, then people eating these contaminated food stuffs.

Q: What did your sampling of human blood, breast milk, soil, and food reveal?
There was a strong and definite pattern of contamination from soils to food to human breast milk and blood through this pathway.

- Follow-up: How elevated were contamination levels compared to background?
In some areas contaminated soils were hundreds of times higher in dioxin that background.

- Follow-up: What did this show about long-term risk?
Given the persistent nature of dioxin, it could last in soils and contribute to human contamination without proper rehabilitation of soils, for over a hundred years.

Q: What does forensic proof of Agent Orange exposure look like decades later?
When analyzing for TCDD in various test media, the concentration of TCDD can be determined.

- Follow-up: What lab evidence is considered definitive?
If the TOXIC EQUIVALENCY FACTOR is high, where the presence of TCDD is of a high percentage of a total sample, then one can assume high contamination.

- Follow-up: What makes a weak versus strong exposure case?

If the TEQ factor is low for percent dioxin, this is a weak exposure case.

SECTION 3 — Field Work in Vietnam (A Luoi Valley)

Q: Can you walk us through a typical field day during your Vietnam investigations?
We would arrive at a former US military base in the A Luoi Valley. A survey would be done to document all visible UXO (unexploded ordnance) in the region. Soil sampling grids would be laid out if possible. A mine detector was used to check sampling position to determine if any UXO was beneath the surface. If a beep was given, the sampling position was shifted with mine detection used again before sinking the soil corer into the ground. We could collect fish from fish ponds by netting. Other animals were donated by local farmer.

- Follow-up: What challenges did your team face daily?
The danger of UXO was constant. Wherever we walked we did so carefully. When we were sampling near Hamburger Hill, we had to step in exactly the same steps as the mine detector person who was clearing the way for our samplers.

- Follow-up: What safety risks were constant?
Constantly aware of the UXO risk. Grenades and mortar shells where often plentiful in some sampling areas.

Q: How did unexploded ordnance affect your work and data collection?
We had to follow the advice of the deminer when setting out sampling sites for soil in particular, given the potential for sub-surface UXO being present.

- Follow-up: How did demining teams operate around your scientists?
Our deminer was the voice we listened to when sampling. They had experience with UXO and their word was 'law' in the field.

- Follow-up: Were there moments where work had to stop completely?
As we got nearer to Hamburger Hill, we were told by locals not to proceed further because of the very high quantity of UXO present. Local salvagers of scrap metal were killed or maimed as a result of working in areas close to Hamberger Hill. We took their advice and did not proceed further towards the mountain.

Q: When did the magnitude of contamination truly become clear to you?
It became rather shocking when driving to A Luoi Valley from Hue when you say no jungle where AO spraying took place with definite defining lines between sprayed and unsprayed areas.

- Follow-up: Was there a single defining discovery?
A local grass, locals called American Grass, took hold where AO killed jungles. This grass was prevalent where ever AO was sprayed. All indigenous broad-leaved plants were killed.

- Follow-up: How did local villagers react to the findings?
Local counsels warned people of consuming certain food, but how effective that was is questionable.

Q: How did Agent Orange permanently alter forests and ecosystems?
As noted above, jungles were replaced by grasslands.

- Follow-up: What species were most affected?
Jungles and broad-leafed plants succumbed to AO.

- Follow-up: Can these systems ever fully recover?

It will take years, using rapid-growing plantation trees to shade newly planted indigenous trees.

SECTION 4 — Long-Term Harm & Persistence

Q: Why does Agent Orange remain dangerous decades after it was sprayed?
This is the result of the very strong chlorine bond in TCDD. It can remain potent for over one hundred years.

- Follow-up: Why is the argument that it should be gone by now incorrect?
See above …

- Follow-up: What environmental processes trap dioxin in soils?
I'm not aware of any 'environmental processes' that 'trap' TCDD in soils.

Q: How do you scientifically evaluate a site for lingering contamination today?
By periodic testing of soils with specific grid marking to ensure the majority of a region is covered.

- Follow-up: What depth of soil must be tested?
We tested composite soils from 10 cm depths.

- Follow-up: What levels trigger serious concern?
Levels nearing 900-1000 ppt can illicit serious concerns. These are close of regulation concentrations.

Q: How long can Agent Orange remain a threat in contaminated hotspots?
If not remediated … for several hundred years.

- Follow-up: Are we talking decades or centuries?
Centuries.

- Follow-up: What does generational exposure mean for families?

Generational exposure not only refers to environmental exposure, but also altered parental DNA which can affect future generations.

Genetic Damage In New Zealand Vietnam War Veterans

Participants Report

Prepared by Louise Edwards
Institute of Molecular BioSciences
Massey University

A B S T R A C T

From July 1965 until November 1971, New Zealand Defence Force Personnel fought in the Vietnam War. During this time the United States military forces sprayed more than 76,500,000 litres of phenoxylic herbicides over parts of Southern Vietnam and Laos. The most common herbicide sprayed was known as 'Agent Orange'. All of the Agent Orange sprayed during the Vietnam War was contaminated with 2,3,7,8-tetrachlorobenzo-*para*-dioxin (known simply as TCDD), a known human carcinogen. Since returning to New Zealand more than 30 years ago, New Zealand Vietnam War veterans have expressed concern about the numerous health problems experienced by both themselves and their children. New Zealand Vietnam War veterans attribute these health problems to exposure to Agent Orange while serving in Vietnam.

This study aimed to ascertain whether or not a small sample of New Zealand Vietnam War veterans have incurred genetic damage as a result of service in Vietnam. The Sister Chromatid Exchange assay (SCE) is a very sensitive and widely applied assay used as a bioindicator of genetic damage induced by an environmental agent or clastogen. In the current study a group of 24 New Zealand Vietnam War veterans and 23 control volunteers were compared using an SCE analysis. All participants were screened to reduce the possible influence of factors that could severely impact on findings and to eliminate any bias in the SCE results.

The results from the SCE study show a highly significant difference between the mean of the experimental group and the mean of the control group ($p < 0.001$). This result suggests, within the strictures of interpreting the SCE assay, that this particular group of New Zealand Vietnam War veterans has been exposed to a harmful substance(s) which can cause genetic damage. Comparison with a matched control group would suggest that this can be attributed to their service in Vietnam. The result is strong and indicates that further scientific research on New Zealand Vietnam War veterans is required.

A C K N O W L E D G E M E N T S

I would like to greatly acknowledge all the people who have offered their advice, support and time to this project, without these people it would not have been possible. I would like to especially thank the following people, thank you to my supervisor Dr. Al Rowland, a huge thank you to my father without his help and knowledge I may never have finished the project. Thank you to Mohammed Abdul Wahab, Chad Johnson and Ruth Wren for your technical advice and all your help in the lab. Thanks also go to Chris Kendrick for your assistance with blood collections, to John Podd for your very willing assistance with the statistical analysis. Thank you to Roger Mortlock, Piers Reid, Ken Avenall, Daryl Edwards and John Govern for giving me so much help finding the participants for the project, and for giving me a lot of insight into the Vietnam War.

Lastly, I would like to extend my sincere gratitude and respect to all of the volunteers who took part in this study, especially to the Vietnam veterans, thank you for all you have given, you have served your country well, and you will always be remembered for the price you have paid. Thank you.

T A B L E O F C O N T E N T S

PAGE

ABSTRACT……..….1

ACKNOWLEDGEMENTS…….…….…2

TABLE OF CONTENTS…….....3

Chapter One: INTRODUCTION……....4

Chapter Two: LITERATURE REVIEW……....8

Chapter Three: RESULTS/DISCUSSION…….21

Chapter Four: RECOMMENDATIONS……...29

REFERENCES……..30

1 CHAPTER ONE: INTRODUCTION

In the 1950s South East Asia was an area of the globe in severe political turmoil. Emerging from the post-colonial era, nations were attempting to establish their own identity. New Zealand became embroiled in one of the most bitter wars of the last century outside of the two World Wars: the Vietnam War.

In 1958, several religious and political groups revolted against the South Vietnamese government, most notably the Vietcong, coupled with invasion from the north. In response, some western nations became involved in the defence of South Vietnam, including New Zealand. New Zealand Defence Force Personnel were based in Vietnam from June 1964. In July 1965, New Zealand troops moved into a combatant role supporting the USA in an attempt to stop invasion of South Vietnam by its North Vietnamese neighbours. New Zealand's troops continued to fight in Vietnam for over 6 years; the last leaving in November 1971. The Australian Task Force base at Nui Dat, in Phuoc Tuy Province, was established in June 1966, and although most New Zealand troops spent some time here, New Zealand soldiers generally served in Long Khanh, Bien Hoa, Binh Duong, Gia Dinh and Hua Nghia provinces as well as Phuoc Tuy province (Irvine, 2003) (Figure 1.1).

During the Vietnam War the United States military forces sprayed an estimated 76,540,964 litres of phenoxylic herbicides (Duchnowicz *et al*., 2005) over approximately 3.6 million hectares of Vietnamese and Laotian land in order to remove forest cover, destroy crops and clear vegetation from the perimeters of the US bases as part of their military strategy. A consequence of this decision was a legacy of ill health, not only amongst the Vietnamese population themselves, but also in thousands of American, Australian and New Zealand Vietnam War veterans, and their children.

In 1961, the USA government commenced an aerial spraying programme (codenamed Operation "Ranch Hand") of a group of defoliants, the most common of which was known as 'Agent Orange'. The concentration at which herbicides were sprayed by USA forces was more than an order of magnitude greater than that for similar domestic weed control.



Figure 1.1 South Vietnam 1965-1972
Most New Zealand troops spent some of their time in Vietnam at the Australian Task Force base in Nui Dat, (in Phuoc Tuy Province). The dark colour around Nui Dat indicates the area where New Zealand troops served (Chadwick, 2004)

Between 1961 and 1972 various herbicide mixtures, nicknamed by their coloured identification barrels, were used by the USA and the Republic of Vietnam forces to defoliate forests and mangroves in order to clear perimeters of military installations and to destroy "unfriendly" crops as a tactic for decreasing enemy shelter and food supplies (Stellman *et al*., 2003).

Operation Ranch Hand dispersed around 95 % of all the herbicides used in Operation Trail Dust, the overall herbicide programme. Other branches of the USA armed services and the Republic of Vietnam forces used hand sprayers, spray trucks, helicopters and boats to disperse the remainder.

Current literature substantiates the view that exposure to Agent Orange and other herbicides can lead to adverse health effects and cause genetic damage in humans (Akhtar *et al*., 2004; Bukowska, 2004; Duchnowicz *et al*., 2005; Eriksson *et al*., 1981; Hardell, 1979; Palmer, 2005; Schecter *et al*., 1995). With the amount of information that is now available, it is accepted that New Zealand Vietnam War veterans were exposed to Agent Orange and other herbicides during their service in Vietnam. The current study has therefore been established to investigate genetic damage (if any) that has been sustained by New Zealand Vietnam veterans. The Sister Chromatid Exchange Assay (SCE) has been chosen to analyse Vietnam veterans in the current study. The SCE Assay is a reliable and widely applied assay used for detecting genetic damage. This assay has been used successfully in previous studies involving chemical exposure and possible genetic damage (Akin *et al*., 2005; Arias, 2002; Bhattacharya *et al*., 2005; Garaj-Vrhorac & Zeljezic, 2001; Iannuzzi *et al*., 2004; Zober *et al*., 1993).

In 2000, the IPCS (International Programme on Chemical Safety) published guidelines for the monitoring of genotoxic effects in humans (Albertini *et al*., 2000). In defining the significance of the endpoint and application of the sister chromatid exchange assay, the report states "The readily quantifiable nature of SCEs with high sensitivity for revealing toxicant-DNA interaction and the demonstrated ability of genotoxic chemicals to induce a significant increase in SCEs in cultured cells…has resulted in this endpoint being used as an indicator of DNA damage in blood lymphocytes of individuals exposed to genotoxic (agents)." The SCE assay is thus acceptable as an indicator of *in vivo* damage. Futhermore, it is an accepted tenet in the current study that any damage to DNA may lead to ill health and possibly result in intergenerational effects. Follow-up studies on individuals exposed to genotoxic agents have clearly demonstrated the predictive value of high chromosomal damage for subsequent health risk (Hagmar *et al*., 1994, 1998, 2001).

1.1 Aim

- **To determine whether or not New Zealand Vietnam veterans have incurred any genetic damage as a result of their service in Vietnam.**

In order to achieve this aim, within the strictures of the assay applied, the following objective is stated: An SCE analysis will be conducted to establish whether or not a sample group of Vietnam veterans have a statistically higher frequency of sister chromatid exchange than a control group of men who did not serve in Vietnam.

1.2 Hypothesis

- **That New Zealand Vietnam veterans have incurred genetic damage as a result of their service in Vietnam.**

- **The *null* hypothesis is that New Zealand Vietnam War veterans did NOT incur genetic damage.**

If the null hypothesis is true then we would predict, according to the current objective, that no statistically significant difference in mean SCE frequency between the Vietnam veterans group and the control group would be detected.

2 CHAPTERTWO: LITERATURE REVIEW

2.1 Agent Orange and Health Effects

Over the duration of Operation Ranch Hand, 6 major herbicides were aerially spayed: Agent Pink (approximately 51,000 L); Agent Green (approximately 31,000 L); Agent Purple (approximately 1.8 million L); Agent Orange (unknown volume, but in excess of 50 million L); Agent White (approximately 20.5 million L) and Agent Blue (approximately 4.7 million L).

Approximately 65 % of the herbicides used contained 2,4,5-trichlorophenoxacetic acid (2,4,5-T), and all of the 2,4,5-T used contained 0.5 to 100 ppm of 2,3,7,8-tetrachlorobenzo-*para*-dioxin (known simply as TCDD or Dioxin) as a manufacturing contaminant (Gough, 1991). It is the TCDD that is considered to be the prime cause of detrimental health and genetic effects from these herbicides (Neuberger *et al*., 1999; Palmer, 2005; Pavuk *et al*., 2005; Pearce & Mclean, 2005).

Military herbicide operations in Vietnam became a matter of scientific controversy right from their inception. In April 1970 2,4,5-T was banned from most USA domestic uses and from many other countries on the basis of evidence of its teratogenicity[1] (Stellman *et al*., 2003). Even given this knowledge, the military strategy of using herbicide spray in Vietnam was considered a greater priority at the time.

Estimates of exactly how much TCDD was deposited in Vietnam are based on the volume of 2,4,5-T-containing herbicide sprayed, and on TCDD contamination levels, but are hard to predict. In 1970 when Operation Ranch Hand finally ended, over 3.6 million hectares of forest and villages in Central and Southern Vietnam had been covered with millions of litres of toxic herbicide (Tuyet & Johansson, 2001). Any humans or other living organisms situated in these 3.6 million hectares of forests would have almost certainly come into direct contact with these toxic substances.

[1] A '**teratogen**' is a term used to describe any agent with the potential to cause genetic deformities.

Agent Orange was the most common of the herbicides used by the USA, and comprised a 1:1 mixture of 2,4-dichloropheoxyacetic acid (2,4-D) and 2,4,5-T (Figure 2.1). Agent Orange was used for the longest duration, and was one of the most toxic herbicides used. It was commonly made available in hand-sprayers to be used by soldiers around the perimeters of their camps. No precautions while using Agent Orange were generally enforced, thus giving soldiers the impression that this substance was harmless. Aerial spraying and hand spraying missions not only brought soldiers and the Vietnamese living in the area into direct contact with the toxic herbicide, but also caused contamination of drinking water and many food sources such as fish and crops. Exposure to Agent Orange and the toxic contaminant TCDD therefore occurred very easily during the Vietnam War, and was usually unavoidable. Dai (2000) estimates that during the War about 17 million people living in South Vietnam, and about one million from the North, were directly exposed to TCDD-contaminated herbicides.

In studies conducted by Schecter *et al.* (1995) comparing Vietnam veterans with contemporary veterans who had served elsewhere, TCDD levels were found to be significantly elevated among those who had served in Vietnam.

2.1.1 2,3,7,8-tetrachlorobenzo-*para*-dioxin (TCDD)

Known simply as TCDD or Dioxin, this chemical is produced as a by-product of many industrial processes. It is a contaminant of particular phenoxylic herbicides that contain 2,4,5-T and have been manufactured and used in many countries through out the world. TCDD is formed during the incomplete combustion of organic material where chlorine is available in the feedstock or in the air supply. It is also produced at trace levels in various industries. Focus on dioxins as contaminants began in the 1940s and 1950s in industrial settings, where manufacture of chlorinated phenoxy herbicides occurred, as a result of exposed workers exhibiting particular health problems (Aylward & Hays, 2003). The ability of TCDD to affect the endocrine system, and toxic effects on experimental animals, prompted several studies into the possible effects of dioxin on humans, especially regarding their reproductive ability. TCDD behaves as a multi-site human carcinogen, and is thought to induce tumours in humans indirectly (Albertini *et al.*, 2000). The biological mechanism of TCDD-induced carcinogenesis is not

completely clear. Thus exposure to TCDD results in a broad spectrum of biological responses, including altered metabolism, disruption of the normal hormone signalling pathways, and reproductive and developmental effects.

2.1.2 TCDD Half Life in Humans

The half life of a particular chemical is of great importance for hazard assessment because it allows an estimation to be made of the persistence of a chemical in living aquatic and terrestrial organisms. The half life is the time required to reduce the concentration of a chemical by one-half in tissue, organ or in the whole organism (Geyer *et al*., 2000).

It is known that TCDD is very persistent and has a long half-life in organisms (Geyer *et al*., 2000; Li *et al*., 1999; Van den Berg *et al*., 1994). Geyer *et al*. (2002) states that the average half life of TCDD in humans is approximately 2,840 days (7.78 years). A half life as large as this means that New Zealand Vietnam veterans who were exposed to TCDD more than 30 years ago are still very likely to have elevated TCDD levels when compared to non-veterans. As recently as 1995, TCDD blood levels were found to be between 25 and 170 times higher in people living in sprayed areas of Vietnam, compared to people living in unsprayed villages in Northern Vietnam (Palmer, 2005).

2.1.3 Health Effects Caused by Exposure to TCDD

Spraying of Agent Orange during the Vietnam War represents the world's largest ever TCDD contamination to date. Health effects associated with exposure to TCDD have not been fully characterised. In 1997 the International Agency for Research on Cancer (IARC) classified TCDD as a Group 1 human carcinogen, based largely on four highly-exposed industrial studieds that showed an excess of all cancers (Steenland *et al*., 1999). The largest of the four groups considered by the IARC is the USA study group of 5,172 workers at 12 plants that produced chemicals contaminated with TCDD. These workers were exposed to high levels of TCDD. The workers were found to have on average 286 times more TCDD in their blood than the general population. This population was also found to have a 46 % greater mortality rate caused by cancers.

A recent study contrasting cancer incidence rates in white male USA Air Force veterans involved in Operation Ranch Hand with the USA white male population reported increases in prostate cancer and melanoma in Ranch Hand Veterans (Akhtar *et al*., 2004). Pavuk (2005) reported statistically significant associations between TCDD and all types of cancer in USA Air Force veterans selected as comparisons in the Air Force health study.

Farm and agricultural workers who are exposed to a range of chemicals as part of their job have been the subject of many scientific studies. Illing (1997) found an increased rate of cancer in farmers and agricultural workers that was directly related to their occupational background exposure to organochlorines (including TCDD) and other pesticides. Dich & Wiklund (1998) reported a statistically significant increased risk of prostate cancer among pesticide applicators. In Britain a study was conducted around a pesticide factory, revealing an excess of skin melanoma, lung, stomach, pancreas and prostate cancers (Wilkinson *et al*., 1997). A series of case-control studies in Sweden have found increased risks of soft-tissue sarcoma and malignant lymphoma among agricultural workers who had been exposed to phenoxy herbicides (Eriksson *et al*., 1981; Hardell & Sandstrom, 1979).

Research on ex-servicemen from the Vietnam War has shown significant associations between TCDD exposure and certain kinds of cancer, including soft tissue sarcoma (Eriksson & Hardell, 1990; Lynge, 1993), non-Hodgkin's lymphoma (Pearce & Mclean, 2005) and multiple myeloma (Bertazzi *et al.*, 2001). One major investigation that warrants special attention is the on-going study of the residents of Seveso, a small town in Italy. In 1976 an explosion at the ICMESA (Industrie Chimiche Meda Società) chemical plant near Seveso resulted in the highest exposure to TCDD in a residential population to date. The earliest related health effect was chloracne in children who were outdoors and in the path of the toxic cloud (Caramaschi *et al*., 1981). In the following years other adverse health effects were observed and found to be linked to TCDD exposure. These include spontaneous abortions (Revich *et al*., 2001), cytogenetic abnormalities (Bertazzi *et al*., 2001), congenital malformations (Mastroiacovo *et al*., 1988; Revich *et al*., 2001), impaired liver function and lipid metabolism (Ideo *et al*., 1985; Mocarelli *et al*., 1986).

In one particular study of the Seveso population, Bertazzi *et al.* (2001) discovered a two-fold increase in rectal cancer-induced deaths and an excess of "other" digestive cancer-induced deaths. Lung cancer was also in moderate excess; nearly twice as many lymphohemopoietic neoplasms were observed than expected. Bertazzi *et al*. (2001) also reported particular increases in Hodgkin's disease, multiple myeloma, and acute myeloid leukaemia. All of these cancers are well established as cancers arising from specific genetic malfunction. Moderate to significant increases were also observed in chronic obstructive pulmonary disease and diabetes.

In addition to known carcinogenic properties, Steenland *et al.* (1999) reported that TCDD exposure is a possible cause of heart disease. Elevated ratios for mortality from heart disease were found in a large multi-country study. Steenland *et al.* (1999) also reported a positive relationship with total cholesterol and TCDD exposure.

Exposure to Agent Orange also has major effects on the reproductive system of humans; TCDD is an endocrine-disrupting chemical with a highly toxic effect on the human reproductive system (Rogan & Ragan, 2003). Even at low doses TCDD can seriously disrupt normal reproduction in humans; it can lower fertility, increasing antenatal mortality and the risk of endometriosis, and can also cause many birth defects (Lawson *et al*., 2004). Egeland *et al*. (1994) conducted a study on male reproductive endocrine function of subjects occupationally exposed to TCDD and found that exposed individuals had lower testosterone and higher gonadotrophin levels in a dose-dependent relationship with increasing serum dioxin concentrations. In addition to these illnesses, Agent Orange exposure was also found to be associated with the onset of porphyria cutanea tarda[2] (Frumkin, 2003).

Henriksen *et al*. (1997) performed a cross-sectional medical study of the Operation Ranch Hand participants and found a 50 % higher prevalence of diabetes among those individuals with the highest levels of TCDD in serum, compared with non-exposed control individuals. Steenland *et al*. (2001) found an increased risk of diabetes with TCDD exposure. Kern *et al*., (2002a) biochemically linked TCDD exposure and

[2] **Porphyria cutanea tarda** is a disorder of heme biosynthesis due to a defective liver enzyme. Symptoms of this disorder include photosensitivity; hepatic dysfunction; discolored teeth, gums and skin; excessive hair; and psychiatric symptoms.

diabetes in humans, complementing the many epidemiological studies that had been conducted previously.

Although the majority of current literature supports the claim that exposure to TCDD causes detrimental health effects, there are some studies that disagree. Most of these studies are related to the reproductive outcome of those exposed to TCDD. Wolfe *et al*. (1995) conducted a study on reproductive outcomes in Vietnam War veterans and found no elevation in the risk of spontaneous abortion or still birth. Some elevations were found in birth defects but these were reported to be non-significant and there was no increase in birth defect severity. Schnorr *et al*. (2001) found no association between paternal TCDD levels at the time of conception and spontaneous abortion or sex ratio among pregnancies fathered by men exposed to TCDD.

Goetz *et al*. (1994) investigated neurological disorders and brain tumours in Vietnam veterans exposed to TCDD; it was concluded that there was insufficient evidence to determine an association between neurological disorders and exposure to TCDD in Vietnam. However, it was found that there was limited evidence to suggest no association between exposure and brain tumours.

2.2 Exposure of New Zealand soldiers to herbicide sprays

Past claims of herbicide exposure have largely relied on anecdotal evidence. More recently however, a major Select Committee report conducted by the New Zealand Government and published in October 2004 has resulted in more convincing information being presented on exactly where New Zealand soldiers were at certain times, which corresponds exactly to times and places of Agent Orange release. The case is no longer circumstantial and the evidence strongly substantiates the claim that New Zealand troops were exposed to Agent Orange. The claim that Vietnam veterans were exposed to herbicide spraying as part of Operation Trail Dust was recognised by the Government in December 2003, 32 years after the New Zealand Vietnam War veterans left Vietnam.

On 3 December 2003 a new report was submitted to Parliament's Health Select Committee (Chadwick, 2004). The Chief of the Defence Force had requested an investigation be conducted into the spraying of herbicides in Phuoc Tuy province in South Vietnam between 1965 and 1971 (Figure 1.1). The report concluded that while serving in Vietnam between 1965 and 1971, New Zealand Vietnam War veterans were exposed to large quantities of the defoliants Agent Orange, Agent Blue[3] and Agent White[4]. It was estimated that at least 1.8 million litres of the defoliants Agent Orange, White and Blue was sprayed in the Phuoc Tuy Province between November 1965 and June 1968 (Taylor, 2003).

Phuoc Tuy Province was the location of the first Ranch Hand missions conducted in January 1962. The head of the Scientific Advisory Group of the Commander in Chief, Pacific (CINCPAC) reported that 227,125 litres of defoliant was sprayed on the Phuoc Tuy Province between December 1965 and January 1966. New Zealand Vietnam veterans were serving in this province during this time (Irvine, 2003).

Yet more evidence that New Zealand War Veterans became exposed to harmful defoliants during their service in Vietnam was presented upon examination of the military command zones which the American commanders divided South Vietnam into: I Corps, II Corps, III Corps and IV Corps (Figure 2.3). New Zealand and Australian units operated exclusively in III Corps. Operation Ranch Hand records show that III Corps received 21,521,614 litres of Agent Orange, 563,852 litres more than the other three zones combined.

The evidence is substantial to support the claim that New Zealand troops were both directly and indirectly exposed to the TCDD-containing herbicide Agent Orange while serving in Vietnam.

[3] **Agent Blue** was a mixture of herbicides containing Cacodylic acid, commonly known as Arsenic. It was used specifically to kill rice in Vietnam.
[4] **Agent White** was a 4:1 mixture of 2,4-D and Picloram. Picloram is a herbicide used on woody plants.

2.3 Consequences of Herbicide Exposure in Vietnam

During the 1970s, returned Vietnam Veterans began to report skin rashes, cancers, psychological symptoms, extreme fatigue, congenital abnormalities as well as handicaps in their children, and many other health problems. In the USA some 300,000 veterans have undergone medical tests and an estimated 2,000 children of veterans are suffering from the birth defect spina bifida (Palmer, 2005). A Columbia University study also estimates that up to 4 million people may be directly affected by Agent Orange (Stellman *et al*., 2003). Most veterans are concerned that Agent Orange exposure might have contributed to these health problems. These concerns helped to initiate a series of scientific studies on Agent Orange and its carcinogenic contaminant TCDD. In addition to polluting the environment, exposure to the toxic TCDD-containing herbicides has been found to cause many diseases, including several types of cancers (Hardell & Eriksson, 1999; Hardell & Sandstrom, 1979; Khuder *et al*., 1998; Lynge, 1998; Pavuk *et al*., 2005; Safi, 2002; Saracci *et al*., 1991), as well as causing increased rates of endometriosis (Igarashi *et al*., 2005; Rier & Foster, 2003), congenital birth defects (Barrow *et al*., 2002; Lawson *et al*., 2004) and other health problems (Aoki, 2001; Lawson *et al*., 2005; ten Tusscher *et al*., 2003) in the children of those exposed.

Tuyet and Johansson (2001) conducted a study on Vietnamese women and their husbands who were exposed to Agent Orange during the Vietnam War. The authors found that 66 % of all children had some type of major health problem. Thirty-seven percent of these children were born with some visible malformation or disability while 27 % had developed a disability during the first year of life. Of the 60 children suffering from health problems, 40 were unable to attend school but were able to help with agricultural work and domestic chores. Twenty children were very severely physically and mentally disabled, and required 24-hour care; needing to be attended to by their parents for every daily need. There were no cases of congenital malformation nor other disabilities among unexposed siblings of the husbands and wives, nor among the children of their siblings.

Giri *et al*. (2004) concluded that exposure to Agent Orange is associated with an increased risk of prostate cancer. Men who had been previously exposed to Agent

Orange were at least two times more likely to be diagnosed with prostate cancer as unexposed men. Pavuk *et al*. (2005) also reported that prostate cancer was significantly associated with service in South East Asia (including, or exclusively in, Vietnam).

2.4 USA & Australian Reactions to Agent Orange Exposure

The United States Department of Veteran Affairs now accepts a link between Agent Orange exposure and Hodgkin's Disease, multiple myeloma, non-Hodgkins lymphoma, respiratory cancers (lung, bronchus, larynx and trachea), soft-tissue sarcoma, prostate cancer, chronic lymphocytic leukemia, porphyria cutanea tarda, acute and subacute peripheral neuropathy, and adult-onset diabetes.

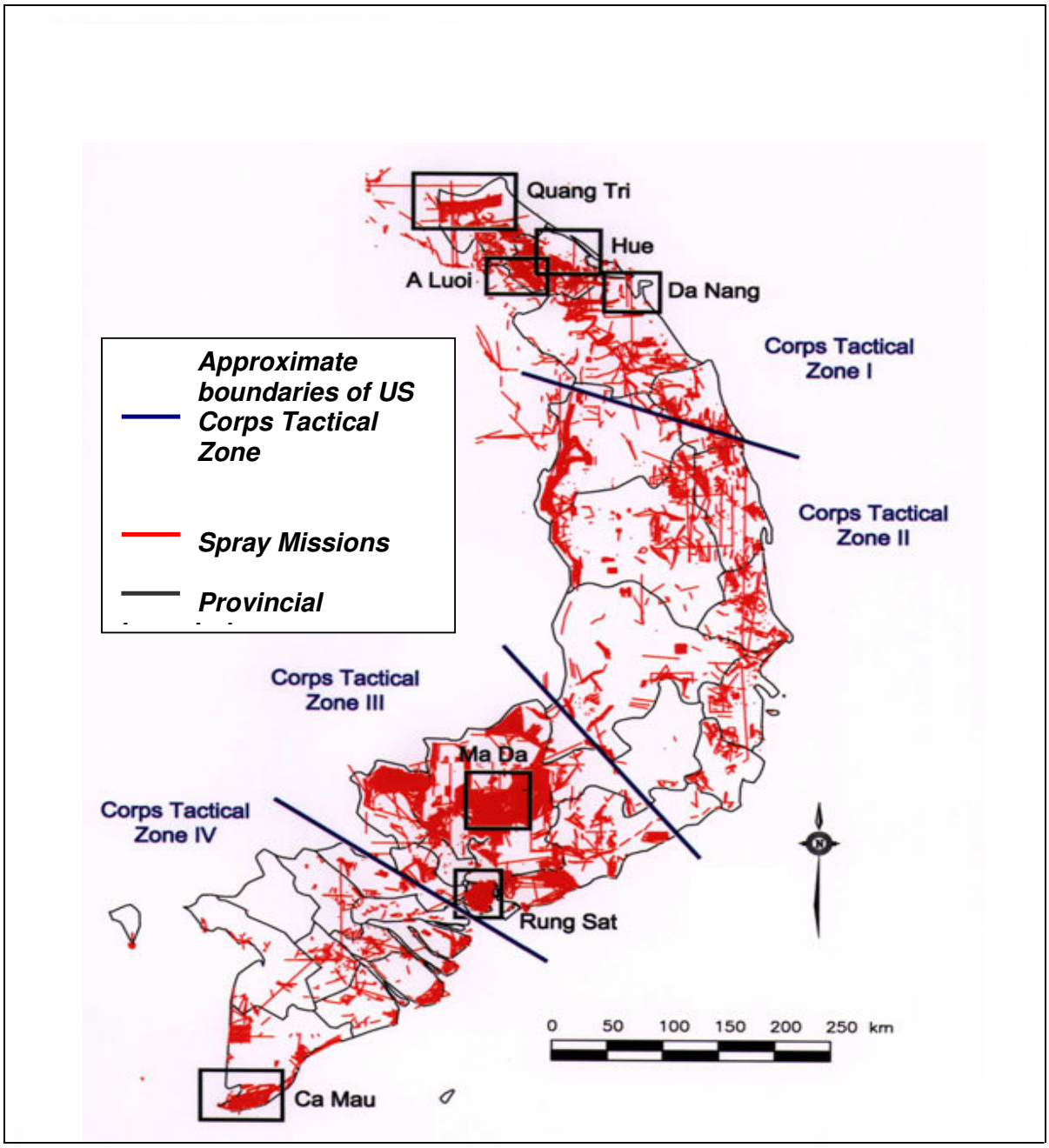


Figure 2.3 Map of Agent Orange Spraying

Map of South Vietnam, showing the aerial herbicide spray missions of Agent Orange from 1965 to 1971 as part of Operation Ranch Hand. New Zealand troops served exclusively in III Corps. III Corps received the greatest volume of Agent Orange.

US Department of the Army (Irvine, 2003)

The USA Government also accepts a link between Agent Orange and spina bifida in children of male veterans and a link between all birth defects that are not caused by familial disorder, birth-related injury, or foetal or neonatal infirmity in children of female veterans. Compensation and health care are provided to veterans and children of veterans suffering from these illnesses (Chadwick, 2004; Irvine, 2003).

According to Irvine (2003), the Australian Department of Veteran Affairs does not accept a link between Agent Orange and these health problems; yet they give the benefit of the doubt to veterans on a case-by-case basis. They also provide treatment to any Vietnam veteran with cancer. The Australian Department of Veteran Affairs (while still not accepting a link) in partnership with the Department of Health and Ageing, provides treatment to children of Vietnam veterans born with cleft lip or palate, spina bifida, acute myeloid leukemia, and adrenal gland cancer.

2.5 Detection of Genetic Damage

Although concerned about the direct health effects of Agent Orange, Vietnam War Veterans are most fearful of long term genetic damage, with the possibility of this damage being passed on to their children and further generations. Several molecular assays are now available to researchers to determine if genetic damage has occurred in humans. One of the most sensitive and widely applied tests for clastogenicity[5] is the Sister Chromatid Exchange (SCE) assay. Due to the time constraints on the current study it was possible to conduct only one of the cytogenetic tests mentioned here. SCE was chosen due to its high sensitivity and success rate in studies on clastogens.

2.5.1 Determination of Genetic Damage using SCE Assay

As noted earlier (Section 1), a statistically significant increase in the average SCE frequency in an experimental group compared to a matched control group, is, according to Albertini *et al.* (2000), indicative of genetic damage. To reiterate, the SCE

[5] A **'clastogen'** is the term used to describe any environmental agent which results in damage to DNA. A clastongen may or may not be a 'mutagen' (resulting in mutations directly), a 'teratogen' (resulting in genetic deformities) or a 'carcinogen' (resulting in cancer).

cytogenetic test is used to visualise the number of SCEs in cells, and is considered a bioindicator of any genetic damage that has been sustained by the subject. It is therefore a test that indicates the harmfulness of particular chemicals.

Changes in the genetic fingerprint induced by environmental mutagens may produce harmful genetic effects on human health, causing mutations in sex cells and somatic cells. Sex cell mutations create a genetic risk for hereditary diseases and congenital defects while somatic cell mutations result in various diseases including cancer (Kaioumova & Khabutdinova, 1998). The SCE test has been previously applied successfully to animals and humans to determine whether or not genetic damage has been incurred as a result of exposure to dioxins and other chemicals (Akin *et al*., 2005; Arias, 2002; Bhattacharya *et al*., 2005; Garaj-Vrhovac & Zeljezic, 2001; Iannuzzi *et al*., 2004; Zober *et al*., 1993). Zober *et al.* (1993) show that the SCE technique is suitable to evaluate possible genotoxic effects of particular chemicals even if exposure occurred many years ago. It is therefore appropriate that the SCE test be performed as a test for ascertaining evidence of genetic damage, if any, sustained by New Zealand Vietnam Veterans as a result of exposure to herbicides while serving in Vietnam. The results of the current study will add to the body of knowledge so far gathered on the genetic health status of Vietnam War veterans.

2.6 The Sister Chromatid Exchange Assay

The incidence of sister chromatid exchanges in a cell increases due to many variables including age, smoking, some medications, and exposure to any substances that cause damage to DNA. A wide variety of agents that are known to cause chromosome breaks have also been found to induce SCE. Numerous studies have utilised SCE analysis to explore the extent of genetic damage caused by environmental agents. Rowland & Harding (1999) found that SCE frequency increased in female smokers between the ages of 16 and 25 years, compared to a non-smoking control group. A study conducted on methamphetamine abusers also found significant increases in SCE frequencies (Li *et al*., 2003). Iannuzzi *et al*. (2004) reported increases in the frequencies of SCEs in sheep flocks that had been exposed to specific dioxins in herbicides. Exposure to pesticides, iodine-131, wood dust, and many other environmental factors have also shown

increases in SCE frequency when compared with matched controls (Elavarasi *et al*., 2002; Sonmez *et al*., 1997; Zeljezic & Gavaj-Vrhovac, 2002). These studies highlight the usefulness of SCE analysis in the biomonitoring of human populations exposed to a variety of agents.

Evidence of genetic damage is accepted if the number of SCEs in an experimental group is more statistically significant than a selected control group (Albertini *et al*., 2000). A significant increase in SCE frequency is accepted as an indication that the DNA of a target group has been damaged in some way. Any damage to DNA is universally accepted as being detrimental to a person's well-being.

3 CHAPTER THREE: RESULTS/ DISCUSSION

3.1 SCE Analysis

The Sister Chromatid Exchange Assay (SCE) is a very sensitive and widely applied assay to study genetic damage induced by an environmental agent or clastogen. In the current study a group of New Zealand Vietnam veterans and a control group were compared using an SCE analysis, with the aim of exploring the possibility of genetic damage in the experimental group.

The SCE analysis initially included 25 men in each of the veterans and control group, a total of 50 participants. The personal questionnaire (Appendix IV) was completed and returned to the researcher by 47 of these participants. Of the remaining three men, two failed to return a questionnaire by the conclusion of the study, and one returned an incomplete questionnaire that was unsuitable for use in statistical analysis for the current project. Hence 24 veterans and 23 control individuals made up the study group. All results and statistical analyses for the current study were therefore calculated using this group of 47 individuals only.

The results from the sister chromatid exchange assay show a highly significant difference between the mean of the experimental group and the control group. A difference between these two groups was expected if genetic damage, according to the limitations of the SCE assay as a bioindicator, has been sustained by the veterans group while serving in Vietnam. However, a statistical analysis was required to ascertain whether the difference seen between the two groups was statistically significant or possibly just due to coincidence. It was essential to determine what confounding factors may be acting on individuals in the current study and perhaps altering the results, leading to inaccurate conclusions. Therefore, a close examination of the confounding factors known to have

an effect on SCE rates was conducted. The following is a summary and explanation of all results obtained leading to the conclusions drawn from the study overall.

	Mean SCE/Cell	Standard Deviation	Number of Participants
Veteran Group	**10.99**	**3.05**	**24**
Control Group	**8.24**	**1.10**	**23**

Table 3.1 SCE Analysis Results
Descriptive statistics for the mean SCE rates of the veteran and control group. Each set of statistics was calculated from the 50 cells analysed for each participant.

Table 3.1 shows the overall results for the SCE analysis – Mean SCE/Cell shows the average SCE frequency per cell for each of the veterans and controls. This average value was taken from the mean of 50 consecutive cells counted for each participant. The difference seen here with raw data (approximately 2.75 SCE/cell) appears to be large.

The graph below shows exactly the same information as in Table 3.1 but in a graphical form. The large difference between the two groups is much more easily seen in this representation. The 95% confidence is also indicated on the graph. The 95% confidence interval is an important parameter because it says that we can be 95% confident that the actual average SCE/cell for each group falls within these confidence intervals. Because there is no overlap between the two 95% confidence intervals shown on the graph below, we can be very confident that the differences between the two groups is meaningful.

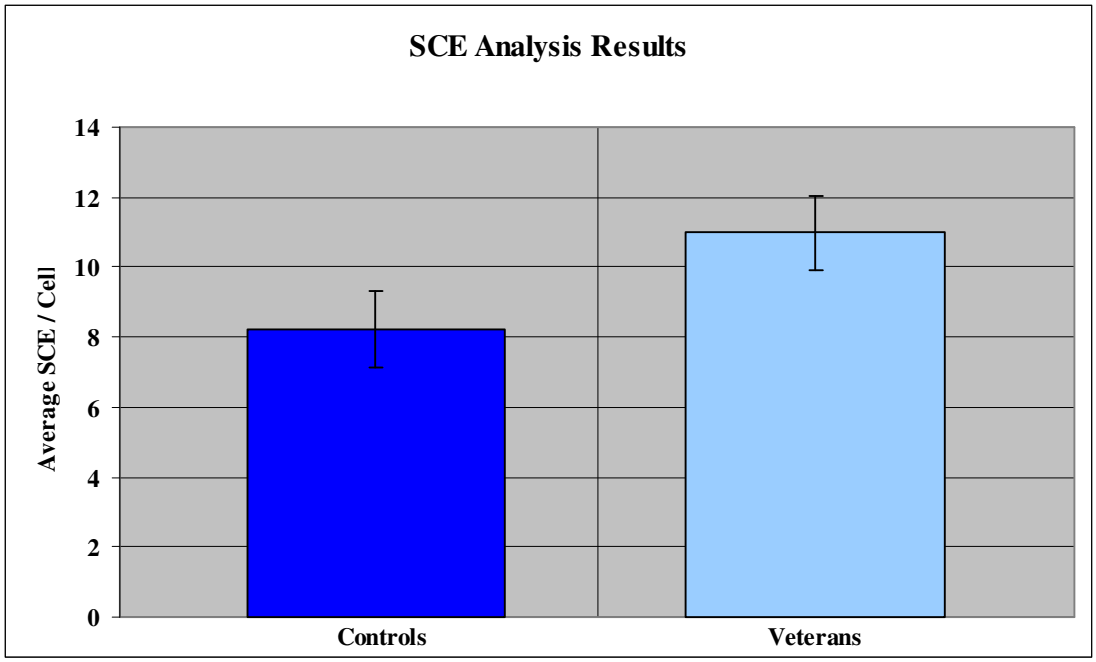


Figure 3.1 SCE Analysis Results
Graphical representation illustrating the descriptive statistics for the SCE rates (Table 4.1). The increase in average SCE per cell between the two groups can be clearly seen. The 95% confidence intervals are indicated on the error bars; the confidence intervals do not overlap.

3.2 Confounding Factors

It is possible that there are factors other than service in Vietnam that may affect the SCE results obtained in the current study. Any factor which affects SCE results other than the factor being tested (in this case service in Vietnam) is known as a confounding factor. These confounding factors could be causing the difference seen between the groups. Careful consultation of current literature revealed that the biggest confounding factor with regard to SCE studies is cigarette smoking, with smokers consistently having significantly higher SCE rates compared to non-smokers (Barale *et al.*, 1998; Biro *et al.*, 2002; Burkvic *et al.*, 1998; Burgaz *et al.*, 1998; Karaoguz *et al.*, 2005; Lambert *et al.*, 1982; Lazutka *et al.*, 1992; Sardas *et al.*, 1991; Testa *et al.*, 2005). Karaoguz *et al.* (2005) and Popp *et al.* (1994) also found alcohol consumption to be a confounding factor in SCE studies. Age has also been consistently reported as having a significant association with SCE rates in humans (Burgaz *et al.*, 1998; Gulten *et al.*, 2002; Kaul *et*

al., 2001; Kelsey *et al*., 1992). The review of current literature clearly indicated three confounding factors that needed to be statistically corrected for: age, cigarette smoking and alcohol consumption; all have the potential to affect SCE results. Information on age, smoking rates and average alcohol consumption of participants was available in the personal questionnaires.

When investigating confounding factors it is important to note that the SCE assay only detects exchanges that are occurring in the bloodstream at the time the blood is drawn. Therefore, it is only necessary to correct for those confounding factors which are having an effect currently. Approximately six months after cessation of cigarette smoking, SCE frequencies return to normal (Lazutka, *pers. comm.*). Therefore although some participants in the current study may have smoked earlier in life, the SCE assay will not indicate any damage from this past smoking, providing it was at least 6 months prior to the blood used in the current study being drawn. Examination of all personal questionnaires revealed that all non-smokers in both the veteran and control group had not smoked for a minimum of 12 months.

Although every effort has been made to correct for all confounding factors, which could be affecting SCE rates, it is possible that one or more confounding factors have been overlooked due to the fact that they are unknown to the researcher. It appears likely, however, for the data obtained, that there is some factor(s) involving the veterans group that has resulted in them showing higher average SCE rates compared to New Zealand army personnel who did not serve in Vietnam. By controlling for all known confounding factors, we can assume this difference is caused by service in Vietnam.

After correction for confounding factors the results were not changed, indicating that these factors were having no significant effect on the SCE results.

3.3 Statistical Analysis

The statistical analysis that was conducted gave a *p*-value of less than 0.001, which indicates that the difference in means between the experimental and control groups was highly statistically significant. Accepting the SCE assay as an indirect bioindicator, this result would suggest that New Zealand Vietnam veterans may have sustained genetic damage as a result of service in Vietnam. Further investigation into the results was conducted providing more statistical data to support this finding.

3.3.1 Within-Group Variability

When analyzing the descriptive statistics for the raw SCE data, it became apparent that although there was a significant difference between the veteran and the control groups, the spread of the data within these groups was also very different. The standard deviation for the control group was 1.10, the veterans group had a standard deviation of 3.05, almost three times higher than that of the control group. It was therefore necessary to investigate the spread of data in each of these groups to try and ascertain the reason for this large difference. It was possible that the higher standard deviation and perhaps the higher mean seen in the veterans group was due to a small number of very high SCE frequencies skewing the distribution. The average SCE frequency per cell for each of the veterans and controls was plotted (Figure 3.2 below) to investigate the spread of these groups and compare them with one another. Figure 3.2 illustrates the difference in spread between the two groups. It can be seen that the difference in standard deviation between the groups is due to the overall spread of data being greater in the veterans group compared to the control group; the large difference in spread between the two groups is not due to a small number of outliers that are skewing the veterans group distribution, although the distribution is slightly skewed.

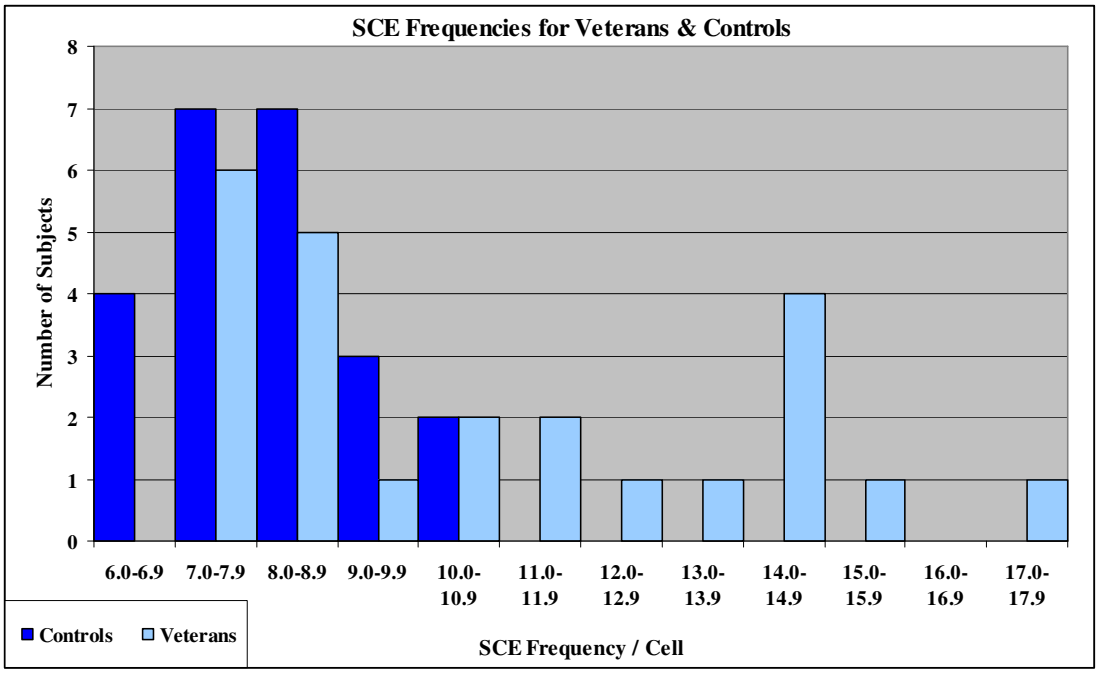


Figure 3.2 Plot of SCE Raw Data
The raw data (SCE averages) for each of the 24 veterans and 23 controls being statistically analysed. This plot clearly displays the difference in spread between the two groups. It is evident from this plot that the difference in means between the two groups is not due to a few high value outliers.

Note that out of the 24 veterans included in this analysis, 12 have higher SCE frequencies than the highest SCE frequency recorded for the entire control group (10.54 SCEs/cell). Therefore, half of all veterans studied have a higher SCE frequency than the highest obtained SCE frequency among the controls. This illustrates the fact that the experimental group have much higher SCE rates as a group when compared to the control group and the statistical analysis reflects this. The 95 % confidence intervals for the estimated means show no overlap between the veterans and the control group (Figure 3.1), giving further evidence that the difference in the means is significant, despite the difference in spread. It is also important to note that the estimated statistics show very similar values for the standard error of each distribution respectively. This again reiterates the fact that the difference between the two groups is highly significant.

3.3.2 Statistical Effect Size

The Effect Size (ES) is a measure of the magnitude of a treatment effect; in the case of the current study a measure of the magnitude of exposure effect. The ES is independent of sample size. Cohen (1988) defined any ES of 0.8 or larger as being a large effect. The ES obtained for the current study, 1.226, is therefore a large ES, and indicates that the effect of service in Vietnam (perhaps caused by exposure to Agent Orange), is very large.

3.3.3 Conclusions

- The SCE results obtained show a highly statistically significant difference between a group of New Zealand Vietnam veterans and a group of matched controls ($p < 0.001$)

- Following statistical correction for influence of confounding factors, the difference in mean between the two groups remains highly significant ($p < 0.001$)

3.4 Overall Summary

It is important to consider that statistical significance of genetic damage should be interpreted cautiously with regard to the biological significance. The SCE assay cannot be applied as a diagnostic tool. Although it is interpreted as a sensitive and powerful bioindicator of genetic damage, it cannot predict specific health outcomes. However, genetic damage to any degree has the potential to result in adverse health effects.

In the current study, a significantly higher frequency of SCE was observed in a sample group of New Zealand Vietnam War veterans compared to a matched control group of New Zealand army and ex-army personnel. Elevated frequency of SCE in a target group is an accepted indicator of clastogenicity/genotoxicity.

3.4.1 Conclusion

According to the guidelines published by the ICPS (Section 1 of this report) defining the significance of the endpoint of the SCE assay as a bioindicator of genetic damage, it is possible to draw the following conclusion from the results obtained from the current study:

- **The SCE assay conducted on a small sample of New Zealand Vietnam veterans in this study would suggest that these men have been exposed to a harmful clastogenic agent as a result of service in Vietnam. Within the strictures in interpreting the biological significance of this particular assay, there is an indication that these men may have incurred genetic damage.**

4 CHAPTER FOUR: RECOMMENDATIONS

It is acknowledged by the author that time constraints of a two year project have resulted in the small sample size of the current study. However, the strong results that have been obtained are interpreted, with limitations, as being indicative of genetic damage in New Zealand Vietnam War veterans and should be seen as an alert signal.

4.1 New Zealand Vietnam War Veterans

The current study has obtained highly significant results and strong evidence that New Zealand Vietnam War veterans have been exposed to a clastogen which can cause genetic damage as a result of service in Vietnam. The results therefore warrant a larger study of New Zealand Vietnam War veterans. A larger study would consist of a significantly larger sample size (minimum of 50 veterans and 50 controls) than the current study. In addition to a larger sample size, a number of cytogenetic assays, such as those mentioned in Section 2.5 should be used for analysis.

4.2 Children of New Zealand Vietnam War Veterans

The current study has detected high SCE frequencies in New Zealand Vietnam War veterans, but in a small sample. Nonetheless, the convincing results suggest that a similar scientific investigation of the children of these veterans be conducted using other assays. Whilst not wanting to appear alarmist, inherited genetic damage can be passed on to the next generation, possibly causing detrimental health effects through many generations to come.

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Furman, Melanie

From: Gary Goode <gngoode@gmail.com>
Sent: Wednesday, September 30, 2026 12:28 PM
To: Jan McColm; Furman, Melanie
Subject: Let us count the calls for a fully independent public inquiry into CFB Gagetown's harmful chemical use.

This message originates from outside the Maine Legislature.

How much longer must we wait for accountability and justice.

Gary Goode
gngoode@gmail.com
250-423-0141

Calls for a Public Inquiry into the use of Agent Orange at Canadian Forces Base Gagetown

Nine distinct, dated, publicly reported calls for a public Inquiry into Agent Orange and related herbicides at CFB Gagetown, found through direct search. Treat as a floor, not a ceiling — provincial, municipal, and individual statements not covered by national media may add to this count. Each entry is independently verifiable at its cited source.

The Calls

1. June 2005 — New Brunswick MLA Jody Carr calls for an independent inquiry into the spraying of Agent Orange, Agent Purple, and other defoliants at CFB Gagetown during the 1950s and 1960s. *[Global News, "Timeline: the fight for Agent Orange compensation in N.B."]*

2. 2006 — The federal Conservative Party campaigns on a promise of a full inquiry into Agent Orange and defoliant spraying at Base Gagetown. Not followed through once in office (later noted publicly by NDP MP Peter Stoffer). *[CBC News, "CFB Gagetown Agent Orange victims urged to seek compensation"]*

3. 1 March 2007 — Kenneth Dobbie, President of the Agent Orange Association of Canada, sends a 9-page document to all 308 MPs: "We insist a public judicial inquiry be commenced to find the truth." *[Agent Orange Association of Canada, letter to the Minister of Veterans Affairs, via VAORRC.org]*

4. c. 2013–2014 — The federal NDP formally calls for an inquiry into defoliant use at CFB Gagetown in the House of Commons, citing veteran Basil McAllister's case. *[Global News, "NDP calls for inquiry into defoliant use at CFB Gagetown"]*

5. Ongoing, since c. 2005 — Gary Goode, Chair of Brats In The Battlefield and a Gagetown veteran who lost a lung to cancer, has lobbied for an independent public inquiry for nearly twenty years, including direct testimony to Parliament. *[The Globe and Mail (March 2024); CBC News (18–19 December 2024)]*

6. Reiterated March 2024 — Green Party Leader Elizabeth May: "Even at this late a date it would be good to have a public inquiry," citing her own long-standing advocacy. *[The Globe and Mail, March 2024]*

7. 13 Dec 2019 – 11 Apr 2020 (open); presented 21 Oct 2020 — House of Commons e-petition e-2327, sponsored by MP Jenica Atwin (Fredericton), calls on Parliament to "convene a fully independent public inquiry" into pesticide application at CFB Gagetown, 1950s to present. Presented as Petition No. 432-00139. *[House of Commons of Canada, ourcommons.ca/petitions]*

8. 6 March 2024 — Maine's Gagetown Harmful Chemical Study Commission calls for a new, independent probe, finding Canada's own report data and analysis "incorrect" and "biased." *[CBC News, "Maine commission calls for new probe of impacts of Agent Orange use at Base Gagetown"]*

9. December 2024 — House of Commons Standing Committee on National Defence holds hearings on legacy contamination sites including Gagetown; Gary Goode's testimony renews the call for an independent public inquiry. *[CBC News, "Former Gagetown soldier encouraged by federal probe of Agent Orange use at base"]*

Government's Standing Response

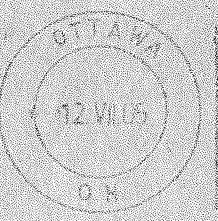
As of March 2024: "Given the comprehensive nature of this report, an additional inquiry is not planned at this time." No inquiry has been called.

National Defence / Défense nationale

If undeliverable, return to sender at point of mailing.
En cas de non-livraison, renvoyer au lieu d'expédition.

Director
Access to Information and Privacy
National Defence Headquarters
MGen George R. Pearkes Building
Ottawa, Canada K1A 0K2

Ms. Gail Radford-Ross
206 - 1239 12 Avenue SW
Calgary, Alberta
T3C 3R6


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Requests Search Result / Résultat de la recherche sur les demandes

Criteria: Request Type = A, Request Number = *200400207* / Critère : Type de la demande = A, Numéro de demande = *200400207*

Request Demande	*Source*	*Due Date Échues*	*Summary Sommaire de la demande*	*PAGE(S) Reviewed Révisées*	*Released Relâchées*	*Closed Complétées*	*Disposition*
A-2004-00207 / 3-4	Public	2004-10-27	Information on spraying of "Agent Orange" by the U.S. Army at CFB Gagetown in the late 1960's. Also information on medical information of military personnel based there	167	82	2004-09-08	Disclosed in part

Total Requests: 1 ***Total Pages Reviewed/Released:*** ***167 / 82***

Nombre total de demandes : 1 ***Nombre total pages révisées / relâchées :*** ***167 / 82***

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Williot P@ADM(HR-Mil) DCOS FHP@Ottawa-Hull

From: Mohanna S@ADM(HR-Mil) DCOS FHP@Ottawa-Hull
Sent: Wednesday, July 07, 2004 12:11 PM
To: Williot P@ADM(HR-Mil) DCOS FHP@Ottawa-Hull
Subject: FW: RECOGNITION

For your info. Please let me know if you need more on the subject. This is the summary of the review of the file I got from CFB Gagetown on this issue.

S.Mohanna MD FRCPC FACPM OSJ CD
Deputy Chief of Staff Force Health Protection /Sous-chef d'état major protection de la santé de la force
Occupational and Environmental Health/Santé au travail et environnementale
1745 Alta Vista Drive room/pièce 369
Ottawa On K1A 0K6
tel: 945-6569 fax: 945-6823
e mail mohanna.s@forces.gc.ca

-----Original Message-----
From: Mohanna S@ADM(HR-Mil) DCOS FHP@Ottawa-Hull
Sent: Wednesday, 26 May, 2004 16:32
To: s.19(1)
Cc: Bernier Col JJRS@ADM(HR-Mil) DCOS FHP@Ottawa-Hull; Fleming LCdr IM@ADM(HR-Mil) DCOS FHP@Ottawa-Hull; Campbell MWO JA@ADM(HR-Mil) DCOS FHP@Ottawa-Hull; Verville MWO JRC@ADM(HR-Mil) DCOS FHP@Ottawa-Hull; Sutherland LCol BA@ADM(HR-Mil) DCSA@Ottawa-Hull
Subject: FW: RECOGNITION

s.19(1) Dear

I have just completed the review of all the documents submitted to me regarding the use of Agent Orange ((Tetra-chloro-di-benzo-p-dioxin) at CFB Gagetown.

In June of 1966, Agent Orange was used as a potential herbicide by s.15(1) among fifteen other herbicides. Helicopters did the spraying on very small plots uninhabited areas with very dense vegetation. 116 plots were sprayed; each plot measuring 600 by 200 feet separated by a buffer zone of 100 feet. The results of each herbicide were compared in order to determine the best one to be used.

s.15(1) As far as Agent Orange is concerned, 2 ½ barrels (120 gallons) were used once. The barrels were held on a truck and returned tc . after the spraying.

Since that experimental use in June of 1966, there are no records that Agent Orange was ever used again in Gagetown. A complete record has been kept of all the different herbicides used with the location of the spraying and the disposal of the used drums.

In 1985, extensive environmental studies of the soil and ground water were done by five commercial agencies under the supervision of Health Canada. There was no evidence that chemicals caused contamination.

Liquid residue was found in 112 excavated drums from a total of 666 drums. The total amount of residue was less than 1000 litres and consisted of Tordon 101 herbicide, which is found everywhere in Canada, as well as Sodium Silicate, which is used for water treatment as a setting agent for concrete.

No civilian or military personnel were placed at risk and no civilian community was affected. Up until 1985 (28 years after the spraying) more than 150,000 troops were trained at CFB Gagetown. No indications from medical records have suggested ill health effects.

S.Mohanna MD FRCPC FACPM OSJ CD
Deputy Chief of Staff Force Health Protection /Sous-chef d'état major protection de la santé de la force
Occupational and Environmental Health/Santé au travail et environnementale
1745 Alta Vista Drive room/pièce 369
Ottawa On K1A 0K6
tel: 945-6569 fax: 945-6823
e mail mohanna.s@forces.gc.ca

-----Original Message-----
From: Mohanna S@ADM(HR-Mil) DCOS FHP@Ottawa-Hull
Sent: Monday, 17 May, 2004 13:44
To: s.19(1)
Cc: Bernier Col JJRS@ADM(HR-Mil) DCOS FHP@Ottawa-Hull; Lalonde JD@ADM(HR-Mil) DCOS FHP@Ottawa-Hull
Subject: FW: RECOGNITION

s.19(1) Dear
I have just received some documents pertaining to the use of Agent Orange in Gagetown. The oldest one was from April 1966 and the most recent one was from March 1985. I will review them in order to try to answer your enquiry as soon as possible.

S.Mohanna MD FRCPC FACPM OSJ CD
Deputy Chief of Staff Force Health Protection /Sous-chef d'état major protection de la santé de la force
Occupational and Environmental Health/Santé au travail et environnementale
1745 Alta Vista Drive room/pièce 369
Ottawa On K1A 0K6
tel: 945-6569 fax: 945-6823
e mail mohanna.s@forces.gc.ca

-----Original Message-----
From: Sutherland LCol BA@ADM(HR-Mil) DCSA@Ottawa-Hull
Sent: Tuesday, 04 May, 2004 10:05
To: 'bryan'
Cc: Mohanna S@ADM(HR-Mil) DCOS FHP@Ottawa-Hull
Subject: FW: RECOGNITION

s.19(1)

Dr. Samy Mohanna from the Canadian Forces Medical Group's Occupational and Environmental Health Program directorate will be contacting you in due course to answer your questions on Agent Orange that are of a scientific nature.

Yours truly,

B.A. (Brian) Sutherland

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LCol / lcol
CWATRP Program Manager (http://www.forces.gc.ca/hr/centre/engraph/cwatrpp_e.asp?cat=13) /
PREGC Directeur du programme (http://www.forces.gc.ca/hr/centre/frgraph/cwatrpp_f.asp?cat=13)
(613) 995-1579
Sutherland.BA@forces.gc.ca

-----Original Message-----
From: Sutherland LCol BA@ADM(HR-Mil) DCSA@Ottawa-Hull
Sent: Tuesday, 04 May, 2004 08:31
To: 'bryan'
Subject: RE: RECOGNITION

Dear s.19(1)

I am waiting for a response from the Forces' medical branch as I believe they would have the expertise in this area.

Yours truly

B.A. (Brian) Sutherland
LCol / lcol
CWATRP Program Manager (http://www.forces.gc.ca/hr/centre/engraph/cwatrpp_e.asp?cat=13) /
PREGC Directeur du programme (http://www.forces.gc.ca/hr/centre/frgraph/cwatrpp_f.asp?cat=13)
(613) 995-1579
Sutherland.BA@forces.gc.ca

s.19(1)

-----Original Message-----
From: bryan [mailto:
Sent: Tuesday, 04 May, 2004 08:29
To: Sutherland.BA@forces.gc.ca
Subject: Re: RECOGNITION

Dear L/Col Sutherland:

Thank you for your quick response. I would certainly appreciate hearing if there has been any type of investigation into Agent Orange.

Thank you for your attention to this matter.

s.19(1)

----- Original Message -----

From: Sutherland.BA@forces.gc.ca

To: s.19(1)

Sent: Monday, May 03, 2004 10:23 AM

Subject: RE: RECOGNITION

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Dear s.19(1)

The Chemical Warfare Agent Testing Recognition Program was instituted to acknowledge the service of service members who served as test subjects in Ottawa at the Chemical Warfare Laboratories and Suffield, Alberta. To the best of my knowledge, there are no plans to expand the program's mandate into other areas and situations. Also, I am not in a position to comment on whether or not the issue of Agent Orange has been brought to the attention of Canadian Forces authorities; I will try and track down someone that can provide this information.

Yours truly

B.A. (Brian) Sutherland
LCol / lcol
CWATRP Program Manager
(http://www.forces.gc.ca/hr/centre/engraph/cwatrpp_e.asp?cat=13) /
PREGC Directeur du programme
(http://www.forces.gc.ca/hr/centre/frgraph/cwatrpp_f.asp?cat=13)
(613) 995-1579
Sutherland.BA@forces.gc.ca

-----Original Message-----
From: bryan [mailto
Sent: Saturday, 01 May, 2004 21:58
To: recognition@forces.gc.ca
Subject: RECOGNITION

May 1st, 2004

Dear Sir/Madam:

Can you please tell me if there is any recognition for service members who were exposed to Agent Orange. I died of Multiple Myeloma (bone marrow cancer). s.19(1)
His name:

He told us that himself as well as others were exposed to Agent Orange in CFB Gagetown. I now know that New Brunswick Power employees who were exposed
s.19(1) have been compensated. I have also learned that Agent Orange was used at the following sites according to United States Congressman Lane Evans (Indiana): (This includes use, testing or storage of Agent Orange, Agent Blue, Agent Purple, Agent White).

Aberdeen Proving Ground, Aberdeen, Maryland
Apalachicola National Forest (Sophoppy, Florida)
Avon Air Force Base, Florida
Beaumont, Texas
Brawley, California
Bushnell Army Air Field, Florida
Camp Detrick, Maryland
Dar and Prek Clong, Cambodia
Eglin Air Force Base, Florida
Fort Gordon, Georgia
Fort Richie, Maryland
Fredericton, New Brunswick,

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Canada

Guanica, and Joyuda, Puerto Rico
Gulfport, Mississippi
Huntington County, State College, Pennsylvania
Jacksonville, Florida
Kauai, Hawaii
Kingston, Rhode Island
Kompong Cham Province, Cambodia
Laos
Las Marias, Puerto Rico
Las Mesas Cerros and La Jugua, Mayaguez, Puerto Rico
Loquillo, Puerto Rico
Mauna Loa, Hilo, Hawaii
Operation PACER HO (Disposal at sea)
Pinal Mountains, Globe, Arizona
Pranburi and other locations in Thailand
Prosser, Washington
Rio Grande, Puerto Rico
Wayside and Wilcox, Mississippi

s.19(1)

spoke of himself and other soldiers cleaning up a spill of Agent Orange while in the Canadian Armed Forces. His collegue and friend s.19(1)
also spoke of this and was diagonsed called and mentioned that we should look into this with the Canadian Armed Forces. We s.19(1)
left it at the time as got cancer shortly afterwards.

It is my understanding that Agent Orange is a reconginzed cause (by the American Armed Forces) of the following: **Multiple Myeloma which is characterized by proliferation of bone marrow stem cells resulting in an excess of neoplastic cells with the production of excess abnormal protein, usually immonoglobulins. Identification of these proteins in the blood or urine represents the best diagnostic feature of this disease. The pelvis, spine, ribs and skull are frequently involved.** suffered the persistent unexplained skeletal pain (especially in the back or thorax) renal failure or recurrent bacterial infections, which are the most common presenting symptoms. Anemia with weakness and fatigue may predominate in some patients.

It is my understanding that Agent Orange was a 50-50 mix of two chemicals, known conventionally as 2,4,D and 2,4,5,T. The combined product was mixed with kerosene or diesel fuel and dispersed by aircraft, vehicle, and hand spraying. An estimated 19 million gallons of Agent Orange were used in South Vietnam during the war.

The earliest health concerns about Agent Orange were about the product's contamination with TCDD, or dioxin. TCDD is one of a family of dioxins, some found in nature, and are cousins of the dibenzofurans and pcb's.

s.19(1)

suffered another known side effect of Agent Orange - Non-Hodgkin's lymphoma.

s.19(1)

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I would be very interested to know if this has been brought before the Department of National Defence and if so what action has been taken. If not, how do I go about getting information on the actual use of Agent Orange at CFB Gagetown and what precautions were taken for troops having to do clean-up of silled substance? (It is my understanding that no precautions were taken and that these soldiers were standing in the Agent while pushing it with a broom to clean it up.

I would appreciate an answer to my questions. Thank you.

s.19(1)

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Page(s) 000007 to/à 000044

is(are) exempted pursuant to section(s)
est(sont) exemptée(s) en vertu de(s)(l')article(s)

13(1)(a), 15(1)

of the Access to Information Act

de la Loi sur l'accès à l'information

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MEDIA BRIEFING

27 MAR 85

GOOD MORNING, LADIES AND GENTLEMEN. AT THE RISK OF BORING YOU WITH REPETITION, I WOULD LIKE TO SUMMARIZE WHAT YOU HAVE HEARD AND PERHAPS PUT OUR FINDINGS IN PERSPECTIVE.

WHAT WE HAVE UNCOVERED IS NEITHER A CHEMICAL NOR TOXIC WASTE DUMP. RATHER, IT REPRESENTS A LAND-FILL SITE AT WHICH, IN YEARS PAST, WE BURIED THE EMPTY CONTAINERS LEFT OVER FROM OUR ANNUAL SECOND-GROWTH CONTROL SPRAY PROGRAMME. I USE THE TERM "EMPTY" IN A RELATIVE SENSE ONLY. YOU MUST REMEMBER THAT IN THOSE DAYS, ENVIRONMENTAL REGULATIONS DID NOT REQUIRE SPRAYING CONTRACTORS TO RINSE, PUNCTURE, CRUSH AND BURY THE CONTAINERS AS THEY DO TODAY..

THERE CAN BE LITTLE DOUBT THAT WHEN SOME OF THESE BARRELS WERE BURIED THEY CONTAINED SMALL AMOUNTS OF THEIR ORIGINAL HERBICIDE CONTENTS (ONE PINT / A QUART PERHAPS). OVER THE YEARS SOME OF THIS HERBICIDE HAS LEAKED INTO THE SURROUNDING SOIL AND RAIN OR GROUND WATER HAS LEAKED INTO SOME OF THE BARRELS. THIS ACCOUNTS FOR THE MINUTE QUANTITIES OF HERBICIDE RESIDUES FOUND IN OUR SOIL AND WATER SAMPLING TESTS. WE HAVE BEEN UNABLE TO UNEARTH ~~ONE BIT OF~~ EVIDENCE TO SUPPORT THE IRRESPONSIBLE ALLEGATIONS THAT ~~HUNDREDS (OR INDEED, ANY)~~ FULL BARRELS OF HERBICIDE WERE EVER BURIED AT THE SITE.

LET ME REMIMD YOU THAT OUR PAINSTAKING TESTING PROGRAMME AT THE DUMPSITE HAS CONCLUDED THAT THE GROUND WATER MEETS THE ACCEPTABLE LIMITS OF THE DRINKING WATER QUALITY STANDARDS, AND THAT THE SOIL PRESENTS NO ENVIRONMENTAL THREAT. THIS MEANS TO ME THAT I CAN, WITHOUT FEAR OR HESITATION, DRINK THE WATER DRAWN FROM ANY OF THE 12 WELLS ON THE SITE AND JUST AS FEARLESSLY EAT POTATOES GROWN ON THE SITE. (AS A

.../2

JUL 14 2004 15:47 FR DCOS FHP 613 945 6823 TO 99545193 P.02/03

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"SPUD ISLANDER", HOWEVER, I AM WELL AWARE THAT YOU CANNOT GROW POTATOES IN A GRAVEL PIT SO THIS LATTER REASSURANCE MAY BE SOMEWHAT HYPOTHETICAL).

MOST IMPORTANTLY, HOWEVER, THE RESULTS OF THESE TESTS ARE A CLEAR INDICATION THAT WE HAVE NOT CONTRIBUTED IN ANY WAY TO ADVERSELY AFFECTING THE ENVIRONMENT NOR THE HEALTH OF THE RESIDENTS IN THIS AREA.

TO THESE RESIDENTS I WOULD LIKE TO TAKE THIS OPPORTUNITY TO PASS ON MY PERSONAL APOLOGIES FOR THE INORDINATELY LENGTH OF TIME TAKEN BY THIS INVESTIGATION. AS I HAVE ALREADY SAID IT HAS BEEN A PAINSTAKINGLY COMPLEX PROCESS AND ONLY COMPLETED ON MONDAY OF THIS WEEK WHEN WE RECEIVED THE FINAL ANALYSES FROM HEALTH AND WELFARE CANADA AND ENVIRONMENT CANADA. MY ONLY EXCUSE IS THAT I DID NOT WISH TO RELEASE ANY INFORMATION UNTIL WE HAD ALL OF THE FACTS AT OUR DISPOSAL. DURING THE LONG PERIOD OF OUR INVESTIGATION YOU HAVE BEEN SUBJECTED TO A CLEVERLY ORCHESTRATED CAMPAIGN OF FEAR AND DECEPTION BY SEVERAL GROUPS PROFESSING TO HAVE YOUR BEST INTERESTS AT HEART. BY USE OF HALF-TRUTHS, MISQUOTATION, RUMOUR AND TOTALLY UNFOUNDED STATEMENTS, THEY HAVE ELICITED YOUR SUPPORT FOR THEIR SOMEWHAT DUBIOUS CLAIMS FOR PERSONAL COMPENSATION FROM OTHER AGENCIES. THEY HAVE SUCCEEDED IN SPREADING ALARM AND DESPONDENCY WITHIN THE COMMUNITIES SURROUNDING CFB GAGETOWN WHILE MANAGING TO DRIVE YOUR PROPERTY VALUES DOWN. BEFORE OFFERING THESE GROUPS ANY FURTHER SUPPORT I WOULD ASK YOU TO CONSIDER IF THEY REALLY HAVE YOUR BEST INTERESTS AT HEART. OUR FACTS ARE NOW ON THE TABLE. ASK TO SEE THEIRS!

TO ASSIST IN ALLAYING THESE FEARS WE HAVE ALREADY INITIATED A SERIES OF BRIEFINGS IN CONCERT WITH APPROPRIATE GOVERNMENT AGENCIES, FOR ELECTED OFFICIALS AT BOTH THE FEDERAL AND PROVINCIAL LEVELS, AS WELL AS FOR MAYORS AND CIVIC OFFICIALS OF LOCAL TOWNS AND MUNICIPALITIES.

.../3

JUL 14 2004 15:47 FR DCOS FHP 613 945 6823 TO 9954519 P.03/03

A0090078-2-000046

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LET ME CLOSE BY RE-ITERATING THAT WE HAVE NEVER IN THE PAST HAD, DO NOT NOW HAVE, NOR EVER WILL HAVE ANY TOXIC OR CHEMICAL DUMPS WITHIN THE CONFINES OF CFB GAGETOWN. OUR SECOND-GROWTH CONTROL SPRAY PROGRAMME, INCLUDING ITS CONTAINER DISPOSAL METHODS, HAS ALWAYS BEEN AND WILL ALWAYS BE CARRIED OUT IN STRICT ACCORDANCE WITH EXISTING FEDERAL AND PROVINCIAL REGULATIONS. IT POSES NO THREAT TO THE ANIMAL AND HUMAN POPULATION OF THE BASE NOR TO OUR NEIGHBOURING COMMUNITIES.

JUL 14 2004 15:47 FR DCOS FHP 613 945 6823 613 945 6823 TO 9954519 P.01/03

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COMBAT TRAINING CENTRE

CENTRE D'ENTRAINEMENT AU COMBAT

Headquarters
Combat Training Centre
Canadian Forces Base Gagetown
Oromocto, New Brunswick
E0G 2P0

13 March 1985

Dear Jon,

I have enclosed a report on the meeting held for Upper Gagetown on 08 March 1985. The memo was prepared by Captain Jim Rose (Log/Tn); it is self-explanatory.

s.20(1) are trying to organize meetings in the following locations: Fredericton, Oromocto, Burton - exact locations and dates to be announced. I will be represented at each one.

I also enclose some printed data given out by s.20(1) personnel.

I have all your tapes and I am systematically reviewing them. I am making a brief written summary of each tape for briefing purposes. I also have some high tech equipment for automatic high-speed copying and I can mix/match, sequence/edit and produce various combinations. I am thinking about how best to use them in the current situation.

We are presently scheduling a number of activities such as a detailed press release followed by a press conference, detailed briefings to MLAs, MPs and Mayors, etc. I have a Major MPIO here to help with the preparation of a press release.

Quite frankly, with respect to this problem and as Mr W.C. Fields said in his epitaph: "I would rather be in Philadelphia

Sincerely,

Ray

s.19(1)
s.20(1)

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JUL 14 2004 15:48 FR DCOS FHP 613 945 6823 TO 9954519 P.02/03
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s.20(1)

09 March 1985

Col R. Hurley, CD
Deputy Commander
Combat Training Centre
CFB Gagetown
Oromocto, N.B.

Dear Ray:

The expert witness tapes that were produced as a result of the Herbicide Trial in Nova Scotia two years ago are delivered as promised.
The people featured on the tapes are the world's experts on herbicides. They were brought to Nova Scotia by NSFI in response to the trial forced on the Company by a small and very determined group of environmentalists.

The tapes are not very exciting from a production point of view since the subjects refused to let us do anything with them. We could video tape them but only if we did not edit in any way... in some cases that meant that we could not even zoom the camera. However, they are the best in their fields in the world, so from that point of view they are invaluable.

I included the entire set becuase there are a number that deal with the use of herbicides in forestry which includes second growth clearance, especially in plantations. Since the use of chemicals in Gagetown was essentially to control second growth, I thought they would be useful. Besides, I thought you might like to have the entire set, if for no other reason than that the local forestry people might be interested in them.

You will find they have a variety of uses - briefings, public meetings, informing medical staff, etc. Above all, they give the best scientific evidence available. The basis of the message is that herbicides, if used properly, are safe.

I sent a list of the tapes to George a few days ago and I have enclosed another with this letter.

Yours sincerely,

s.19(1)

s.20(1)

Enclosure

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20 min. 26 sec

19 min. 57 sec

s.19(1)

s.20(1)

30 min. 43 sec

** TOTAL PAGE.03 **

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DIRECTORATE OF HISTORICAL HERITAGE

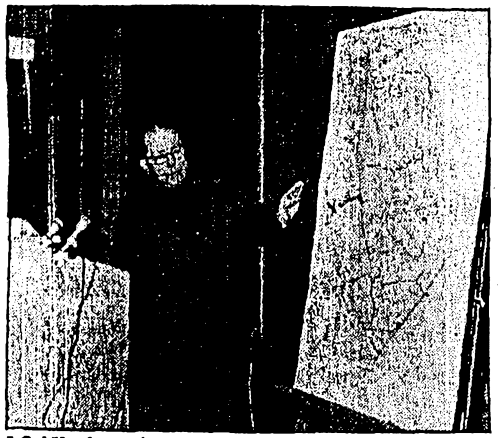
BASE GAGETOWN GAZETTE

Director of Cdn Forces His
National Defence Headquart
Ottawa, Ontario
K1A 0K2

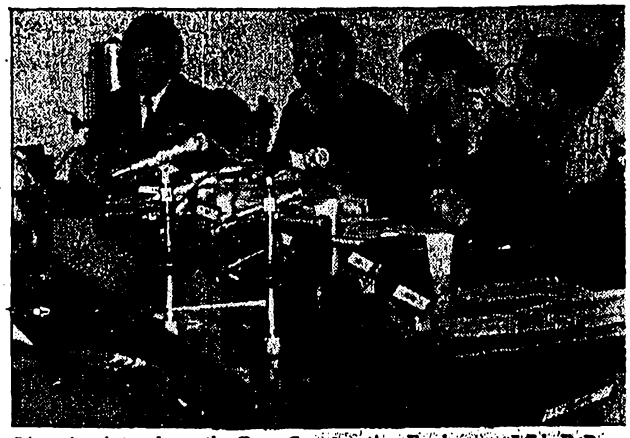
GAGETOWN DILIGENCE

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LCol Hurley points out the area near Blissville (marked here with an X for identification purposes) where the 1966 tests took place.



Listening intently as the Base Construction Engineer LCdr R. Popp ing Officer Maj K. Penney (third from left) answers some of the media questions are NDHQ Information Officer Hurley.

Base Gagetown was the focal point of the continuing battle over the use of chemical sprays when it was revealed in the House of Commons last week that the defoliant "Agent Orange" had been tested here in 1966.

Agent Orange, a combination of chemical compounds 2,4,5-T and 2,4-D, was used in Vietnam to defoliate dense jungle, and contains a potent form of "dioxin", which has been linked with cancer and other health problems in Vietnam veterans. The effect of "dioxin" on humans is under close scrutiny in the United States because a group of Vietnam vets are suing their government for compensation for medical conditions they claim were caused by exposure to Agent Orange.

On the morning of Friday, 22 Jan, NDP MPs Terry Sergeant (Selkirk-Interlake) and Simon de Jong (Regina East) presented in the House of Commons a US military report, "Technical Memorandum No. 141, Defoliation Tests in 1966 at Base Gagetown, New Brunswick, Canada". The reports discussed testing defoliants code-named Agents Orange, White and Purple on 116 different two-acre plots at Base Gagetown.

Public concern for the health of the soldiers involved in the testing, as well as possible danger to civilians residing on the fringe of the base, was reflected by phone calls to the base by several news reporters that day. The New Brunswick Concerned Parents Group, active opponents of the provincial spruce budworm spray program, condemned the 1966 tests and provincial health minister, Brenda Robertson, called for an investigation of the incident.

The Department of National Defence quickly took action to examine the background of the tests and to search for any Canadians involved in the spraying. Since the tests took place before the integration of the Forces, the Army files had to be returned to Gagetown from Ottawa and studied before the background of the testing could be discussed with the media.

In Ottawa, Defence Minister Gilles Lamontagne said Monday (26 Jan) that he knew about the U.S. report in September, but had not taken action at the time because he had been assured there was nothing to worry about. He said the tests were conducted for range and brush control purposes only.

On Wednesday, (28 Jan), the two NDP MPs who had obtained the military document under U.S. freedom of information laws came to Base Gagetown totour the area defoliated by the U.S. tests in 1966, and to meet with New Brunswick environmental groups.

Following Mr. Sargeant's aerial tour of the areas sprayed by the U.S. Army during the tests, Base Gagetown officials held a news conference at Building F-1. On hand to field questions were Base Commander Brigadier-General G.R. Cheriton, Base Operations OfficerLCol R.G. Hurley, Base Construction Engineering Officer Maj K.G. Penney and Chief of Staff Col W. H. Batt.

Since the MPs had alluded to suspicions of a coverup of chemical warfare tests in Canada, the story attracted a number of reporters to the news conference, and another later in the day given by Mr. Sargeant and Mr. de Jong.

General Cheriton said the Americans had been invited to test defoliants at Base Gagetown in 1965, under a request for assistance and technical information. Only 15 per cent of the training area is cleared for military manoeuvres, Col Hurley pointed out, and the base fights a continuing battle to control secondary growth in cleared areas. About $300,000 will be spent this year on herbicidebrush control, and Col Hurley said if the training area were not sprayed every five or six years, it would take 40-50 million dollars to reclaim it. He said soldiers cleared brush with axes and machetes when the camp was being opened up in



Terry Sargeant, MP (NDP Selkirk-Interla visit last week. Simon de Jong (NDP Regi Tabernor, the Commander's aide.

Continued P. 2

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r of Cdn Forces History
l Defence Headquarters
Ontario

ol. 21 No. 5

esday, 04 Feb. 81

Combat Training Centre

s Controversy



n Engineer- LCdr R. Pepper, SO3 Ops Capt T. Burnie, Chief of Staff
answers one Col W.H. Batt, General Cheriton and SSO Ops LCol R.G.
tion Officer Hurley.



it, MP (NDP Selkirk-Interlake) is welcomed by the Commander on his
t. Simon de Jong (NDP Regina East) is partially hidden behind Capt D.
Commander's aide.

ining area is
r military
Col Hurley
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secondary
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d P. 2

Defoliant

from P.1

the late 50's, but this took too many man-hours. Machine clear-cutting was tried, but it was expensive and left stubble which injured infantrymen. It also destroyed ground cover and caused erosion.

Gagetown turned to herbicides in the early 60's and used 2,4,5-T and 2,4-D among other chemicals. Major Penney said Tordon 101 was used beginning in 1965 and in 1975 the military switched to granular DyCleer 10-P. All the chemicals used were commercially available, registered with the Department of Agriculture and approved for use in Canada.

Col Hurley said the test strip was 3.5 miles long by a quarter-mile wide, ran between the Broad Road and the Blissville airstrip, and came no closer than 2.2 miles from the nearest civilian habitation. There were no adjacent farmlands and the area was only accessible by air.

Only one Canadian who was involved in the test has come forward to date - most of the test program was carried out by U.S. Army personnel. Edmonton pilot, Bill Wright, now a helicopter pilot for an Alberta firm, said he flew an American military helicopter which sprayed the test strip. He said some of the chemical blew through the cockpit, caught in the recirculation system, but he has had no health problems in the 15 years since the tests. General Cheriton said a search was on to locate any others who had been involved, and said they could number up to a dozen men if it was a typical spray operation.

General Cheriton said the tests had been conducted for range control purposes only, and refuted the claim of the NDP MPs that the American's purpose was chemical warfare. He said he found it unbelievable that the U.S. would test a defoliant for military use at Base Gagetown when they controlled up to two-thirds of Vietnam at any time during the war and could have easily, and more logically, run tests there.

Mr. Sargeant said he was not concerned especially with this incident, but said it was an example of what he alleged is a coverup of chemical warfare tests in Canada. He said he also feels firm and informed policies must be drawn up by both Federal and Provincial Government to deal with chemicals. He asserts that we are dealing with the technology of the '80's with the mentality and knowledge of the '60's.

RCR Band Concert
— Valentine Theme —

1430 hrs, 08 Feb 81

Base Theatre

Free Admission

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And Come Early!

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Environment Canada Official Feels Barrels Buried At Base

By MARK ESTILL
Staff Writer

An investigation will begin next week at Canadian Forces Base Gagetown for barrels of herbicide which were supposedly buried on the base in the 1960s.

Ian Travers, head of the hazardous waste section of Environment Canada, said his department has reason to believe there may be full drums of herbicide buried on the base.

The search for the full drums comes after base officials discovered several empty and partially crushed herbicide barrels on Wednesday after being informed of the location by members of the Sprayers of Dioxin Association.

Jerry White, vice president of SODA, said he has affadavits from five SODA members who say full barrels were buried near the location of the empty barrels. The present estimate is that five truckloads or 200 of the 45 gallon barrels were buried at the site, Mr. White said.

"There's some pretty good indications there may be full barrels," Mr. Travers said of the SODA information. He said this information was confirmed by military officials.

Captain David Scandrett, base information officer, said the military had not seen the affadavits. When asked if officials from the base had confirmed the existance of the barrels to Environment Canada he said that this was conceivable. Captain Scandrett said he did not know who had confirmed this with the federal officials.

A statement from CFB Gagetown released late Friday said that the site has be cordoned off and placed out of bounds to all military and civilian personel of CFB Gagetown until further notice.

An Environment Canada employee who examined the crushed barrels on Thursday said there was no evidence of chemical in the barrels, Mr. Travers said.

Environment Canada will be taking soil tests in the area next week to determine if any herbicide has seeped into the surrounding area, Mr. Travers said.

Mr. Travers said there is a chance that if barrels had been buried in the 60s they are still intact, although they may have rusted out. Many organizations disposed of chemical barrels in the 60s by burial, including burying any chemical which they had left over from spraying operations, he said.

"The real problem is if they're full," he said. "If the barrels are empty, it is much less significant."

There is also some question of what the drums contain. Markings on the drums discovered Wednesday indicated that they contained Tordon 101, a 2,4-D herbicide. But Mr. White said an orange stripe on one of the barrels was a sign that it had contained Agent Orange, a powerful defoliant used in Vietnam.

"There has been considerable speculation as to what is contained at this chemical site," the CFB Gagetown release states. "Our investigation will attempt to determine the exact contents and condition of the site because the safety and welfare of our soldiers and their dependents and surrounding community remains uppermost in our minds."

The base is also reviewing its records to confirm the site, the news release states.

Captain Scandrett said the base would be consulting with Environment Canada next week to develop a plan for investigation of the site. The investigation could take months, he said.

Indentifying former hazardous waste dumps in New Brunswick is one of the functions of Environment Canada, Mr. Travers explained. "There's evidence back in 1964 this way was the easiest way to go given standard procedures."

Federal officials, in conjunction with the provincial Department of the Environment, have located 200 potential sites for cleanup and tests.

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Group Thinks Site Holds 200 Barrels Of Old Herbicide

FREDERICTON — An official of the Sprayers of Dioxin Association said Thursday the group's estimate that 200 barrels of herbicide were buried at a site on Canadian Forces Base Gagetown might be "on the conservative side."

Jerry White was commenting in an interview on preliminary results of digging at the site. The base said Wednesday that crews had uncovered 29 barrels.

Most were empty, but nine contained a clear liquid or soil, samples of which are being sent for analysis.

CFB Gagetown and Environment Canada started digging at the site after allegations by the sprayers' group that 200 full barrels might have been dumped there about 20 years ago.

Mr. White said Thursday the high number of drums uncovered in the small area dug so far indicates there could be more than 200.

A base official said Wednesday there could be up to 100, but he'd be surprised if there were 200.

Meanwhile, an official of Environment Canada clarified his earlier comments about the presence of dioxin, a potentially dangerous contaminant, in the Tordon 101 used by the base in a defoliation program. The compound, still used, was used in 1965 when the barrels were apparently dumped.

Ian Travers of Environment Canada in Dartmouth, N.S., said Thursday there are indeed dioxins in 2,4-D, one of the active ingredients in Tordon 101, but not the dioxin 2,3,7,8-TCDD, considered the most toxic.

Mr. White indicated earlier he wanted to be on the base when the barrels were uncovered, but he said Thursday he hasn't 'bothered applying in writing for permission to be there because Col. R. G. Hurley, deputy base commander, has told him he could "apply until hell froze over" and not get on the base.

In another development Thursday, a base spokesman denied suggestions by Mr. White that the dump site might have contained herbicides more toxic than Agent Orange, the subject of a successful suit by United States war veterans who used the material in Vietnam and suffered health problems.

Mr. White said he believes the base might have obtained Agent Purple and Agent Blue cheaply from the U.S. military after it stopped using the agents in 1962. The agents contain dioxin levels many times that of Agent Orange, he said.

Base Spokesman David Scandrett denied there was any Agent Blue or Agent Purple on the base between 1962 and 1965.

"If Mr. White has evidence to state that that is the case, then we are more than happy to see it. We have yet to see any evidence from Mr. White."

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Gleaner
18 Dec 84

SODA Claims More Dump Sites Located

The president of the Sprayers of Dioxin Association said Monday his group has discovered two more chemical dumps at Canadian Forces Base Gagetown near Fredericton.

The dumps are as big as the one discovered earlier. That first dump contained 600 barrels, one of which contained traces of 2,4 D, Jerry White said in an interview.

Mr.White said the containers were buried by the U.S. Army in the 1960s after tests on Super Orange, a defoliant stronger than Agent Orange which was widely used in Vietnam.

"These, I believe, do pose a significant health hazard to the people living adjacent to the base and those who have lived or worked on the base in the last number of years."

Mr.White, who has asked the New Brunswick government to order tests for people living in the area, said the wells could be contaminated. The two sites are located within 20 miles of the site which was identified earlier this year at the base, Mr. White said.

Residents of the area have asked SODA to prepare a petition asking for a health study of the area surrounding the dump to be circulated in the new year, Mr. White said. The petition will ask the federal government to conduct a study into the health hazards, he said.

Mr. White said he did not contact the military about the sites because of the runaround he received after identifying the first site. The military initially admitted that there were six barrels on the site and eventually 600 were found, he said. The two sites are about the same size as the other site.

Cadets who trained on the base during the summer were told by commanding officers not to drink water from brooks, streams or ponds because they might contain poison, said Mr. White.

Earlier this year, the association correctly pinpointed the existence of a chemical dump at the biggest training base in the Commonwealth.

Base officials agreed to dig up the areas, saying at most there would be 300 barrels, but 600 were unearthed. Some contained traces of dioxin-laced 2,4-D and other toxic chemicals.

There is no one at CFB Gagetown available to speak about Mr. White's charges because of the base Christmas leave.

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CFB Gagetown Official Wants Sites Identified

By LOUELLA BILLINGS
Staff Writer

CFB Gagetown Deputy-Commander Colonel Ray Hurley said he will investigate the sprayers of dioxin association's latest charges of more chemical dump sites once Sprayers Of Dioxin president Jerry White identifies where they are.

Colonel Hurley said the base has been conducting a herbicide program since it opened in the 50's and "of course there are a lot of places where chemical containers are buried, but there is no reason to believe Environment Canada regulations were not followed."

"I have been talking to Mr. white about his latest statements in which he says U. S. Army tested Super Orange," Colonel Hurley said. "But I don't know what he means by agent orange. He has to identify the chemical and the location of the dumps he is referring to, before we can do anything about it."

Colonel Hurley said thousands of dollars have already been spent digging up the last lot of barrels. "We could dig up the whole base but it would cost a million dollars and unless there is something more concrete to prove there are dangerous chemicals buried there I can't see doing that."

Colonel Hurley said the U.S. Army tested several herbicides, all of which CFB personnel had previously tested on their own.

In a previous statement, Mr. White had said cadets had been told not to drink the water from brooks and streams within the base. Colonel Hurley said that is not at all unusual, "We carry water during our manoevers and we don't encourage personnel to drink from streams and brooks for various reasons, none of which have anything to do with fear of contamination."

A0090117-4-000056

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Hurley Claims No Proof Harmful Chemicals Used

Daily Gleaner 8 Jan 88

By LOUELLA BILLINGS
Staff Writer

Military papers recently obtained through the Right To Information Act describing tests to be conducted in 1965 by the U.S. Army at CFB Gagetown do not prove the harmful chemical Dioxin (TCDD) was ever used, says the deputy-base commander.

Colonel Ray Hurley said the tentative proposal described in the 1965 paper actually never occurred but there were similiar tests in 1966 and 1967. He said during those tests several herbicides were applied to specific wooded areas of the base to test the chemicals in a north temperate zone on vegetation such as alder, maple, birch, spruce, hemlock and pine.



Col. Ray Hurley



Jerry White

Colonel Hurley said five or six American civilians from the U.S. Army Chemical Corps supervised the test using a Canadian pilot, Corporal Bill Wright, and Canadian personnel to help with the actual mixing of the chemicals. "As far as our correspondence with the Americans, there was never any indication the testing was for combat use in Vietnam," Colonel Hurley said. "The Americans involved were civilians, supposedly testing chemicals for use as herbicides."

In 1968, the U.S. Army prepared a document describing the results of the defoliation tests at CFB Gagetown. In that document there is reference made to the similiarities between vegetation densities at Gagetown and Southeast Asia.

"But that document was written two years after the test here and it was decided the chemicals which had been tested at Gagetown were not strong enough for the Vietnam spraying," Colonel Hurley said. "The chemical used in Vietnam was super agent Orange, which contains dioxin, TCDD and is a byproduct from the manufacture of 2,4,5 T and 2,4,D. The harmful dioxin is produced through the manufacturing process not solely through the combination of 2,4,5 T and 2,4,D."

Colonel Hurley said many personnel involved in the spraying at Gagetown have been contacted and there have been negative results as far as a great number of health problems. He said he remembers the pilot, Cpl. Wright, as a very "flamboyant fellow, who used to laugh about taking a shower in the stuff, gargling with it and how the chemical was great for removing grease from hands". He says Cpl. Wright is now retired, but has suffered no health affects from being so closely involved with the chemical.

"All our information available indicates quite clearly there has been no harmful concentration of dioxin used during testing on the base," Colonel Hurley said. "I am confident the current testing will not reveal any harmful levels of dioxin." The tests are from samples taken from some of the more than 600 chemical barrels uncovered on the base. The barrels were dug up at the request of the Sprayers of Dioxin, an association of men who claim they are suffering various health problems as a result of working with dioxin spraying during the 60's.

Results of those tests as

(See HURLEY P.20)

A0090117-5-000057

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No Evidence Of Danger In Dump

Allegations made by environmental groups that local ground water had been seriously contaminated, the environment adversely affected, and citizens' health affected by chemicals buried at CFB Gagetown, were proven unfounded last week when test results were made public.

Reports received from private laboratories in Saint John, Fredericton and Burlington, Ontario, revealed water taken from the boreholes at the Shirley Road Dump site is within the safety guidelines set for for drinking water quality by the National Health and Welfare Department. The reports also concluded there is no evidence to lead one to believe levels of Picloram, found at the site, would cause ill health for anyone drinking the water there. In addition, the report concluded there is no significant environmental impact on the soil around the site.

Major Mike Rushton reported a sampling and an analysis program, designed by the Environmental Protection Services, Environment Canada, and monitored by the Department of National Health and Welfare was carried out by a total of five commercial agencies.

He said Acadia Consultants and Inspectors Ltd., of Fredericton, were retained to carry out a ground water monitoring program.

The Research and Productivity Council and K-F Laboratories, both of Fredericton, also carried out analysis of ground water samples obtained from 12 boreholes, in and around the disposal site.

The major added Atlantic Analytical Services, Ltd., of Saint John, and the Research and Productivity Council analyzed the contents of the drums. They confirmed the bulk of the residues were Tordon 101.

Major Rushton reported Atlantic Analytical Services, and Zenon Environmental Inc., of Burlington, Ont., detemined herbicide content of soil samples from the excavation area. Zenon Environmental was also contracted to analyse soil samples for dioxin content. "Six soil samples were collected from 140-square meter area, where most of the drums were located," he said. "A seventh sample, for control/comparison purposes, was taken from outside the excavated zone. A total of 112 drums, of 666 excavated at the site in November, 1984, contained liquid residue. The total liquid was estimated to be less than 1,000 litres, or equivalent to six 45 gallon drums of liquid.

"The drums were indentified as follows — Approximately 500 Tordon-101 drums, Tordon 101 being a commonly available herbicide in common use in Canada for secondary growth control, and the remainder either sodiumsilicate drums, sodiumsilicate being a chemically inert substance used in water treatment, or DDT drums or oil." Major Rushton said the disposal site has been in use since 1969, and some of the drums could not be identified.

"Claims that Agent Orange drums were buried at the disposal site are without foundation," Major Rushton said. "The few drums, three in all, used in tests carried out by the U.S. Army in the 60's, were held on the truck which carried the containers, and were returned with two more full drums to the USA in the same vehicle." He said 108 gallons of Agent Orange had been sprayed locally in total.

Major Rushton emphasized all the spraying had been done by contract, and indicated contractors would stand to lose financilly had they buried full barrels of the herbicides, as they were paid for what they applied. He said the remaining drums would be washed out, crushed and buried to meet with present-day disposal standards.

Discussing the five other suggested dump sites at the Base, Major Rushton said containers in four of the sites were empty and rinsed, while debris such as boxes had been burned. He said the site near Geary had been examined by metal detector search, and there was no indication of any chemical content barrels surfaced.

Major Rushton said claims regarding the Enniskillen site were also unfounded, and no evidence had come to light to substantiate these allegations. He added of the four drums reported, there was one, an old empty Tordon 101 drum, rusted and bullet ridden; and three were old petrol drums filled with rocks and used for military target firing exercises."

Ian Travers, of the Environmental Protection Service, Atlantic Region, added his assurance water samples taken at the Shirley Road site contained nothing known to pose an threat to health or environment.

Dr. Claire Franklin, Chief of Environmental and Occupational Bureau of Chemical Hazards, Health and Welfare Canada, said there was no hazard from water in the well holes. She said the chemicals found, and outlined by Major Rushton, would become 'less concentrated' as the water moved away from the site. She said the water, taken as samples from the holes drilled, compared favorably with standards set for by the World Health Organization, and were well within acceptable limits."

Major Rushton added, "The results are clear there is no imminent hazard to health. The water we have tested is well below those limits set out in the health guidelines."

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ISSN 0713-391X

GAZETTE

The Combat Training Centre, Canadian Forces Base Gagetown, N.B.

Centre d'entraînement au combat, Base des Forces canadiennes, Gagetown, N.-B.

Wednesday
April 3, 1985

mercredi
3 avril 1985

Vol 25 No 13

General Rails Against Misinformation

Tests Reveal No Health Hazard

By James Haley
Gazette Editor

No evidence of significant or harmful chemical contamination in water or soil samples was found as a result of extensive testing of several dumpsites in the CFB Gagetown training area.

Officials at CFB Gagetown made public, last Wednesday, the results of tests carried out on the chemical container disposal site on the base.

"What we have uncovered is neither a chemical nor toxic waste dump," said BGen G.S. Kells, base commander. "Rather, it represents a landfill site at which, in years' past, we buried the *empty* containers left over from our annual secondary growth control spray programme." The commander explained that environmental regulations at the time did not require chemical barrels be rinsed, punctured, crushed and buried as they do today. This, he said, accounts for the partially filled barrels discovered last fall.

Because the barrels probably contained small amounts of their original herbicide contents, "this accounts for the minute quantities of herbicide residues found in our soil and water sampling tests," said BGen Kells. "We have been unable to unearth conclusive evidence to support the irresponsible allegations that hundreds, or indeed, any *full* barrels of herbicide were ever buried at the site."

BGen Kells said that the idea of burying full barrels of herbicide was illogical. The secondary growth control programme has been conducted by private contractors and the base only paid for chemicals actually used. "What motive would they have for burying full containers of expensive chemicals?"

Allegations by local environmental groups that local ground water had been seriously contaminated, the environment adversely affected and citizens' health had been affected by chemicals buried at the base were proven unfounded by the release of the testing reports. The tests were conducted by five private laboratories on samples taken from the 666 barrels buried at the Shirley Road landfill site located seven kilometres from the camp.

The reports concluded that for the chemicals found in the boreholes at the site for which were are guidelines, the levels are within the Drinking Water Quality Guidelines of National Health and Welfare. It was also concluded that there is no evidence to believe that levels of Picloram found at the site would cause ill health for anyone drinking the water there.

Also there was no significant environmental impact on the soil and around the site.

BGen Kells said, "This means to me that I can, without fear or hesitation, drink the water drawn from any of the 12 wells on site and just as easily eat potatoes grown on the site . . . . The results of these tests are a clear indication that we have not contributed in any way to adversely affecting the environment nor the health of the residents in this area."

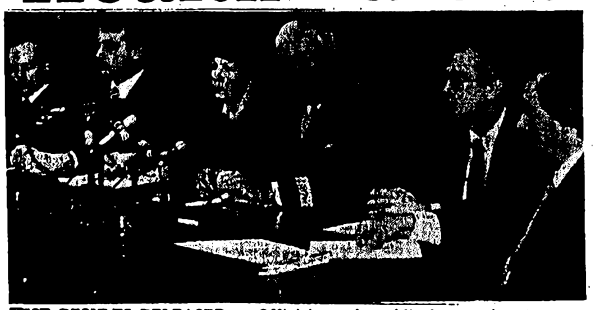
BGen Kells lashed out at local environmental groups for their treatment of the investigation. "During the long period of our investigation you (the public) have been subjected to a cleverly orchestrated campaign of fear and deception by several groups professing to have your best interests at heart. By use of half-truths, misquotation, rumour and totally unfounded statements, they have elicited your support for their somewhat dubious claims for personal compensation from other agencies. They have succeeded in spreading alarm and despondency within the communities surrounding CFB Gagetown."

The base commander has advised his staff not to speak with with the officials of the Sprayers of Dioxin Association or the Health, Environment, Life Protection group. He said if those groups have concerns they should contact the appropriate government authorities and the base will take instruction from those authorities.

BGen Kells re-iterated that Base Gagetown has never had, do not have now, nor will ever have any toxic or chemical dumps. He explained the secondary growth control programme has always carried out the existing federal and provincial environmental regulations and always will. "(This programme) poses no threat to the animal and human population of the base nor to our neighbouring communities."

The sampling and analysis programme designed by the Environmental Protection Services, Environment Canada, and monitored by the Department of National Health and Welfare was carried out by a total of five commercial agencies.

Acadia Consultants and Inspectors Ltd of Fredericton was retained to carry out a ground water monitoring programme.



TEST RESULTS RELEASED — Officials made public last Wednesday the results of testing done for chemical contamination in the training area of the base. From left: Maj Michael Rushton, SO Tech Svcs; Rick Walters, NDHQ; Dr. Clair Franklin, Environment Canada; BGen George Kells, base commander; Ian Travers, Environment Canada hazardous waste section and George Lindsay, Environment Canada. *(Daily Gleaner Photo by Louella Billings)*

The Research and Productivity Council and K-F Laboratories, both of Fredericton, also carried out analysis of ground water samples obtained from 12 boreholes in and around the disposal site.

Atlantic Analytical Services, Ltd. of Saint John, and the Research and Productivity Council analyzed the contents of the drums and they confirmed that the bulk of the residues were Tordon 101. Atlantic Analytical Services and Zenon environmental Inc. of Burlington, Ont. determined herbicide content of soil samples from the excavation area. Zenon Environmental was also contracted to analyse soil samples for dioxin content.

Six soil samples are collected from a 40 square metre area where most of the drums were located. A seventh sample, for control/comparison purposes, was taken from outside the excavated zone.

A total of 112 drums of the 666 excavated at the site in November 1984, contained liquid residue. The total liquid was estimated to be less than 1,000 litres or equivalent to six 45-gallon drums of liquid.

The drums were identified as follows: approximately 500 Tordon 101 drums (Tordon 101 is a commonly available herbicide in common use in Canada for secondary growth control) and the remainder were either sodium silicate drums (sodium silicate is a chemically inert substance used in water treatment); or DDT drums (DDT was used for insect control in the '60s); or drums that had contained petrol or oil. The disposal site has been in use since 1969 and some of the drums could not be identified.

Claims that Agent Orange drums were buried at the disposal site are without foundation. The few drums, used in tests carried out by the U.S. Army in the '60s, were held on the truck which carried the containers and were returned to USA in the same vehicle.

"The results of these tests," said BGen G.S. Kells, commander of CFB Gagetown, "are a clear indication that we have not contributed in any way to adversely affect the environment or the health of the residents in this area."

To further ensure that high standards are maintained, BGen Kells confirmed that Environmental Protection Service recommendations are to be carried out at the site. Any remaining liquid residues will be removed from the site and shipped to authorized treatment facilities.

The soil at the site, although not an environmental threat, will be stabilized by planting grasses. Consideration is to be given to additional sampling and analysis of ground water at the site.

A continuing programme to provide factual information to local community leaders is planned in an effort to allay fears and doubts generated in local residents that an adverse environmental situation exists in their neighbourhoods as a result of activities at the base.

A0090117-7-000059

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(1)

Warren Sgt DJ@3 ASG Health Svcs@Gagetown

From: Bernier LCol JJRS@ADM(HR-Mil) DCOS FHP@Ottawa-Hull
Sent: Wednesday, 29, January, 2003 2:21 PM
To: Mohanna S@ADM(HR-Mil) DCOS FHP@Ottawa-Hull; Lalonde JD@ADM(HR-Mil) DCOS FHP@Ottawa-Hull
Cc: Hnatiuk Col SJ@ADM(HR-Mil) DND/VAC@Ottawa-Hull; Hewitt Maj PW@DCDS J3 INTL@Ottawa-Hull; Scott Col KC@D MED POL@NDHQ
Subject: RE: FW: Re: Agent Orange

Samy
Please review the issue including the NAS study with Janick and respond. My understanding is that no causal association between agent orange and any long-term health problem has ever been scientifically demonstrated, and that

s.15(1)

-----Original Message-----
From: Hewitt Maj PW@DCDS J3 INTL@Ottawa-Hull
Sent: Wednesday, 29 January, 2003 10:07
To: Bernier LCol JJRS@ADM(HR-Mil) DCOS FHP@Ottawa-Hull
Cc: Hnatiuk Col SJ@ADM(HR-Mil) DND/VAC@Ottawa-Hull
Subject: FW: FW: Re: Agent Orange

Sir:
Could you have a look at the e-mail below. I was hoping to get feedback from HRDC/CPP on this, however I am anticipating I will be told to use the ATI process. FHP must have a file on Agent Orange from the 1990s. Let me know, thanks.
Peter
P.W.(Peter) Hewitt
Major
J3 Intl (CIMIC/EHS)
992-2492 CSN: 842-2492
Fax: (613) 992-7015/7737
Sec Fax:
Hewitt Maj PW@COS J3@NDHQ
Internet: Hewitt.PW@forces.ca

(2) Copies of official report of applicant, what used + test results given to Sgt Warren (PMED) as per maj Davies instns. s.15(1) s.16(2)(c)

DH.
Asst Prop O
7 May 04.

-----Original Message-----
From: marilyn.hewitt@hrdc-drhc.gc.ca
[mailto:marilyn.hewitt@hrdc-drhc.gc.ca]
Sent: Thursday, 23 January, 2003 14:19
To: pauline.obrien@hrdc-drhc.gc.ca
Cc: Hewitt.PW@forces.gc.ca
Subject: fwd: FW: Re: Agent Orange

Hi Helen.
Here is the request.

This was forwarded to me by Major Peter Hewitt who is involved in Environmental health issues with the Canadian Military.
Many thanks,
Marilyn Hewitt
Reassessment Medical Adjudicator
Tel. No: (613) 957-0462
e-mail: marilyn.hewitt@hrdc-drhc.gc.ca
---------- Original Text ----------

From: <Hewitt.PW@forces.gc.ca>, on 2003-01-23 1:54 PM:
To: hewitt.m@isp.dba.dsbops@nhq

A0090118-1-000060

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992-2492 CSN: 842-2492
Fax: (613) 992-7015/7737
Sec Fax:
Hewitt Maj PW@COS J3@NDHQ
Internet: Hewitt.PW@forces.ca

(2) Copies of official report of applicat. inc, what used + test results given to Sgt Warren (PMED) as per maj Davies instns. s.15(1) s.16(2)(c)

DH.
Asst Prop O
7 May 04.

-----Original Message-----
From: marilyn.hewitt@hrdc-drhc.gc.ca
[mailto:marilyn.hewitt@hrdc-drhc.gc.ca]
Sent: Thursday, 23 January, 2003 14:19
To: pauline.obrien@hrdc-drhc.gc.ca
Cc: Hewitt.PW@forces.gc.ca
Subject: fwd: FW: Re: Agent Orange

Hi Helen.
Here is the request.

This was forwarded to me by Major Peter Hewitt who is involved in Environmental health issues with the Canadian Military.
Many thanks,
Marilyn Hewitt
Reassessment Medical Adjudicator
Tel. No: (613) 957-0462
e-mail: marilyn.hewitt@hrdc-drhc.gc.ca
---------- Original Text ----------

From: <Hewitt.PW@forces.gc.ca>, on 2003-01-23 1:54 PM:
To: hewitt.m@isp.dba.dsbops@nhq

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Tel; (902) 626-2838
Fax: (902) 566-7954
mcgoodic@vac-acc.gc.ca

>>> Sharon Hnatiuk 01/22/03 09:16am >>>
I was awy from the office yesterday and I will investigate your question as a priority. Are you loking for the "operational" side ie were tests actually conducted, exactly when, where etc or more for the medical aspects?

>>> Maureen Goodick 01/21/03 09:46am >>>
Good Morning,
I am a policy analyst with VAC who must respond to a question regarding the spraying of Agent Orange at CFB Gagetown, N.B. in 1966/67. Can you provide any info re this matter? Thanks.

Maureen Goodick
Policy Analyst
Program Policy Directorate
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Fax: (902) 566-7954
mcgoodic@vac-acc.gc.ca

A0090118-3-000062

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National Defence / Défense nationale

7795-3 (Comd)

Headquarters
Combat Training Centre
Canadian Forces Base Gagetown
Oromocto, New Brunswick
E0G 2P0

12 February 1985

Distribution List

BRIEFING TO MEMBERS OF NEW BRUNSWICK CABINET - 24 JANUARY 1985

Enclosed are transcripts of briefings given to the Ministers of Labour and Human Resources, Health and Environment of the New Brunswick Cabinet on 24 January 1985 on the subject of the CFB Gagetown Brush Regrowth Control Programme and related issues.

J.J.C. Brassard
Lieutenant-Colonel
Acting Commander

Enclosures: 2

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BRIEFING ON THE

CFB GAGETOWN HERBICIDE CONTAINER

DISPOSAL AREAS

TO

MEMBERS OF THE

PROVINCE OF NEW BRUNSWICK CABINET

ON 24 JANUARY, 1985

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GOOD MORNING. THE AIM OF MY BRIEFING IS TO MAKE YOU AWARE OF THE BACKGROUND TO THE DISPOSAL OF HERBICIDE DRUMS AT CFB GAGETOWN AND GIVE YOU A STATUS REPORT ON OUR SITE INVESTIGATIONS.

BACKGROUND

THE EMPTY CONTAINERS FROM OUR SECONDARY GROWTH CONTROL PROGRAMME WHICH INCLUDE METAL AND PLASTIC DRUMS AND CARDBOARD BOXES HAVE BEEN DISPOSED OF IN A NUMBER OF WAYS OVER THE YEARS.

IN THE EARLY YEARS UNTIL THE MID 60's, CONTRACTORS WERE TOLD TO REMOVE THE CONTAINERS FROM THE BASE. FROM THEN UNTIL 1980, WE SPECIFIED BURIAL OR DISPOSAL TO PRECLUDE POSSIBILITY OF CONTAMINATING HUMANS OR ANIMALS. SINCE THEN, WE REQUIRE CONTRACTORS TO PUNCTURE, BREAK, OR BURN THE CONTAINERS, THEN BURY THE REMAINS. SINCE 1983 WE REQUIRE METAL AND PLASTIC CONTAINERS TO BE RINSED AS WELL.

FORMAL RECORD HAS NOT BEEN KEPT OF THE LOCATIONS WHERE EMPTY HERBICIDE CONTAINERS HAVE BEEN BURIED IN THE PERIOD UP TO 1981; WE DO KNOW FROM OUR DND EMPLOYEES AND FROM HERBICIDE CONTRACTORS THAT THE SHIRLEY ROAD LANDFILL SITE (MARKED AS SITE 4 ON THE MAP) WAS THE PRIMARY LOCATION FOR DISPOSAL OF EMPTY HERBICIDE CONTAINERS IN THIS PERIOD. IT IS POSSIBLE THERE ARE OTHER SITES, BUT IF THERE ARE THEY SHOULD CONTAIN EMPTY CONTAINERS. THE SITE IDENTIFIED TO BASE AUTHORITIES ON BY

DINT TO SITE 4

s.20(1)

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ORGANIZATION IS WITHIN 200 METRES OF THE SHIRLEY ROAD LANDFILL SITE AND HAS BEEN KNOWN TO BASE AUTHORITIES FOR YEARS AS AN EMPTY CONTAINER DISPOSAL SITE ASSOCIATED WITH THE LANDFILL SITE.

SINCE 1982, OUR RECORDS INDICATE THREE DIFFERENT SITES WHERE THE EMPTY

OINT TO SITES 5, 6, 7

CONTAINERS AND REFUSE HAVE BEEN BURIED (MARKED AS SITES 5, 6, 7 ON THE MAP). IT IS IMPORTANT TO NOTE THAT CONTRACT SPECIFICATIONS WERE DRAWN UP IN ACCORDANCE WITH GUIDELINES OF THE DAY. SINCE 1977 WE HAVE SPECIFIED PROCEDURES LAID OUT IN THE "CODE OF GOOD PRACTICE FOR MANAGEMENT OF HAZARDOUS AND TOXIC WASTES AT FEDERAL ESTABLISHMENTS (EPS)".

STATUS REPORT ON HERBICIDE CONTAINER SITE INVESTIGATION

s.19(1)
s.20(1)

LIDE 1 ON

ON INFORMED THE MEDIA AND OPI GAGETOWN THAT FULL DRUMS OF HERBICIDE WERE BURIED AT A SITE NEAR THE SHIRLEY ROAD LANDFILL SITE. DND EMPLOYEES WHO WERE SUBSEQUENTLY INTERVIEWED BY BASE STAFF CONFIRMED THAT THE SITE HAS BEEN USED OVER THE YEARS TO BURY EMPTY HERBICIDE DRUMS BUT THAT IN ONE INSTANCE IT WAS USED TO BURY FULL DRUMS OF HERBICIDE.

THIS INFORMATION FROM OUR OWN DND PERSONNEL THAT FULL BARRELS OF HERBICIDE COULD BE BURIED AT THE SITE AND SUBSEQUENT CONSULTATIONS WITH ENVIRONMENTAL

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PROTECTION SERVICES AND NATIONAL DEFENCE HEADQUARTERS RESULTED IN A DECISION TO

SLIDE 1 OFF
SLIDE 2 ON

DO A THOROUGH SITE INVESTIGATION. FIRSTLY, A PRELIMINARY INVESTIGATION WAS DONE TO CONFIRM THAT THERE WERE IN FACT CONTAINERS AT THE SITE AND TO CONFIRM WHAT CHEMICALS WE WERE DEALING WITH. THIS INVESTIGATION, WHICH INCLUDED A SMALL DIG

LIDE 2 OFF
HP ON

FOLLOWED BY LIQUID AND SOIL SAMPLING, WAS COMPLETED ON 18 OCTOBER WITH THE FOLLOWING RESULTS:

A. 8 x LIQUID SAMPLES TAKEN FROM SOME OF 29 METAL DRUMS REVEALED 6 SAMPLES TO BE WATER, 1 TO CONTAIN TRACES OF PICLORAM AND 2-4-D (1 PPB PICLORAM AND 1.5 PPB 2-4-D), ELEMENTS FOUND IN TORDON 101, AND ONE TO CONTAIN A SODIUM SILICATE SOLUTION.

B. 2 x SOIL SAMPLES REVEALED ONE TO CONTAIN NO HERBICIDE AND ONE TO CONTAIN TRACES OF PICLORAM, 2-4-D AND 2-4-5-T (9 PPB PICLORAM, 15 PPB 2-4-D AND 3 PPB 2-4-5-T ON A DRY WEIGHT BASIS).

)HP OFF

SODIUM SILICATE WAS CHEMICALLY INERT SUBSTANCE WHICH WAS USED IN OUR WATER TREATMENT PROGRAMME AND IT WAS COMMON PROCEDURE THAT THE EMPTY CONTAINERS WERE DISPOSED OF HERE. THE REMAINDER OF CHEMICALS ARE HERBICIDES RELATED TO OUR SECONDARY GROWTH CONTROL PROGRAMME.

SLIDE 3 ON

THE FULL SITE EXCAVATION WAS COMPLETED ON 23 NOVEMBER 1984; THE FOLLOWING

AND OFF

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WERE UNEARTHED:

CHP ON

135 EMPTY CRUSHED DRUMS

398 EMPTY UNCRUSHED DRUMS OF WHICH 331 WERE TORDON 101

104 DRUMS CONTAINING SOME LIQUID OF WHICH 61 WERE TORDON 101 DRUMS. (NONE

OHP OFF

WERE FULL, MOST HAD ONLY SMALL AMOUNTS OF LIQUID AND IN ONLY ONE CASE WAS THERE A SMELL TO INDICATE IT MAY BE A HERBICIDE).

THESE PLUS THE ORIGINAL 29 BRING TOTAL TO 666.

OF THIS TOTAL, OVER 400 WERE TORDON 101, MANY ARE SODIUM SILICATED DRUMS AND THE REMAINDER ARE TOO WEATHERED TO IDENTIFY.

SAMPLES OF SOIL AND LIQUID FROM SEVERAL DRUMS WERE TAKEN AND ARE PRESENTLY BEING ANALYZED BY A CONSULTANT. WE HAVE SPECIFIED A WIDE RANGE OF TESTS AS FOLLOWS:

CHP ON

SOIL SAMPLES: 2-4-D, 2-4-5-T, PICLORAM, DIOXIN, DDT

LIQUID SAMPLES: 2-4-D, 2-4-5-T, PICLORAM, DIOXIN (IF HERBICIDE PRESENT MORE THAN 100 PPM)

GROUND WATER: PH, CONDUCTIVITY, TOTAL ORGANIC CARBONS, TOTAL ORGANO-HALOGENS, CALCIUM, MAGNESIUM, SODIUM, POTASSIUM, SULPHATES,

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DHP OFF

CHLORIDES, ALKALINITY, TOTAL NITROGEN

RESULTS ARE EXPECTED IN THE NEXT TWO WEEKS. THE PLAN FOR DISPOSAL OF DRUMS AND ANY LIQUID THEY CONTAIN WILL THEN BE MADE IN CONJUNCTION WITH EPS AND OTHER APPROPRIATE PROVINCIAL AND FEDERAL AGENCIES. WE DO NOT EXPECT TO FIND LARGE AMOUNTS OF CONCENTRATED HERBICIDE; MOST OF IT IS EXPECTED TO BE WATER WITH TRACE AMOUNTS OF HERBICIDE.

A GROUND WATER MONITORING PROGRAMME HAS ALSO BEEN ESTABLISHED AT THE SITE IN CONSULTATION WITH NATIONAL HYDROLOGIC RESEARCH INSTITUTE AND EPS, IF IN FACT FULL BARRELS OF HERBICIDE WERE BURIED AT THE SITE AND THEIR CONTENTS DRAINED INTO THE GROUND, THEN THIS PROGRAMME SHOULD CONFIRM IT. FROM NHRI CONSULTATION, WE EXPECT GIVEN LOCAL GROUND CONDITIONS, THAT ANY CONTAMINANTS IN THE GROUND WATER WOULD ONLY MIGRATE A FEW METRES PER YEAR. IT IS THEREFORE REASONABLE TO EXPECT THAT WELLS 3 KM AWAY WOULD NOT BE AFFECTED.

s.19(1) ON

MET WITH REPRESENTATIVES OF CANADIAN FORCES BASE GAGETOWN. HE PRESENTED A NUMBER OF POINTS OF INFORMATION AND SEVERAL REQUESTS. THESE QUESTIONS WERE ANSWERED VERBALLY TO AND ALSO BY LETTER ON s.19(1)

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s.19(1) GAVE INFORMATION ABOUT FOUR SITES ON BASE PROPERTY WHERE HE BELIEVED THAT HERBICIDE CONTAINERS HAD BEEN BURIED OR WHERE HERBICIDES HAD BEEN MIXED. TWO OF THE AREAS REFERRED TO ARE KNOWN TO CONTAIN EMPTY CONTAINERS FROM THE SECONDARY GROWTH CONTROL PROGRAMME IN 1983 AND 1984 (THESE SITES I INDICATED TO YOU EARLIER AS SITES 6 AND 7). DISPOSAL WAS DONE IN ACCORDANCE WITH CURRENT CODES OF PRACTICE ESTABLISHED BY ENVIRONMENT CANADA AND THERE ARE NO PLANS AT THIS TIME TO CARRY OUT FURTHER INVESTIGATIONS OF THESE SITES.

A THIRD AREA MAY HAVE BEEN A WORK AREA IN SUPPORT OF THE SECONDARY GROWTH CONTROL PROGRAMME (THIS AREA IS INDICATED ON THE MAP AS AREA 8); HOWEVER, THERE IS NO EVIDENCE THAT ANY CONTAINERS ARE BURIED THERE. THEREFORE, NO ACTION IS PLANNED TO FURTHER INVESTIGATE THIS SITE.

THE FOURTH SITE AT AREA 9 ON THE MAP MENTIONED IS PRESENTLY BEING REVIEWED BY BASE STAFF AND FURTHER INFORMATION IS BEING PURSUED. WE HAVE INTERVIEWED

s.20(1) THE CONTACT PERSON PROVIDED BY AND IT APPEARS THERE ARE A MAXIMUM OF 40-50 EMPTY DRUMS RELATED TO THE SECOND GROWTH CONTROL PROGRAMME IN EITHER 1962 OR 1964, WHEN AMMATE AND 2-4-5-T WERE USED. A DECISION ON INVESTIGATION OF THIS SITE WILL NOT BE MADE BEFORE THE CURRENT INVESTIGATION ON THE SHIRLEY ROAD CONTAINER DISPOSAL SITE IS COMPLETED.

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s.19(1) REQUESTED AUTHORITY TO CIRCULATE A PETITION FOR SIGNATURE BY MILITARY PERSONNEL AT CANADIAN FORCES BASE GAGETOWN. THIS REQUEST HAS BEEN DENIED, AS CANADIAN FORCES REGULATIONS DO NOT PERMIT MILITARY PERSONNEL TO SIGN PETITIONS RELATING TO THE CANADIAN FORCES OR TO OBTAIN OR SOLICIT SIGNATURES FOR PETITIONS RELATING TO THE CANADIAN FORCES. CIRCULATION OF A PETITION WOULD ALSO CONTRAVENE CANADIAN FORCES REGULATIONS CONCERNING SOLICITING ON DEFENCE ESTABLISHMENTS, WHICH INCLUDES THE MARRIED QUARTERS AREA.

IN CONCLUSION: IT IS IMPORTANT TO NOTE THAT HERBICIDE CONTAINERS FROM THE SECONDARY GROWTH CONTROL PROGRAMME HAVE BEEN DISPOSED OF IN ACCORDANCE WITH APPROPRIATE GUIDELINES OF THE DAY. IN THE ONE INSTANCE WHERE WE WERE GIVEN REASON TO BELIEVE THAT FULL BARRELS OF HERBICIDE MAY HAVE BEEN BURIED, WE INVESTIGATED THOROUGHLY. WE HAVE NO REASON WHATSOEVER TO BELIEVE THAT THERE ARE FULL BARRELS OF CHEMICAL BURIED ANYWHERE ELSE ON THE BASE.

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PRELIMINARY INVESTIGATION RESULTS

8 Liquid Samples

SIX - WATER

ONE - 1 PPB PICLORAM, 15PPB 2-4-D

ONE - SODIUM SILICATE SOLUTION

2 Soil Samples

ONE - No HERBICIDE

ONE - 9 PPB PICLORAM, 15 PPB 2-4-D,

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FULL SITE EXCAVATION

135 EMPTY CRUSHED DRUMS

398 EMPTY UNCRUSHED DRUMS (331 TORDON 101)

104 DRUMS CONTAINING VARYING AMOUNTS OF LIQUID (61 TORDON 101)

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PLANNED CHEMICAL ANALYSIS

SOIL

2-4-D, 2-4-5-T, PICLORAM, DIOXIN, DDT

LIQUID

2-4-D, 2-4-5-T, PICLORAM, DIOXIN

GROUND WATER

PH, CONDUCTIVITY, TOTAL ORGANIC CARBON,

TOTAL ORGANO-HALOGENS, CALCIUM, MAGNESIUM,

SODIUM, POTASSIUM, SULPHATES, CHLORIDES,

ALKALINITY, TOTAL KJEL DAHL-NITROGEN

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FEB. 1 1985

BRIEFING ON THE

CFB GAGETOWN BRUSH REGROWTH CONTROL PROGRAMME

TO

MEMBERS OF THE

PROVINCE OF NEW BRUNSWICK CABINET

BY MR. R. WALTER

24 JANUARY 1985

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IN Attendance 24 Jan 85

BGen Kells	B Comm	CFB Gagetown
Col R. Hurley	C Adm	CFB Gagetown
Maj M. Rushton	SO 2 Tech	CFB Gagetown
Mr. R. Walter	NDHQ A/DCE 3	
Mr. D. Embry	Forestry	
Mr. G. Lindsay	Environment Canada	
Mr. W. Ernst	Environment Canada	
Hon Mr. W. Harmer	Minister of Environment	
Hon Mr. J. Membriquette	Minister of Labour and Manpower	
Hon Mr. C. Gallager	Minister of Health	
Mrs. Claire Morris	DMin Health	
Dr. Walters	Health	
Mr. Brian Barnes	DMin Environment	
Mr. Dave Besner	Dir Environmental Research	

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GOOD MORNING LADIES AND GENTLEMEN, THE AIM OF MY BRIEFING IS TO MAKE YOU AWARE OF THE BRUSH CONTROL REQUIREMENTS FOR BASE GAGETOWN AND TO GIVE YOU A BRIEF HISTORY OF THAT PROGRAM.

CFB GAGETOWN MAKES UP OVER 420 SQUARE MILES OF MOSTLY FORESTED AREA. OF THIS 47,000 ACRES HAVE BEEN CLEARED FOR TRAINING PURPOSES.

40,000 ACRES WERE CLEARED IN THE 1953-56 TIME FRAME AND 6,000 ACRES WERE CLEARED BETWEEN 1963 AND 1967. ADDITIONALLY, 1000 ACRES WERE CLEARED ALONG THE ROAD ALLOWANCES WITHIN THE BASE AREA.

THE MILITARY REQUIREMENT IS FOR GOOD SIGHT AND GOING CONDITIONS WITH BRUSH AND OTHER OBSTACLES NOT EXCEEDING 3 FEET. LOW VEGETATION SUCH AS GRASSES, FERNS, MOSSES, AND WILD FLOWERS ARE RETAINED TO REDUCE EROSION.

MOST AREAS ORIGINALLY WERE CLEARED AND GRUBBED MECHANICALLY. REGROWTH OF BRUSH WITHIN THE TRAINING AREAS IS A MAJOR CONCERN SINCE IT REDUCES AND, IF LEFT UNCHECKED, WILL ACTUALLY ELIMINATE MILITARY TRAINING CAPABILITY.

FROM 1956 TO 1964, FIXED WING AIRCRAFT APPLIED MIXTURES OF 2, 4-D AND 2, 4, 5-T IN AN EFFORT TO MAINTAIN THE CLEARED AREAS BRUSH FREE.

THESE CHEMICALS WERE FOUND TO BE INEFFECTIVE AGAINST SEVERAL SPECIES OF BRUSH AND FURTHER, ACHIEVED LIMITED CONTROL OF LARGE, EVEN SUSCEPTIBLE SPECIES.

THESE PROBLEMS FORCED THE DEPARTMENT TO BEGIN RESEARCH ON OTHER GROWTH CONTROL OPTIONS. ADDITIONALLY, AN APPLICATION ACCIDENT OCCURRED IN 1964. I SHALL DISCUSS THIS IN GREATER DETAIL LATER.

DRASTIC STEPS WERE THEN TAKEN TO ACHIEVE IMPROVED KILL OF TARGET SPECIES AND TO USE CHEMICALS WITH LONGER RESIDUAL ACTION THEREBY REDUCING

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THE NUMBER OF NECESSARY APPLICATIONS. ADDITIONALLY WE ATTEMPTED AND TO FIND OTHER EFFICIENT BRUSH CONTROL METHODS AS AN OPTION TO CHEMICAL TREATMENT.

IN 1965 WE TURNED TO TORDON 101, A MIXTURE OF 2, 4-D AND PICLORAM MANUFACTURED BY DOW CHEMICAL COMPANY.

A DRIFT CONTROL AGENT WAS USED AND THE MIXTURE WAS APPLIED BY HELICOPTER.

SEVERAL RATES WERE EXPERIMENTED WITH AND IN THE SUBSEQUENT YEARS ONE RATE (1.6 GAL/AC) WAS FOUND TO BE SATISFACTORY FOR CONTROLLING MOST PROBLEM SPEICIES. TORDON 101 WAS USED FROM 1965 TO 1974.

IN 1975 WE CHANGED TO TORDON PELLETS. WE FOUND THIS PRODUCT - REDUCED DRIFT POTENTIAL, WAS EASIER TO HANDLE AND STORE, AND ALLOWED FOR MORE EVEN APPLICATION, THEREBY GIVING BETTER CONTROL RESULTS.

IN 1983 DEFENCE HEADQUARTERS BECAME CONCERNED OVER THE POTENTIAL FOR ENVIRONMENTAL DAMAGE DUE TO THE MIGRATION AND PERSISTANCE OF PICTORAM, THE MAIN INGREDIENT IN TORDON PELLETS.

SEVERAL OTHER DEFENCE ESTABLISHMENTS SHOWED THAT SOME MIGRATION OF THIS CHEMICAL OCCURS IN VERY SANDY SOILS. WE REVERTED TO LIQUID APPLICATION WHICH DOES NOT HAVE THE SAME ASSOCIATED PROBLEMS.

THE FOLLOWING SLIDES WILL HELP TO POINT OUT THE SIZE, COST AND OTHER IMPORTANT FACTORS IN OUR REGROWTH CONTROL PROGRAM.

THIS SLIDE POINTS OUT THE SWITCH FROM 2, 4-D/2, 4 5-T MIXTURES TO TORDON 101 (SEE ANNEX A). PREVIOUSLY EVERY PROJECT WAS ACCOMPLISHED WITH FIXED AIRCRAFT. SUBSEQUENT TO 1964 HELICOPTERS WERE USED. THE VARIOUS RATES SHOW THE DIFFICULTY WE HAD IN CONTROLLING BRUSH.

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FROM 1965 TO 1974 TORDON 101 WAS USED ALMOST EXCLUSIVELY.

FROM 1975 TO 1983 TORDON 10K PELLETS WERE USED. HERBEC 20P PELLETS WERE USED FOR SOIL STERILIZAION ON FIRE BREAKS. THESE ARE LOCATED AROUND THE LIVE FIRE IMPACT AREAS, AND IN OTHER HIGH FIRE HAZARD REGIONS.

IN 1984 A SWITCH WAS MADE TO A DYCLEER/SILVAPROP MIXTURE. THIS WAS AT THE DISCRETION OF THE CONTRACTOR. CHOICES OF EFFECTIVE CHEMICALS ARE GENERALLY SPECIFIED TO ENCOURAGE COMPETITION AND FAIR BUSINESS PRACTICES.

THE TOTAL COST OF OUR SPRAY PROGRAM IS SOME 5-1/2 MILLION DOLLARS TO DATE AND COVERS ALMOST 200,000 ACRES.

s.15(1)

IN 1964 THE AND CANADIAN DEPT OF FISHERIES AND FORESTRY WERE APPROACHED BY DND TO INVESTIGATE ALTERNATE CHEMICALS, AND TO SUGGEST METHODS TO IMPROVE CONTROL OF BRUSH SPECIES.

DUE TO THE LACK OF FUNDING TESTS DID NOT BEGIN UNTIL 1966.

IN 1966 AND 1967, 434 ACRES WERE USED TO TEST VARIOUS CHEMICALS. THE SITES ARE SHOWN AT POINTS 1 AND 2. (SEE ANNEX B) THESE SITES WERE CHOSEN BECAUSE OF THEIR RELATIVE ISOLATION AND INDIGENOUS SPEICIES OF BRUSH PRESENT

APPROXIMATELY 100 ACRES.

A LIST OF THE COMPOUNDS TESTED IN 1966 IS SHOWN ON THIS SLIDE (SEE ANNEX C).

A LIST OF COMPOUNDS TESTED IN 1967 IS SHOWN HERE (SEE ANNEX D).

AGENT ORANGE HAS COME TO THE ATTENTION OF THE PUBLIC AS THE MAJOR SOURCE OF CONCERN IN OUR SPRAY PROGRAM

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IN FACT, IT REPRESENTS ONLY A MINISCULE PORTION OF OUR PROGRAM IN A SOLELY EXPERIMENTAL ROLE DURING 1966 AND 1967.

IN THE TWO TEST YEARS COMBINED, ONLY 108 GALS OF THE MATERIAL, (2-1/2 DRUMS) WAS APPLIED TO 24 ACRES WITHIN THE TEST AREAS

SINCE THE 1967 TESTS AN ONGOING PROGRAM OF EXPERIMENTATION TO LOCATE MORE EFFECTIVE - LESS HAZARDOUS HERBIDICES HAS TAKEN PLACE. SOME OF THE HERBICIDES TESTED ARE - DICAMBA, TEBUTHIURON AND KRENITE. THE 1985 PROGRAM WILL TEST GARLON.

ALL OF THE PRODUCTS USED BOTH EXPERIMENTALLY AND AS PART OF THE BRUSH CONTROL PROGRAM ARE APPROVED FOR SUCH USE BY AGRICULTURE CANADA.

I WILL TAKE A MOMENT TO DISCUSS THE PROCEDURES FOR ENSURING THAT ALL ENVIRONMENTAL CONCERNS ARE DEALT WITH. AFTER THE PROJECT DRAWINGS AND SPECIFICATIONS ARE PREPARED THEY ARE SENT TO THE FEDERAL INTERDEPARTMENTAL COMMITTEE ON PESTICIDES, ATLANTIC REGION PESTICIDE ADVISORY COMMITTEE, THE FEDERAL AND FINALLY THE PROVINCIAL DEPARTMENTS OF ENVIRONMENT. ALL OF THESE AGENCIES COMMENT ON AND APPROVE THE PROJECT. A MEMBER OF MOST OF THESE ORGANIZATIONS IS PRESENT HERE TODAY.

TO THIS POINT IN THE BRIEFING THE CHEMICAL MEANS OF GROWTH CONTROL HAVE BEEN DISCUSSED. NOW I WOULD LIKE TO DISCUSS MECHANICAL MEANS WE HAVE TRIED AS AN ALTERNATE TO CHEMICAL CONTROL.

THIS METHOD INCLUDES HANDCUTTING WITH CHAINSAWS AND AXES, ROLLING AND CHOPPING WITH TRACTOR TOWED EQUIPMENT AND BULLDOZING.

SOME DIFFICULTIES WE ENCOUNTERED WITH MECHANICAL CONTROL ARE THAT:

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A. IT REQUIRES THAT TRAINING AREAS BE REMOVED FFROM SERVICE FOR CONSIDERABLE PERIODS OF TIME;

B. IT TENDS TO LEAVE STUBBLE AND OBSTRUCTIONS IMPASSABLE TO WHEELED AND FOOT TRAFFIC AND THEREFORE MAKING THE AREA UNSUITABLE FOR TRAINING;

C. IT CANNOT BE USED IN LIVE FIRE IMPACT AREAS DUE TO THE PRESENCE OF UNEXPLODED ORDANANCE;

D. IT GIVES SHORT TERM EFFECTS - ONLY 1 TO 3 YEARS;

E. IT MAY REDUCE VEGETATIVE GROUND COVER AND INCREASES EROSION PROBLEMS; AND

F. IT HAS AN ENORMOUS COST COMPARED WITH CHEMICAL CONTROL. WE HAVE FOUND THAT IT RANGES FROM 3 TO 5 TIMES THE COST OF CHEMICAL CONTROL PER UNIT AREA.

IN 1963 AND 1964 THE DEPARTMENT SPENT $1.1 MILLION AND 370,000 MANHOURS ON HAND CLEARING.

FROM 1966 TO 1969 13,000 ACRES WERE CONTROLLED MECHANICALLY.

THIS POINTS OUT OUR EXPERIENCE WITH THIS CONTROL METHOD.

SINCE 1969 HERBICIDES HAVE BEEN USED TO ADEQUATELY CONTROL BRUSH REGROWTH.

PRESENTLY, A UNIVERSITY OF NEW BRUNSWICK STUDY INVESTIGATING NON CHEMICAL CONTROL OPTIONS IS UNDERWAY WITH FINAL RESULTS EXPECTED IN APRIL. PRELIMINARY RESULTS SHOW A REQUIREMENT FOR HERBICIDES STILL EXISTS AS THE PRIMARY CONTROL METHOD. SEVERAL SMALL AREAS WILL BE CONTROLLED MECHANICALLY IN 1985. WE CONTINUE TO SEARCH OUT NEW METHODS FOR SOLVING THIS DIFFICULT PROBLEM.

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IN 1964 A SPRAY APPLICATION ACCIDENT OCCURED. 2, 4-D PLUS 2, 4, 5-T WAS BEING APPLIED BY FIXED WING AIRCRAFT. A TEMPERATURE INVERSION AND INCREASING SOIL TEMPERATURES SUSPENDED THE SPRAY ABOVE THE TARGET SPECIES. SEVERAL HOURS LATER THE INCREASED WINDS CARRIED THE SPRAY TO THE UPPER GAGETOWN AND SHEFFIELD AREA SHOWN ON THE MAP AS AREA 3. (SEE ANNEX B).

THE CROWN PAID APPROXIMATELY $250,000 TO SEVERAL MARKET GARDENS IN THE AREA AS REPARATION FOR THE DAMAGE TO THEIR CROPS.

AS I DISCUSSED PREVIOUSLY, AND TO REDUCE THIS OVERSPRAY HAZARD, DND CHANGED ITS SPRAY PROGRAM THE FOLLOWING YEAR, APPLYING TORDON 101 WITH A DRIFT CONTROL AGENT BY HELICOPTER.

THIS ALLOWED FOR MORE EXACT TARGETING AND A BROADER RANGE OF SPECIES WERE CONTROLLED. NO DAMAGE CLAIMS FROM HERBICIDE APPLICATION HAVE BEEN MADE AGAINST CFB GAGETOWN SINCE THAT TIME.

THIS DEPARTMENT HAS CONSISTENTLY USED REGROWTH CONTROL MEASURES IN ACCORDANCE WITH FEDERAL AND PROVINCIAL GUIDELINES.

WE ENSURE THAT THE FEDERAL INTERDEPARTMENTAL COMMITTEE ON PESTICIDES [illegible] DEPARTMENTS APPROVE, AND THAT THE CONTRACTOR AND SPRAY PROJECT ITSELF ARE APPROVED AND LICENCED BY THE PROVINCE.

ALL OF THESE HERBICIDES ARE WIDELY USED ACROSS THE COUNTRY AND AROUND THE WORLD TO ASSIST IN THE CONTROL OF BRUSH SPECIES.

AND NOW MAJOR MIKE RUSHTON WILL BRIEF YOU ON THE HERBICIDE CONTAINER DISPOSAL AREAS. MAJOR.

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ANNEX A
TO
DATED:

OVERVIEW OF HERBICIDE SPRAY PROGRAMME 1956 - 1984

YEAR	$	AREA	CHEMICAL TYPE(S)	VOLUME	EXPEC TED # OF BARRELS
1956	15,692	3,687 Ac	2, 4-D and 2, 4, 5-T	48 OZ/Ac	24
1957	51,224	3,879 Ac	2, 4-D and 2, 4, 5-T	48 OZ/Ac	25
1958	47,730	8,018 Ac (spot)	AMMATE + 2, 4, 5-T	32 OZ/Ac	35
1959	-	-	-	-	-
1960	67,697	9,079 Ac	2, 4, 5-T	32 OZ/Ac	40
1961	32,365	5,189 Ac	2, 4, 5-T	48 OZ/Ac	34
1962	-	-	-	-	-
1963	70,934	9,653 Ac	2, 4-D + 2, 4, 5-T	80 OZ/Ac	105
1964	56,672	9,225 Ac	2, 4-D + 2, 4, 5-T	80 OZ/Ac	100
1965	98,371	4,708 Ac	TORDON 101	1 GAL/Ac	301
1966	207,220	8,431 Ac	TORDON 101	1.6 GAL/Ac	536
1967	253,041	7,873 Ac	TORDON 101	1.6 GAL/Ac	485
		2,000 Ac	2, 4-D	1 GAL/Ac	45
1968	168,497	5,675 Ac	TORDON 101	1.6 GAL/Ac	363
1969	100,188	3,710 Ac	TORDON 101	1.6 GAL/Ac	238
1970	222,851	9,550 Ac	TORDON 101	1.6 GAL/Ac	612
1971	276,719	9,625 Ac	TORDON 101	1.6 GAL/Ac	654
1972	355,389	10,213 Ac	TORDON 101	1.6 GAL/Ac	829
		1,335 Ac	TORDON 10K	30 LBS/Ac	

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ANNEX A
TO
DATED:

OVERVIEW OF HERBICIDE SPRAY PROGRAMME 1956 - 1984

YEAR	$	AREA	CHEMICAL TYPE(S)	VOLUME	EXPECTED # OF BARRELS
1973	257,500	8,664 Ac	TORDON 101	1.6 GAL/Ac	555
1974	249,682	4,144 Ac	TORDON 101	1.6 GAL/Ac	266
		3,149 Ac	TORDON 101	30 LBS/Ac	
1975	249,682	8,855 Ac	TORDON 10K	30 LBS/Ac	
1976	250,000(E)	6,041 Ac	TORDON 10K	30 LBS/Ac	
1977	257,614	5,963 Ac	TORDON 10K	30 LBS/Ac	
	approx	300 Ac	SPIKE 5P	150 LBS/Ac	
1978	349,729	6,055 Ac	TORDON 10K	30 LBS/Ac	
		50 Ac	SPIKE 5P	150 LBS/Ac	
1979	201,299	2,982 Ac	TORDON 10K	30 LBS/Ac	
		102 Ac	SPIKE 5P	150 LBS/Ac	
1980	349,729	4,795 Ac	TORDON 10K	30 LBS/Ac	
1981	104,500	1,347 Ha	TORDON 10K	33 KG/Ha	
		102 Ha	HERBEC 20P	45 KG/Ha	
1982	348,572	1,531 Ha	TORDON 10K	34 KG/Ha	
1983	392,831	1,455 Ha	TORDON 10K	34 KG/Ha	
		178 Ha	HERBEC 20P	22 KG/Ha	
1984	377,699	2,825 Ha	DYCLEER LH +	6.25 L/Ha	707
			SILVAPROP	8.75 L/Ha	550
TOTALS	$5,418,429	131,033 Ac			6,504

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ANNEX C
TO
DATED: JAN 85

1966 COMPOUNDS TESTED BY

s.15(1)

1966 COMPOUNDS TESTED BY DEPT OF FISHERIES AND FORESTRY *

2, 4-D

2, 4, 5-T

TORDON 101

(* - VARIOUS RATES AND MIXTURES OF COMPOUNDS USED)

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ANNEX D
TO
DATED: JAN 85

1967 COMPOUNDS TESTED

s.15(1)

1967 COMPOUNDS TESTED BY DEPT OF FISHERIES AND FORESTRY *

DICAMINE

2, 4, 5-T

TCA

BENZOIC ACID

PICLORAM

(* - VARIOUS RATES AND MIXTURES OF COMPOUNDS USED)

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BRIEFING TO PROVINCIAL MINISTERS ON CFB GAGETOWN CHEMICAL DUMPSITES - 24 JAN 85

LADIES AND GENTLEMEN - GOOD MORNING

IT IS MY PURPOSE HERE TO SUMMARIZE WHAT YOU HAVE HEARD THIS MORNING. I AM SURE THAT LIKE ME YOU HAVE BEEN OVERWHELMED IN A HAZE OF TECHNICAL JARGON. I WOULD HASTEN TO ASSURE YOU THAT AS A SIMPLE SOLDIER I FELT THE SAME WHEN I FIRST EXPERIENCED THE BRIEFINGS TO WHICH YOU HAVE JUST BEEN SUBJECTED. HOWEVER, LET ME REASSURE YOU THAT, IN MY OPINION, THEY ARE NECESSARY IN ORDER TO UNDERSTAND WHAT WE IN GAGETOWN HAVE BEEN UP TO FOR THE LAST 28 YEARS. I MAKE NO APOLOGY FOR WHAT YOU HAVE BEEN SUBJECTED TO. IF YOU WISH TO EXPLAIN IT TO YOUR CONSTITUENTS THEN YOU MUST UNDERSTAND IT FROM FIRST PRINCIPLES.

IN SIMPLE LAYMEN'S TERMS WE HAVE USED A VARIETY OF HERBICIDES IN ORDER TO MAINTAIN SUFFICIENT CLEARED AREAS IN WHICH TO CARRY OUT OUR MILITARY TRAINING. TO THE EXTENT POSSIBLE WE HAVE SUPPLEMENTED THESE CHEMICAL ENDEAVOURS WITH A VARIETY OF MECHANICAL CLEARANCE DEVICES. IN THE EARLY DAYS WE, LIKE THE REST OF THE WORLD, HAD LITTLE KNOWLEDGE OF THE CHEMICALS WE WERE USING AND OF THEIR EFFECTS ON PEOPLE OR ON OUR ENVIRONMENT. BECAUSE OF OUR RELATIVE IGNORANCE WE HAVE, FROM DAY ONE SOUGHT AND FOLLOWED THE ADVICE OF EXPERTS IN THE FIELD. THEREFORE, WE HAVE **NEVER** FAILED TO ADHERE TO ANY GOVERNMENT/ENVIRONMENTAL DIRECTION IN THIS REGARD. WE HAVE USED ONLY REGISTERED, AUTHORIZED CHEMICALS IN THE MANNER RECOMMENDED BY THE APPROPRIATE FEDERAL OR PROVINCIAL AGENCY. THESE INCLUDE, AS YOU HAVE HEARD: UNB, NBDOE, ENVIRONMENT CANADA, THE CANADIAN FORESTRY SERVICE AND THE FEDERAL AND PROVINCIAL DEPARTMENTS OF AGRICULTURE. AS A RESULT WE HAVE NOT USED 2-4-5-T SINCE 1964.

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THIS, AS YOU NOW KNOW, IS THE MAIN SOURCE OF DIOXIN, ESPECIALLY OF TOXIC DIOXIN. RATHER WE NOW USE 2-4-D WHICH CONTAINS ONLY TRACE AMOUNTS OF DIOXIN. ALSO WE HAVE DISPOSED OF THE CONTAINERS IN A TOTALLY RESPONSIBLE MANNER AND ALWAYS IN ACCORDANCE WITH EXISTING FEDERAL AND PROVINCIAL REGULATIONS.

FOR THESE REASONS, THEREFORE, I GET VERY UPSET WITH MEDIA REPORTS THAT CFB GAGETOWN IS HARBOURING SEVERAL (OR MANY) CHEMICAL OR TOXIC WASTE DUMPS. I CAN STATE CATEGORICALLY THAT WE HAVE NEITHER CHEMICAL NOR TOXIC WASTE DUMPS ON BASE. RATHER, WHAT WE HAVE ARE LAND-FILL SITES WHICH CONTAIN EMPTY BARRELS, BOTH METAL AND PLASTIC, WHICH ONCE CONTAINED RELATIVELY HARMLESS CHEMICAL HERBICIDES. THEY POSE NO THREAT TO ANIMAL NOR HUMAN LIFE, NOR TO PLANT LIFE, EVEN IN THE IMMEDIATE VICINITY OF THE SITES (WHICH HAVE BEEN DELIBERATELY SELECTED AS FAR AS POSSIBLE FROM HUMAN HABITATION).

NEXT, I WOULD LIKE TO DEAL WITH THE AGENT ORANGE MYTH. AS YOU HAVE HEARD, IN 1964, CANADA REQUESTED TO CARRY OUT s.15(1) TESTS IN GAGETOWN TO ASSESS THE VALUE OF AGENT ORANGE IN CONTROLLING SECONDARY GROWTH IN OUR TRAINING AREA. FINANCIAL CONSTRAINTS POSTPONED THESE TESTS FOR TWO YEARS BUT EVENTUALLY WE DID CARRY OUT THESE TESTS UNDER VERY CONTROLLED CONDITIONS IN A VERY ISOLATED AND SMALL AREA (ONLY ACRES). I WOULD REMIND YOU THAT ONLY 2½ BARRELS (APPROX 120 GALLONS) WERE USED. AT NO TIME WERE MILITARY NOR CIVILIAN PERSONNEL PLACED AT RISK DURING THIS TRIAL. CERTAINLY NO CIVIL AN COMMUNITY WAS EVER EFFECTED.

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I WOULD REMIND YOU THAT OUR SECONDARY GROWTH CONTROL SPRAYING PROGRAMME HAS NOW BEEN IN USE FOR 28 YEARS. WE HAVE NO INDICATION FROM OUR MEDICAL RECORDS THAT MILITARY PERSONNEL HAVE EXPERIENCED ANY ILL RESULTS FROM THIS ENDEAVOUR. WHEN YOU CONSIDER THAT, DURING THIS PERIOD MORE THAN 150,000 TROOPS HAVE TRAINED IN GAGETOWN, THE RECORD CAN SPEAK FOR ITSELF. IT IS MY CONSIDERED OPINION, THEREFORE, THAT OUR SECONDARY GROWTH CONTROL SPRAYING PROGRAMME POSES NO THREAT TO THE ANIMAL AND HUMAN POPULATION OF CFB GAGETOWN, NOR TO ITS NEIGHBOURING COMMUNITIES. I WOULD ALSO REMIND YOU THAT I RESIDE, WITH MY FAMILY, IN OROMOCTO AND WOULD NEVER WISH TO EXPOSE MY FAMILY TO ANY POSSIBILITY OF SUCH DANGER.

s.19(1)
s.20(1)

ORGANIZATION HAVE ATTEMPTED WITH SOME DEGREE OF SUCCESS, TO SPREAD ALARM AND DESPONDENCY WITHIN THE COMMUNITIES SURROUNDING CFB GAGETOWN. BY USE OF UNFOUNDED AND POSSIBLY LIBELOUS STATEMENTS THEY HAVE SUCCEEDED IN FRIGHTENING THE UNINFORMED, DESTROYING PROPERTY VALUES AND DEMANDING PROVINCIAL STUDIES TO SUPPORT THEIR DUBIOUS CLAIM FOR COMPENSATION.

AS A TAXPAYER, I WOULD STRONGLY OBJECT TO ANY EXPENSIVE ENVIRONMENTAL OR HEALTH STUDY BEING CARRIED OUT ON THIS ISSUED, UNTIL AND UNLESS WE HAVE SOME EVIDENCE THAT A PROBLEM EXISTS. AS YOU HAVE HEARD, WE ARE AWAITING THE RESULTS OF TESTS ON ONE OF THE LAND-FILL SITES CONTAINING EMPTY HERBICIDE CONTAINERS. IF, AS I STRONGLY SUSPECT, THESE TESTS CONFIRM MY BELIEF THAT WE HAVE NOTHING TO FEAR, I WOULD ASK THAT YOU BROADCAST THESE RESULTS IN THE LOUDEST POSSIBLE MANNER. REASSURE YOUR CONSTITUENTS THAT INNUENDOS ARE JUST THAT. PUT THIS FEAR TO REST! I AM AS CONCERNED

s.20(1)

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AS YOU IN ENSURING THE SAFETY OF PERSONNEL UNDER MY COMMAND. IN FACT I HAVE SWORN AN OATH TO HER MAJESTY THAT I WILL BE RESPONSIBLE FOR THE WELFARE OF MY SUBORDINATES.

LET US BE UNDER NO ILLUSION CONCERNING AND s.19(1)
HIS MOTIVES. HE CLEARLY INTENDS TO MAKE LIFE AS MISERABLE AS POSSIBLE FOR ALL OF US IN AN ATTEMPT s.19(1)
FROM NB POWER AND NO DOUBT FROM DND. HE WILL USE ANY s.20(1)
MEANS, INCLUDING OUTRIGHT FALSEHOOD, FEAR-MONGERING AND HEADLINE GRABBING, TO PLAY ON THE FEARS OF CITIZENS TO SUPPORT HIS DUBIOUS CAUSE.

DON'T UNDERESTIMATE THIS ESTEEMED GENTLEMAN, HOWVER. HE IS BOTH CLEVER AND SMOOTH
s.19(1)

AS I HAVE ALREADY STATED, I AM PERSONALLY CONVINCED THAT NOTHING ON, UNDER OR BELOW THE SURFACE OF BASE GAGETOWN POSES ANY THREAT TO ITS CURRENT POPULATION, NOR TO THE CITIZENS OF SURROUNDING COMMUNITIES. I FU&LLY EXPECT THAT MY CONVICTIONS WILL BE SUPPORTED WHEN WE RECEIVE THE SOIL AND LIQUID TEST SAMPLE RESULTS NEXT WEEK AND THE GROUND WATER TEST RESULTS IN MID-FEBRUARY. IF THIS SUPPORT IS FORTHCOMING I INTEND TO MAKE THE STATEMENT CLEARLY AND PUBLICLY. IN THE UNLIKELY EVENT THAT THE TEST RESULTS INDICATE THAT AN ENVIRONMENTAL HAZARD DOES EXIST WE WILL TAKE ANY AND ALL NECESSARY STEPS TO CORRECT IT ON THE ADVICE OF AND ASSISTANCE FROM ENVIRONMENT CANADA. IN EITHER EVENT YOU WILL BE KEPT FULLY INFORMED OF DEVELOPMENTS.

IN THE MEANTIME THERE IS NOTHING TO INDICATE THAT THERE ARE ANY GROUNDS FOR ANY COSTLY HEALTH OR ENVIRONMENTAL STUDIES IN SURROUNDING COMMUNITIES.

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RESTRICTED

cAdm

/95-3 (TECH SVCS)

MINUTES OF A MEETING

BETWEEN ENVIRONMENT CANADA AND DND

ON A CHEMICAL WASTE DISPOSAL SITE

HELD AT GR 039793 IN THE CFB GAGETOWN TRAINING AREA AT 0830 HOURS

AND AT BUILDING H-14 CONFERENCE ROOM AT 0930 HOURS, 18 SEPTEMBER 1984

CFB Gagetown
Oromocto, NB

24 September, 1984

MEMBERS, DELEGATES or REPRESENTATIVES

Chairman	Maj IM Rushton	SO2 Tech
Members	Mr Rick Walter	NDHQ/DCE
	Mr George Lindsay	Environment Canada, District Director, Fredericton
	Mr Ian C. Travers	Environment Canada, Head of Hazardous Wastes Section, Halifax
	Capt JS Fisher	Prod O CE Coy
	Capt DM Scandrett	BPIO
	Mr CC Clowater	FGSO
	Mr HP Cusack	Tn Coy

SITE VISIT

1. Maj Rushton accompanied Mr Walter, Mr Lindsay and Mr Travers to a site at GR FA 039793 in the CFB Gagetown training area to visit the site of an apparently abandoned chemical disposal site which had been reported to Base authorities on 12 September 1984.

2. The site consisted of a mound of earth from which was protruding 5-6 empty metal drums, one of which was red with white markings indicating it had contained TORDON 101 brush killer solution. At the site the party was met by Mr HP Cusack, an equipment operator in Transportation Company, who claimed that in either 1964 or 1965 he had operated a bulldozer at the site to bury drums similar to the TORDON 101 drum that was visible on the mound of earth. He stated that three Army Service Corps stake truck loads of these drums were placed in the bottom of the gravel pit at that location. He said that some and possibly all of the drums were full because they appeared full when they were handled by those unloading them and that when covering them, several burst and spilled their contents into the ground. (Note: Standard 3 ton stake bed is 13'10" x 7'6". 25 gal drum is 20" in diameter. Therefore there could have been up to 32 drums per truckload ie 96 drums.

s.19(1)
s.20(1)

3. At the site also were empty drums which were purple with a white or yellow stripe around the middle. The white stripe had weathered to the point that it was a rust colour. Apparently this drum was the one that organization claimed was an Agent ORANGE drum.

4. Mr Cusack stated that the total depth of the site would be no more than approximately 10 feet since the barrels were placed along the edge of the existing gravel pit then covered with earth and gravel from the open face. He also stated that in the nine years following this burial, in which he worked at the landfill site nearby, he always took his fill for the landfill site from areas well away from the site. He stated, however, that operators since he has been there have taken fill from near the site and that in one case approximately three years ago an operator did hit a drum and puncture it, causing the contents to spill out. Mr Cusack was then dismissed from the meeting.

5. Mr Travers stated that the approximate dimensions of the site should be determined by metal detector and that the area should continue to remain cordon off and out of bounds to unauthorized personnel.

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RESUMPTION OF MEETING IN CONFERENCE ROOM

6. Site visit completed, the meeting resumed in the H-14 Conference Room where it was joined by Capt Fisher, Capt Scandrett and Mr Clowater. Maj Rushton presented the agenda and oriented Environment Canada personnel to the organization and role of CFB Gagetown. He stressed the importance of the training area to our mission and the importance of the secondary growth control programme to maintaining our cleared areas for training.

ITEM	DISCUSSION	ACTION BY
I	PROPOSED TERMS OF REFERENCE FOR THE INVESTIGATION OF A CHEMICAL DISPOSAL SITE 7. Maj Rushton distributed a proposed terms of reference for the investigation into the chemical waste disposal site which was reported on 12 September 1984. He explained that these terms of reference called for a thorough investigation into the contents of the site in view of the fact that it is suspected that it may contain full barrels of herbicide. He stated that these proposed terms of reference have been seen and approved in general terms by the Chief of Administration. He asked members present to read the document and be prepared to offer comments following a secondary growth control presentation by Mr Walter.	
II	OUTLINE BRIEFING ON CFB GAGETOWN SECONDARY GROWTH CONTROL PROGRAMME 8. Mr Walter presented a briefing on the secondary growth control programme as it pertains to this Base, bringing out the following points: a. NDHQ has fairly detailed information on secondary growth control operations as it relates to types of chemicals and areas sprayed but not to disposal sites for extra chemicals or empty drums. There are incomplete records of disposal sites since late 1970s and no records prior to late 1970s. Disposal sites were usually near aircraft landing and take-off spots which are recorded. b. The following is a summary of chemicals applied from 1956 when handclearing was ceased and chemical control was begun: (1) 1956 - 2-4-D and 2-4-5-T (2) 1957 - 2-4-D and 2-4-5-T (3) 1958 - 2-4-5-T and AMMATE (4) 1959 - no chemicals (5) 1960 - 2-4-5-T (6) 1961 - 2-4-5-T (7) 1962 - no chemicals (8) 1963 - 2-4-D and 2-4-5-T (9) 1964 - 2-4-D and 2-4-5-T (10) 1965 - TORDON 101 (4,708 gal = 188 barrels) (11) 1966 - TORDON 101 and AMMATE plus various chemicals in small test quantities	

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ITEM	DISCUSSION	ACTION BY
	(12) 1967 - TORDON 101 and 2-4-D and various chemicals in small test quantities (13) 1968 - TORDON 101 (14) 1969 - TORDON 101 and 2-4-D (15) 1970 - TORDON 101 and 2-4-D and various chemicals in test quantities (16) 1971 - TORDON 101 and possibly TORDON 10K (17) 1972 - TORDON 101 and TORDON 10K (18) 1973 to present - TORDON 101 and/or TORDON 10K c. Considering that 188 barrels of TORDON 101 were sprayed in 1965 it ssems strange that up to 96 barrels could have been excess to the spray programme and buried. However, since Mr Cusack stated that he buried the barrels in 1964 or 1965 and since 1965 was the first year TORDON 101 was used, it is possible that this disposal site was related to the 1965 secondary growth control programme. If it was related to the programme then it is possible that NORBAC containers, the particulant used with TORDON 101 in 1965, might also be found at the site. 9. Mr Walter addressed questions from Mr Lindsay and Mr Travers regarding the secondary growth control programme. Pertinent details are as follows: a. most chemical application has been done by contract. DND writes a specification in accordance with current federal and provincial regulations. The contractor purchases the specified chemicals, and applies them. Defence Construction Canada awards and supervises the contract; b. NDHQ has specs for 1961, 1964-1984. Specs from 1965 on specify that empty containers and excess chemical is to be buried on site. Rinsing of empty containers was not specified until late 70s. Triple rinsing, crushing and burying was specified commencing in 1983; c. it is difficult to explain why DND stake trucks would have been used to transport the chemical barrels as Mr Cusack had indicated because the secondary growth control was done by a contractor who would have transported excess chemical in his own vehicles. There has, however, been give and take between DND and contractors over the years so possibly special arrangements had been made in this case; d. Mr Bud Balance, who preceded Mr Walter in NDHQ from 1968 until , may be able to answer some of the background questions once he returns from holidays. The incumbent in 1965 cannot be contacted; e. the number of possible disposal sites in the training area could be as high as one per year since 1965 ie 20. Disposal sites for 1983 and 1984 are known; it is also known that on several other years the Base landfill site used. The number of drums in the sites	s.19(1) Mr Walter

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ITEM	DISCUSSION	ACTION BY
	could vary from 200 to 700 depending on the year. Prior to 1965 it was specified that containers and excess chemicals were to be removed from the site. The disposal sites could contain between 200 and 700 drums, depending on the year; f. Maj Rushton will be contacting CE Company and DCL to have them check their records for any indication of disposal sites. Mr Walter will contact contractors still available to see if they still have records or personnel who would know the location of disposal sites; and g. it is expected that disposal sites would be on high ground near the take-off and landing point for the aircraft. 10. Mr Travers asked if the Base had a Waste Management Plan. Maj Rushton answered that we did not have an all encompassing one but that we disposed of hazardous materials such as battery acid, oils, herbicides and other hazardous materials in accordance with current regulations. Mr Travers stated CFB Halifax has a Waste Management Plan including a specified waste disposal site. He suggested CFB Gagetown should consider such a plan. He will forward a copy of the CFB Halifax plan to the Base.	Maj Rushton, Mr Walter Mr Travers
III	DISCUSSION OF PROPOSED TERMS OF REFERENCE FOR THE INVESTIGATION OF A CHEMICAL DISPOSAL SITE 11. Maj Rushton then initiated a point by point review of the Proposed Terms of Reference to validate it and determine division of duties between DND and Environment Canada. The final draft is attached at Annex A.	
IV	FORMULATION OF THE PLAN TO MEET THE TERMS OF REFERENCE 12. General. The next step taken was to discuss the plan to accomplish that set out in the terms of reference. This discussion involved all members and resulted in a plan for a phased operation as follows: a. Phase 1 - delineate and screen the site to determine if there is chemical buried there and if so, what type. This will be done by CFB Gagetown personnel with Environment Canada (EC) advice in period 24-28 September 1984. If no chemical is found, the empty barrels will be disposed of in another site and ground water monitoring wells will be established. If chemicals are found, then proceed to Phase 2. b. Phase 2 - dig the site, clean up and dispose of the chemicals, dispose of empty containers, do soil and ground water sampling and restore the site to original condition. This phase will be done by contract following normal DND procedures and with Environment Canada advice in the period mid-October - mid-November 1984.	

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ITEM	DISCUSSION	ACTION BY
	c. Phase 3 - carry out a document search and physical confirmation to determine the location of other chemical waste disposal sites in the CFB Gagetown training area. This will be done by CFB Gagetown personnel with NDHQ assistance concurrently with Phases 1 and 2.	
	d. Phase 4 - consolidate findings and make recommendations. This phase will be completed by mid-December 1984.	
	13. Details of Phase 1. The details of this screening phase were agreed as follows:	
	a. delineation and mapping of the site is to take place from 19-24 September 1984. Delineation will be done by Range Control personnel using mine detectors to determine as accurately as possible the lateral extent of the site, followed by marking with mine tape. CE Company will then survey the site and prepare a site plan.	Range Control Officer, OC CE Coy
	b. other preparations include the following:	
	(1) Mr Walter will prepare a spec to hire the lab for chemical sampling on 25-26 September. (Note: On 20 September OC CE Company spoke with FMC/SSO Maint and agreed that CE Company would arrange the contract for the lab in accordance with spec developed by Mr Walter);	Mr Walter, OC CE Coy
	(2) funding for Phase 1 will be done by CE Company from Serial 1 funds for now. Final decision on whether Base or FMC bears cost will be made later;	SSO Maint, OC CE Coy
	(3) the formal request for assistance from DND to Environment Canada will be made by forwarding a copy of the minutes of the meeting with a covering letter requesting their assistance in the agreed areas. It was agreed that Environment Canada would bear costs for their visits to CFB Gagetown;	SO2 Tech, Environment Canada
	(4) resources to be available at the chemical disposal site at 0800 hours 25 September 1984 are the following:	OC CE Coy
	(a) four pers (Note: These will be military personnel. Base Surgeon will check their records to ensure they are medically fit prior to the task on 25 September 1984;	
	(b) one backhoe with operator;	
	(c) one-quarter (¼) inch reinforcing rods to be used as prodders;	
	(d) barrel sling;	
	(e) safety equipment to include coveralls, rubber gloves and footwear, hard hats, masks, polyethelene bags to cover drums,	

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ITEM	DISCUSSION	ACTION BY
	oversize drums with covers; (f) several bags of vermiculite; (g) chemical sampling apparatus. Exact details of the sampling apparatus will be worked out betwen Mr Walter and the lab. It will include soil and chemical sampling apparatus; and (h) photographer will be required to take pictures at various stages of the excavation as directed by Mr Travers on the site.	SO2 Tech
	c. procedure for the screening operation is the following: (1) CFB Gagetown personnel and Mr Travers will assemble at 0800 hours 25 September 1984 at the chemical disposal site complete with equipment detailed above;	OC CE Coy, Mr Travers
	(2) backhoe will dig a trench on the west side of the site and personnel will remove soil from the side of the site to expose drums as directed by Mr Travers; (3) if a barrel with chemical is found, the contents will be sampled by Mr Travers and sent to a lab for testing to confirm chemical composition. This will be done for up to three barrels if necessary. Soil samples will also be taken; and (4) the screening will continue until a barrel containing chemical is found or extensive soil contamination is found. If neither of these conditions is met, the operation will end when the complete site has been excavated and empty containers have been documented and disposed of in accordance with current regulations.	
	14. Details of Phase 2. Phase 2 will be executed if barrels containing chemicals or extensive chemical contamination is encountered: a. based on the findings of Phase 1, a specification will be written by CE Company to hire a contactor to do some or all of the following:	OC CE Coy
	(1) investigate the site to determine type and amount of chemical present; (2) dispose of the chemical or prepare it for storage for use in future spray programmes; and (3) establish ground water monitoring wells after containers are removed and take soil samples. The decision to put wells in will be based on whether soil contamination was encountered and whether leakage is suspected. The number of wells will depend on the lay of the land and location of water table.	
	b. ormal contracting procedures will be used. Walter will send whatever helpful documents he	Mr Walter

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ITEM	DISCUSSION	ACTION BY
	can find to assist with drafting the spec. NDHQ/DCE is to approve the spec before tendering begins;	
	c. funding is to be worked out between FMC and OC CE Company. Mr Travers stated that an operation in Amherst, NS in 1978 involving retrieval of 120 drums of PCBs took seven working days and cost $30,000. The depth of excavation was 12-15 feet. It therefore appears we could be looking at a cost in the $50,000 range for retrieval of the drums and any additional costs for clean-up and ground water monitoring. Mr Lindsay and Mr Travers felt that one month was sufficient for Phase 2; and	SSO Maint, OC CE Coy
	d. Mr Clowater was asked to elaborate on the location and state of the site where the PCP-coated ammo boxes were buried. He stated that they are located far enough from the chemical disposal site that they won't be disturbed by this investigation.	
	15. Details of Phase 3. Phase 3 will be conducted simultaneously with Phases 1 and 2. Maj Rushton will co-ordinate a document search for all possible disposal sites since 1956. This search will be supported by ground recce, personnel interviews, and delineation to confirm location and size of sites. Decisions as to detailed investigations of additional sites will be made at this time. Sources will include NDHQ/DCE, FMC/SSO Maint, CFB Gagetown/CE Company, DCL and chemical application contractors.	Maj Rushton
V	MEDIA ATTENTION	
	16. Maj Rushton suggested that the media plan should be centered around the basic principle that DND will co-ordinate the release of information and that this release should be through the BPIO. All agreed to this; Environment Canada representative requested that they be consulted before new releases were made.	Capt Scandrett
	(Note: On 20 September 1984 Mr Lindsay requested a a slight amendment to allow Environment Canada to comment on the environmental aspects of the DND press releases and that they get a copy of the press releases verbally or by hand prior to releasing to the press. This permission was given.)	
	17. Mr Walter made the point that	
s.15(1)		Capt Scandrett All
	18. Mr Lindsay advised that Environment Canada had been contacted by two environmental-conscious groups regarding this case:	
	a. from the leader of the Opposition office of Nova Scotia; and	s.19(1)
	b. Conservation Council of New Brunswick.	
	19. Capt Scandrett asked for direction regarding release	

.../8

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ITEM	DISCUSSION	ACTION BY
	of results of the investigation. Mr Walter said he would get that direction. (Note: Mr Walter confirmed on 20 September that the results could be released to the media as they become known. The policy is to be open with the public on this matter.	Capt Scandrett
	20. Capt Scandrett asked if there would be problems with control of information if civilian contractors were working on the site. Mr Walter advised they were bound by their contract not to release information since they are paid by DND.	
	21. Adjournment. There being no further business to discuss, the meeting was adjourned at 1215 hours.	

H.M. Rushton
Major
Chairman
2572

P.F. Branston
Secretary
2584

Approved

G.S. Kells
Brigadier-General
Commander

DISTRIBUTION LIST

Action	Information
External	C Adm SSO Ops
NDHQ/DCE FMCHQ/SSO MAINT Environment Canada: Mr. G.D. Lindsay District Director Environmental Protection Service Mr. I.C. Travers Atlantic Region Environmental Protection Service	
Internal	
SO2 Tech OC CE Coy BPIO	

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RESTRICTED

ANNEX A
TO 7795-3 (TECH SVCS)
DATED 24 SEP 84

FINAL DRAFT

TERMS OF REFERENCE

1. To investigate the circumstances surrounding the discovery of chemical herbicide containers Area GR GA 039793 in the CFB Gagetown training area on 12 September 1984.

2. Specifically to determine the following:

a. specific information about the containers is to be determined as follows:

(1) number of containers - differentiating between crushed and empty, uncrushed and empty, full and partially full. Where chemical is present in containers, the volume will be specified - DND

(2) type of chemical they contain and/or contained to include:

(a) chemical composition - DND with EC advice

(b) concentration of active ingredient - DND with EC advice

(c) trade name - DND

(d) manufacturer and date of manufacture - DND

(e) toxicity - DND with EC advice

(3) where possible, estimate length of time containers have been at the site - DND with EC advice

b. extent and type of soil and ground water contamination in the immediate vicinity of site - DND with EC advice

c. location of other sites at CFB Gagetown where herbicide containers may be buried - DND

d. whether the site was operated in accordance with accepted procedures of the time - DND with EC advice

3. Make recommendations as to the follow-up action necessary to deal with environmental contamination, if any, and to return the site to its original condition. - EC

4. Recommend a disposal method and/or site for chemicals and/or containers removed from the site. - EC

5. Completion target date - 14 December 1984.

Notes: 1. Time frame has been set based on the following proposed schedule:

a. preparation for investigation - 14 September - 12 October 1984

(1) request Environment Canada assist as an advisor by sending covering letter with minutes of meeting of 18 September 1984;

(2) SO2 Tech, Environment Canada and National Health and Welfare draft plan of action;

(3) NDHQ/DCE approve plan; and

(4) CE Company prepare resources and specifications for execution of plan.

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b. site investigation - 15 October - 16 November 1984 *

(1) CE Company conducts by contract or own resources in conjunction with advice from Environment Canada.

* Ground water information will be long term ie months/years, depending on situation and type of contamination, if any.

c. preparation of findings - 19 November - 14 December 1984

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18 Sep 64

Col. Hurley,

Attached are some of the data sheets that show the connection between 2,4,5-T and TCDD (or TDD as in Fuchs) s.15(1)

The greatest concentrations occur in the n-butyl formulations and Canadian specs called for iso butyl formulations. Therefore it is unlikely that high concentrations of TCDD were present in the chemical applied by us from 1956 - 1964. However, the info positively identifies n-butyl ester formulations of 2,4,5-T were employed during the 1966 and 1967 [redacted] at Gagetown. Table, for s.15(1) the 50:50 mix of n-butyl esters of 2,4,5-T and 2,4-D called Orange are also attached.

The report on 2,4,5-T is rather interesting reading and I have another copy in Ottawa (9 Thurl) I have left it for your perusal.

I realize that most of this material is heavily oriented in the organic chemistry field but hopefully you will decipher the material. If you need more help or info I am always available for consultation. I shall also call Dr Stewart in Pesticide Div of Agr Canada to ensure that I have left nothing out.

Good luck

Phil Gal.

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...ers have carried residues from treated fields to streams and thence to the lakes. Even with these events, accumulations in sediment and fish have not occured.

The widespread use of herbicides has led to their presence in stream waters. This has been largely the result of direct application to water, careless handling of herbicides around streams and removal from treated soils in runoff waters during storms. The triazine herbicides are the only chemical group among currently-used pesticides which are found consistently in stream waters and these mostly in Ontario where the herbicides are used extensively in corn production. Of 92 streams draining into Lake Huron, St. Clair, Erie and Ontario, 77% contained atrazine residues and 28% simazine residues. Levels in water rose to between 10 and 40 ppb during the spraying season and declined to less than 1 ppb in the fall and winter. No toxicological impact has been demonstrated in the aquatic ecosystem as a result of these residues.

Predictions and misconceptions

The experience gained from DDT and related organochlorine insecticides pointed to the fact that predictions are not infallible. For example, it was predicted that DDT would solve the insect pest problem. It did not. It was claimed that since DDT was relatively harmless to man, its massive use would not cause problems to animal life other than insects. This was not true since some fish and birds were adversely affected. Equally, it was predicted that DDT would cause irreparable harm to the environment but experience has shown that environmental residues have declined and permanent damage to fish or wildlife has not been demonstrated. The DDT issue however has sensitized the public and heightened concern about pesticides in general. As a result, misconceptions abound—the latest and perhaps most serious, from the food production aspect, is the issue raised about the safety of the phenoxy herbicides.

Probably the most widely-held misconception is that phenoxy herbicides were first developed in the 1960s as defoliants to aid the U.S. war effort in Vietnam. When this use was first made known, much of the anti-war sentiment came to focus on this new type of "chemical warfare". However, the facts are that the phenoxys including 2,4-D and 2,4,5-T are among our oldest and most widely-used herbicides. They have been used for weed control in grain crops, lawns, pastures, forestry and on roadsides and powerlines since the mid-1940s. Being synthetic versions of the natural plant hormone, indole acetic acid, they are highly active at low concentrations in plants and can stimulate a range of natural phenomena including root initiation, apical dominance and seed production as well as causing defoliation. At higher concentrations, they act as herbicides and are particularly toxic to broadleaved plants and deciduous trees. While the use of 2,4,5-T in Canada has been limited primarily to brush control on roadsides and powerlines, 2,4-D is our most widely-used herbicide. Approximately 5 million kg are used each year for weed control in cereals on the Canadian prairies alone. While care must be taken to avoid spray drift and damage to non-target plants, 2,4-D and 2,4,5-T enjoyed an enviable safety record for over 25 years.

The controversy generated over the use of defoliants in Vietnam gained momentum with reports of an alleged "correlation" between the use of defoliants and "increases" in numbers of malformed children born to Vietnamese women during the War. While a National Academy of Science and other study teams failed to document any of this, a laboratory study with rats did disclose that 2,3,7,8-tetrachloro dibenzo-p-dioxin (TCDD), a contaminant formed during the synthesis of 2,4,5-T, was highly toxic and capable of causing malformations in the unborn. The synthesis of 2,4-D however is quite different and the highly toxic TCDD contaminant does not occur. This is because a different chlorinated phenol is used. For 2,4-D, phenol is chlorinated at the 2 and 4 positions whereas in the synthesis of 2,4,5-T benzene is chlorinated through heat and alkali treatments (Fig. 3, 4). It is during that latter treatment that TCDD is formed. It is possible that some dioxins will be formed during 2,4-D synthesis and this has been confirmed. These appear during condensation reactions involving the dichloro phenols. It has been demonstrated that the dioxins formed in 2,4-D synthesis are of low toxicity to mammals, lower than 2,4-D itself. It is essential therefore that this difference in 2,4-D and 2,4,5-T be clearly understood.

Studies have shown that different productions of 2,4,5-T contain different levels of TCDD and Canada moved in the early 1970s to prohibit the sale of 2,4,5-T containing detectable levels of TCDD (greater than 0.1 ppm). With similar regulations in place, most other countries reinstated the use of 2,4,5-T and, for 5 or 6 years, there was relatively little controversy. Then, in 1979, the U.S. Environmental Protection Agency released a report commonly known as the "EPA Alsea II Study" in which it was claimed that over a 6-year period, the incidence of spontaneous abortions in women was correlated with applications of 2,4,5-T in forests near the town of Alsea, Oregon. Many scientific teams have examined the report, including Canada's departments of agriculture and health and welfare. These scientists are unanimous in their view that the conclusions in the report are not valid. Despite this, an emergency suspension on the use of 2,4,5-T has been in effect in the United States since the spring of 1979.

As would be expected, however, public discussions on 2,4,5-T have frequently included 2,4-D without sufficient explanation to permit the public to differentiate between the two. Thus the 2,4,5-T issue which raises a concern about contamination with a highly toxic dioxin results in public concern about 2,4-D, a product in which this dioxin does not occur. This is a serious error. There is no evidence to suggest any undue hazard associated with 2,4-D and its use is vital to crop production in Canada.

Pest resistance to pesticides

One of the main problems in pest control in Canada, as elsewhere throughout the world, is the ability of pests, whether they be insects (including mites), pathogens, weeds or rodents, to develop resistance to pesticides. This is not a new phenomenon. It occurred with hydrogen cyanide and scale insects and with the arsenicals and the codling moth more than 50 years ago. The present situation however represents a near-crisis with insecticides and some fungicides. Added to this, is the fact that in recent years in some areas weed species formerly controlled with atrazine have developed resistant strains.

When DDT was introduced for housefly control in the late 1940s, its effectiveness was phenomenal. Within a few years, however, resistant strains of houseflies were reported in Italy and this was followed by similar reports from other parts of the world. This was but the beginning

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2,4-D Some current issues ISSN 0316-0114
National Research Council NRCC = 20347

The third issue concerns the extent of the exposure encountered both by persons close to the application site and by those some distance away. This issue was chosen on the basis of recommendations in NRCC (1978): (1) that information be compiled on the levels of exposure encountered by field workers during spraying and (2) that studies be initiated to determine the drift of phenoxy herbicides. In the present analysis, a computer model is used to calculate bystander exposure from the aerial application of 2,4-D. Two situations representative of 2,4-D use in Canada were chosen: one on the Prairies and one in New Brunswick.

The fourth issue identified is the question of the association between phenoxy herbicides and disease observed in man. Several epidemiological studies have been published claiming an association between various cancers and phenoxy herbicide exposure. This has led to major public debate on the implications of these claims for Canadians.

1.2 CRITIQUE AND RECOMMENDATIONS

ISSUE 1: What is the connection between adverse reproductive effects and the dioxin contaminants in 2,4-D? (See Chapter 2 for details and references)

The herbicide 2,4-D has been reported to cause adverse reproductive effects in rats at doses of 50 $mg.kg\text{-}BW^{-1}.d^{-1}$ or above. It has also been reported to be a weak mutagen. Because of the highly toxic nature of the dioxin 2,3,7,8-T_4CDD found in 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) (another phenoxy herbicide) and the publicity it has been given, dioxins in 2,4-D formulations have been suspected as the cause of these birth effects. However, 2,3,7,8-T_4CDD has not been found in 2,4-D at the detection limit reported by Agriculture Canada (1 $\mu g.kg^{-1}$). The presence of three other chlorinated dioxin isomers has been confirmed, namely 2,7-dichloro-, 1,3,7-trichloro- and 1,3,6,8- or 1,3,7,9-tetrachlorodibenzo-p-dioxins. Based on structure-activity relationships, these dioxins would be expected to be much less toxic than 2,3,7,8-T_4CDD. Only one of these isomers, 2,7-dichlorodibenzo-p-dioxin, has actually been tested for its potential to cause adverse reproductive effects; none were observed in rats at doses up to 2 $mg.kg\text{-}BW^{-1}.d^{-1}$. By comparison, the highest no-effect level documented for 2,3,7,8-T_4CDD in rats is 0.125 $\mu g.kg\text{-}BW^{-1}.d^{-1}$ ($\approx$ 16 000 times less than that for 2,7-D_2CDD).

Examination of the limited information on the level of specific dioxin congeners in the various formulated products of 2,4-D, as well as their toxicity, does not support the suspicions that the dioxins are the causative agent. Unfortunately, the strength of any analysis is tempered by the lack of information on the dioxin content of the 2,4-D formulations used in the reproductive studies. In order to clarify whether 2,4-D formulations themselves are responsible for these effects, it is recommended that:

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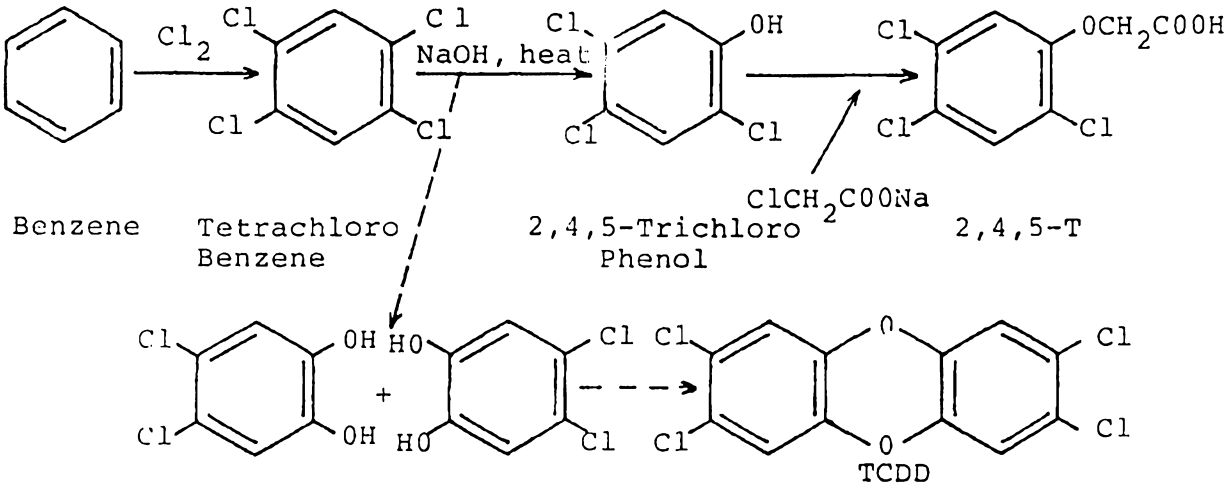


Figure 3. Synthesis of 2,4,5-T from trichlorophenol and possible contamination with 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) during the alkali treatment.

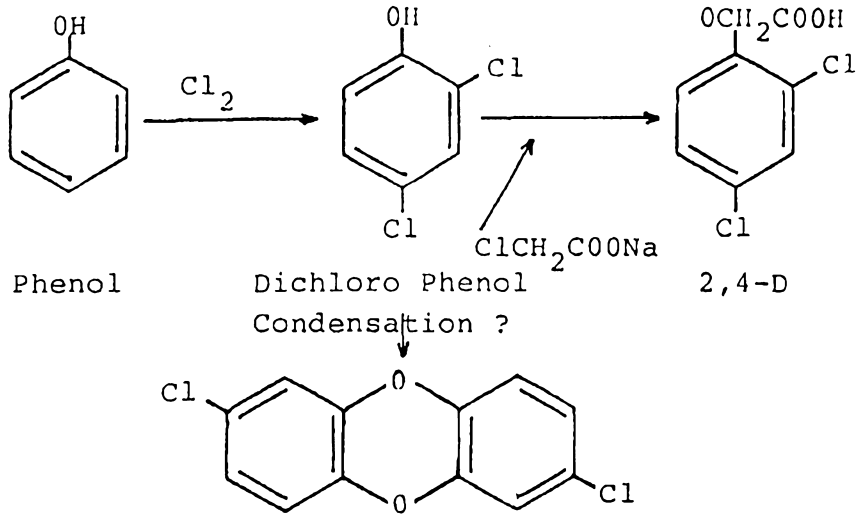


Figure 4. Synthesis of 2,4-D. Alkali treatment is not involved. Condensation reactions could theoretically produce less toxic "dioxins" - e.g., dichloro-dibenzo-p-dioxin.

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Results of Field Tests to Study Human Exposure to 2,4,5-T Application

by T. L. Lavy, University of Arkansas



The herbicide 2,4,5-T [(2,4,5-trichlorophenoxy) acetic acid] has been a valuable asset for the past 25 years due to its excellent control of broadleaf plants. It has been especially important for clearing rights-of-way and in the production of pine timber and rice. However, recently 2,4,5-T has been under investigation to determine whether it may be harmful to animal or human life. The Environmental Protection Agency has suspended many uses of 2,4,5-T and it has been the subject of much controversy.

Included with the information currently being compiled by EPA are data collected by researchers at the University of Arkansas. We were interested in collecting information which was lacking on actual human exposure to 2,4,5-T. For our study, field workers were tested who used 2,4,5-T in their regular spray operations. The proximity of these people to mixing and application operations should afford the maximum human exposure possible to 2,4,5-T applicators.

A great amount of investigation has already taken place with 2,4,5-T. The Council for Agricultural Science and Technology (CAST) has studied 2,4,5-T, along with other phenoxy herbicides. CAST reports issued in 1975 and 1978 state that these herbicides are beneficial and safe for use if precautions that must be taken with any pesticide are observed.

Although opposition to this opinion remains, the reputation of 2,4,5-T may have been clouded for the public by its past association. It was among the broadleaf defoliants used in Vietnam and, consequently, is sometimes still allied with the reputations of Agent Orange or dioxins. These compounds are presently being blamed for adverse effects on human life resulting from their use in the war in Vietnam.

To color the reputation of 2,4,5-T further, it is a fact that TCDD (2,3,7,8-tetrachlorodibenzo-*p*-dioxin), a dioxin toxic to animal life, occurs as a by-product during the manufacture of 2,4,5-T. When 2,4,5-T was first produced, levels of TCDD remaining in the herbicide could run as high as 32 ppmw, but the process today produces 2,4,5-T with only trace levels of less than 0.05 ppm. The compound used in our study contained 0.04 ppmw of TCDD. (This amount is equivalent to 1 drop in 7200 gallons of the spraying mixture). Although estimates had been made on human exposure prior to the study by our staff at the University of Arkansas, only limited information was available on the level of exposure to humans applying 2,4,5-T.

The study was carried out using crews engaged in their usual work activities in central Arkansas pine forests and rice fields. Twenty-two workers participated in the study. Some of these people have been involved in 2,4,5-T spray operations for several years. None of them have reported harmful effects as a result of working with the herbicide. As nearly as possible, investigators did not interfere with work habits of the crew members. Spray operations included a ground crew with backpack spray rigs, a tractor-propelled mist blower crew, and helicopter crews who make aerial application.

Our objectives were to analyze the 2,4,5-T content of the air around the worker to which his skin might be exposed, the air he breathed, and his urine, which can indicate the total internal dose to which he is subjected.

To accomplish the first analysis, we attached gauze patches to the clothing of the worker on the chest, upper back, bicep, and thigh areas just before each spray operation began and removed them immediately after the spraying was complete. The gauze patches were placed in amber-colored glass jars containing methyl alcohol and transported to the laboratory for analysis.

To measure 2,4,5-T in the breathing zone, we attached a small pocket-sized air pump to the clothing of the crewman. The pump pulled air across an absorbing resin which trapped the 2,4,5-T present. This resin was taken to the laboratory, extraction made with methyl alchohol, and analysis performed with a gas chromatograph equipped with an electron capture detector.

Complete urine samples were collected from each crew member from one day before to four days beyond the spraying operation. Previous studies had shown that over 95% of the 2,4,5-T that enters the body is excreted in a 7-day period.

Analyses were carried out at Northrop Laboratories in Little Rock and at the Altheimer Laboratory in Fayetteville. The methods used have been shown to be precise to the 10 parts per billion level. We attempted not only to determine how much exposure each worker was subjected to but also to note the relationship of the amount of exposure to his official work duties. All workers involved in the spray operation were included: supervisors, spray mixers, backpack sprayers, tractor driver for the mist blower, helicopter pilots, and flagmen. Some workers handled the spray compound more than others, and some (backpack crewmen, especially) were in closer contact with the spray mist. Crewmen also had their individual techniques for performing their duties. Some wore protective clothing and were very careful; others

[1] Published with approval of Director of Arkansas Agric. Exp. Stn., Univ. of Arkansas, Fayetteville.

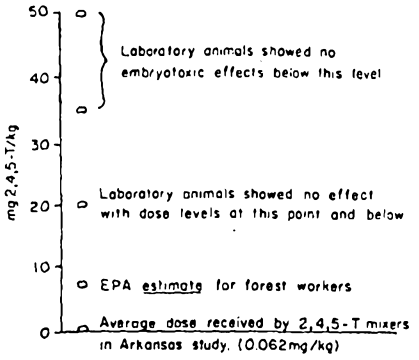


Fig. 1. Comparisons of Arkansas Field test results with 2,4,5-T information from other studies.

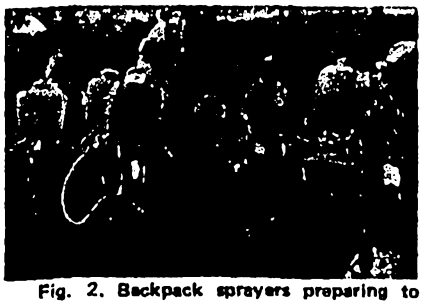


Fig. 2. Backpack sprayers preparing to spray.



Fig. 3. Helicopter with spray boom.

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Page(s) 000106 to/à 000107

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MEMORANDUM

7600-2 (CE)

08 Feb 81

Requirements Officer

SECOND GROWTH CONTROL
CFB GAGETOWN 1956 TO 1975

1. Annex A details the quantities of herbicide and the areas treated for the period Aug 1956 to Aug 1975. This information has been compiled from three separate source documents contained in CE Coy Property Records.

2. Tasking to prepare this report was received at 1500 hrs, 06 Feb 81 with submission by 1200 hrs, 09 Feb 81. Due to this restriction of time, a thorough review of this material has not been possible.

3. This report should be read in conjunction with map MCE 24, Edition 11 TR 79, dated 1979.

J.S. Fisher
Capt
Acting Engineering Officer

Enclosures: 2

		including sentry posts #3 and #2	[illegible]	Aerial Spray/Fixed Using
	3.	Lawfield OP including sentry posts #13, 14 & 15 extending northwest to Boundary of Lawfield Impact	500 out of 1661	Aerial Spray/Fixed Using
	4.	NBCW and Assault Grenade Ranges	245	Ground Spray
	5.	Proposed Sniper Range (Sentry Post =18)	165	Ground Spray
1959		Nil	Nil	Nil
60	1.	Area Bounded: N: Camp Argonaut S: Heliport E: Lindsay Brook W: Town Limit Line	50[illegible]	Aerial Spray/Fixed Using
	2.	Area 2	1017	Aerial Spray/Fixed Using

A0090122-2-000109

Ammate	2 km to Geary
Nil	Nil
32 oz 2,4,5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	1 km to Burton Station
32 oz 2,4,5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	2 km to Haneytown

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YEAR	AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1960 (cont'd)	3. Hersey Impact extending north into demolition area only of Area 6	3149	Aerial Spray/Fixed Using	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	5 km to Upper Gagetown
	4. Area 32 and west to Easting 98 in Area 31	3687	Aerial Spray/Fixed Using	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	4 km to Enniskillen Station
	5. NBCW and Assault Grenade Ranges	245	Ground Spray	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	4 km to Geary
	6. Proposed Sniper Range	165	Ground Spray	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	2 km to Geary
	7. Wellington Rocket Launching Range	236	Ground Spray	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	7 km to Haneytown
19[illegible]	1. Area 6 North of Northing 78	[illegible]1	Aerial Spray/Fixed Using	40 oz 2,4.5 T in mix 20% fuel oil 80% water 4 gal/acre	5 km to Burton Station
	2. Area 6 Bounded N: Northing 76 S: Northing 78 E: Easting 06 W: Easting 04	[illegible]4	Aerial Spray Fixed Using	40 oz 2,4.5 T in mix 20% fuel oil 80% water 4 gal/acre	3 km to Turpee's Corner
	3. Leufield Impact	[illegible]31	Aerial Spray Fixed Using	40 oz 2,4.5 T in mix 20% fuel oil 80% water 4 gal/acre	6 km to Mill Road

A0090122-3-000110

YEAR		AREA	ACREAGE	APPLICATION METHOD
1962		Nil	Nil	Nil
1963	1.	Area 4	1017	Aerial Spray/Fixed Using
	2.	Argus Impact extending NW including sentry posts 2 and 3	2639	Aerial Spray/Fixed Using
	3.	Lawfield OP including sentry posts 13, 14, 15 extending NW to boundary of Lawfield Impact	500 out of 1661	Aerial Spray/Fixed Using
	4.	Hersey Impact extending North into Demolition Area only of Area 6	3149	Aerial Spray/Fixed Using
	5.	Lawfield Impact	1951	Aerial Spray/Fixed Using
1964	1.	Area Bounded N: Camp Argonaut S: Heliport E: Town Limit Line W: Lindsay Brook	508	Aerial Spray/Fixed Using
	2.	Area 2 and Area 1 East of Shanks Road	1477	Aerial Spray/Fixed Using
	3.	Area 5 North of Northing 79	1017	Aerial Spray/Fixed Using
	4.	Greenfield Impact including ICM Impact extending North into	4469	Aerial Spray/Fixed Using

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CHEMICAL	NEAREST COMMUNITY
Nil	Nil
40 oz 2,4.0 and 40 oz 2,4.5 T in one gal fuel oil at 5 gal/acre	2 km to Haneytown
40 oz 2,4.0 and 40 oz 2,4.5 T in one gal fuel oil at 5 gal/acre	4 km to Haneytown
40 oz 2,4.0 and 40 oz 2,4.5 T in one gal fuel oil at 5 gal/acre	7 km to Pleasant Villa
40 oz 2,4.0 and 40 oz 2,4.5 T in one gal fuel oil at 5 gal/acre	5 km to Upper Gagetown
40 oz 2,4.0 and 40 oz 2,4.5 T in one gal fuel oil at 5 gal/acre	8 km to Mill Road
40 oz 2,4.0 40 oz 2,4.5 T in gal oil, 5 gal/acre	1 km to Burton Station
40 oz 2,4.0 40 oz 2,4.5 T in	Adjacent to Burton Station

YEAR	AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1964 (cont'd)	5. Area 5 Bounded: N: Northing 78 S: Northing 75 E: Easting 06 W: Easting 04	1024	Aerial Spray/Fixed Using	40 oz 2,4.0 40 oz 2,4.5 T in 1 gal oil, 5 gal/acre	7 km to Burpee's Corner
	6. Lawfield OP including sentry posts 13, 14 & 15 extending Northwest to boundary of Lawfield Impact	500 out of 1661	Aerial Spray/Fixed Using	40 oz 2,4.0 40 oz 2,4.5 T in 1 gal oil, 5 gal/acre	7 km to Pleasant Villa
1965	1. Argus Impact extending NW including sentry posts 2 & 3	1559 out of 2639	Aerial Spray/Fixed Using	Torden 101R with thickening agent 1 gal product to 10 gal water per acre	4 km to Haneytown
	2. Hersey Impact extending North into demolition area of Area 6	3149	Aerial Spray/Fixed Using	Torden 101R with thickening agent 1 gal product to 10 gal water per acre	5 km to Upper Gagetown
1966	1. Greenfield Impact including ICM Impact extending North into Area 5 of Northing 78	4469	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	4 km to Burton Station 5 km to Burpee's Corner
	2. Area 5 Bounded N: Northing 78 S: Northing 75 E: Easting 06 W: Easting 04	1024	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	7 km to Burpee's Corner
	3. Lawfield Impact	1661	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	6 km to Mill Pond

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YEAR	AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1967	1. Area 5 North of Northing 78	1817	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	5 km to Burton Station
	2. Argus Impact extending NW including sentry posts 2 and 3	1080 out of 2639	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	4 km to Haneytown
	3. Lawfield OP including sentry posts 13, 14, 15 extending NW to boundary of Lawfield Impact	1661	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	7 km to Pleasant Villa
	4. Area 28, 29, 37	2000 out of 10,883 (various parcels of original farmland)	Aerial Spray Helicopter	1.0 gal 2,4D in 2 gal oil and 7 gals water - applied at 5 gal/acre	8 km to Central Hampstead
	5. Wellington Rocket Launching Range	[illegible]	Aerial Spray Helicopter	[illegible]	[illegible]
	6. Area 32 and West to Easting 98 in Area 31	3012 out of 3687	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water [illegible] gals acre	4 km to Enniskillen Station
1968	1. Area Bounded By N: Northing 34 S: Northing 79 E: Easting 01 W: Easting 00	504	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	1 km to Burton Station
	2. Areas 33, 34 & 5 Area 17 South of Northing 78	[illegible]	Aerial Spray Helicopter	1.6 gal Torden 101 [illegible] 10 gals acre	[illegible] to Central Hampstead

A0090122-6-000113

YEAR	AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1969	1. Area 3 bounded on NW by Allen Brook	355	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	Adjacent to Upper Gagetown
	2. Area 37 NW of Hampstead Rd; Area 28 west of MacKenzie Rd; Area 27 and 36 NW of Lawfield Road	3355	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	14 km to Hampstead
1970	1. Argus Impact	1550	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	7 km to Geary
	2. Hersey Impact	3149	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	5 km to Upper Gagetown
	3. Area Bounded by: N: Northing 65 S: Northing 62 E: Easting 15 W: Easting 13	936	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	6 km to Pleasant Ville
	4. Proposed Sniper Range (SP 18)	185	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	2 km to Geary
	5. NBCW and Assault Grenade Ranges	345	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	2 km to Geary
	6. War Training Areas & SP's 45, 55, [illegible] SP 069563, Camp Petersville Bridges - [illegible] Crozier, Scout Camp, Nears Bivouac	3415	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	Various distances ranging from [illegible] to 30 km to Petersville

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A0090122-7-000114

YEAR		AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1971	1.	Greenfield Impact including ICM Impact extending North into Area 5 to Northing 78	4469	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water; 10 gals/acre	4 km to Burton Station 5 km to Burpee's Corner
	2.	Lawfield Impact	2348	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	6 km to Mill Pond
	3.	Area 29 South of Hampstead Rd	2808	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	7 km to Hampstead
1972	1.	Area 1 and 2	1407	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	Adjacent to Burton Station
	2.	Area 5 north of Northing 78	1817	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	5 km to Burton Station
	3.	In Area 6, 1 km North of SP 10 centered on airstrip No. 1	371	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	1 km to Keswick Creek
	4.	In Area 7, centered on airstrip No. 2	371	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	2 km to Burton Station
	5.	In Area 8, centered on airstrip No. 3	371	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	1 km to Mill Road
	6.	Area 17	5	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	2 km to Pleasant Point

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YEAR	AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1972 (cont'd)	7. Argus Impact extending North Including SP's 2 and 3	1080	Aerial Spray Helicopter	Torden 10K pellet applied @ 30 lbs/acre	4 km to Haneytown
	8. Wellington RL Range	255	Aerial Spray Helicopter	Torden 10K pellet applied @ 30 lbs/acre	4 km to Haneytown
1973	1. Area 3 bounded on NW by Allen Brook	253	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	Adjacent to Upper Gagetown
	2. Area 28, 29 and area 17 South of Northing 59	5000	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	7 km to Central Hampstead
	3. Area 32 and West to Easting 98 in Area 31	3309 out of 3687	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	4 km to Enniskillen Station
1974	1. Area 4	789	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	2 km to Haneytown
	2. Area 37 NW of Hampstead Rd. Area 28 West of Mackenzie Rd. Area 27 and 36 NW to Lawfield Rd.	3389	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	14 km to Hampstead
	3. Hersey Impact	4149	Aerial Spray Helicopter	Torden 10K pellet 30 lb/acre	5 km to Upper Gagetown

A0090122-9-000116

YEAR	AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1975	1. Area Bounded by: N: Camp Argonaut S: Heliport E: Town Limit Line W: Lindsay Brook	508	Aerial Spray Helicopter	Torden 10K Pellet 30 lbs/acre	1 km to Burton Station
	2. Area 5 North of Northing 78	1817	Aerial Spray Helicopter	Torden 10K Pellet 30 lbs/acre	5 km to Burton Station
	3. Garfield Impact including ICM Impact extending North into Area 5 to Northing 78	4469	Aerial Spray Helicopter	Torden 10K Pellet 30 lbs/acre	4 km to Burton Station 5 km to Burpee's Corner
	4. Argus Impact	1550	Aerial Spray Helicopter	Torden 10K Pellet 30 lbs/acre	7 km to Geary
	5. Proposed Sniper Range	185	Aerial Spray Helicopter	Torden 10K Pellet 30 lbs/acre	2 km to Geary

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A0090122-10-000117

INFORMATION CHART. BRUSH CONTROL. VARIOUS TRAINING AREAS. C. F. B. GAGETOWN N.B. Sheet 1 of 2

DESIGNATION of AREAS	Acreage (net)	Year of application. Method of application. 1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Remarks
Individual Minor Tactical Training Area No. 1	497	-	-	'H/L'	-	-	-						
" " " " " " " 2	496	-	-	'H/L'	-	-	-						
" " " " " " " 3	414	-	-	'H/L'	-	-	-						
" " " " " " " 4	684	-	-	-	-	-	-						
" " " " " " " 5	508	-	-	-	-	-	'H/P'						extra 1975
Tank Driving Area	789	-	-	-	-	'H/L'	-						
Tank Driving & Manoeuvre Area - North	1,817	-	-	'H/L'	-	-	'H/P'						extra 1975
Tank Driving & Manoeuvre Area - South	4,469	-	'H/L'	-	-	-	'H/P'						
Tank Battle Range	1,024	-	-	'H/L'	-	-	-						
Tank Formal Range - North	1,080	-	-	'H/P'	-	-	-						
Tank Formal Range - South	1,550	'H/L'	-	-	-	-	'H/P'						
Light Mortar Range	255	-	-	'H/P'	-	-	-						
Artillery Gun Area No. 1	271	-	-	'H/L'	-	-	-						
" " " " 2	355	-	-	-	'H/L'	-	-						
" " " " 3	291	-	-	'H/L'	-	-	-						
" " " " 4	370	-	-	'H/L'	-	-	-						
" " " " 5	1,164	-	-	-	-	-	-						
Artillery Target Area - Hersey	3,149	'H/L'	-	-	-	'H/P'	-						
" " " - Lawfield	2,348	-	'H/L'	-	-	-	-						
Unit Training Area No. 1 - North	926	'H/L'	-	-	-	-	-						
" " " " 1 - South	1,829	-	-	'H/L'	-	-	-						
" " " " 2	3,204	-	-	'H/L'	-	-	-						
" " " " 3	5,000	-	-	-	'H/L'	-	-						
" " " " 4	3,355	-	-	-	-	'H/L'	-						
" " " " 5	2,808	-	'H/L'	-	-	-	-						
Rocket Launcher Range	165	'H/L'	-	-	-	-	'H/P'						extra 1975
N[illegible] W Range	245	'H/L'	-	-	-	-	-						
Demolition & Mining Area	3,309	-	-	-	'H/L'	-	-						
Sub Unit Training Area No. 1 (Original Farmland)	113	'H/L'	-	-	-	-	-						
" " " " " 2 " "	114	'H/L'	-	-	-	-	-						
" " " " " 3 " "	148	'H/L'	-	-	-	-	-						
" " " " " 4 " "	176	'H/L'	-	-	-	-	-						
" " " " " 5 " "	430	'H/L'	-	-	-	-	-						
" " " " " 6 " "	251	'H/L'	-	-	-	-	-						
" " " " " 7 " "	157	'H/L'	-	-	-	-	-						
" " " " " 8 " "	139	'H/L'	-	-	-	-	-						
" " " " " 9 " "	166	'H/L'	-	-	-	-	-						
" " " " " 10 " "	139	'H/L'	-	-	-	-	-						
" " " " " 11 " "	58	'H/L'	-	-	-	-	-						
" " " " " 12 " "	246	'H/L'	-	-	-	-	-						
" " " " " 13 " "	448	'H/L'	-	-	-	-	-						
" " " " " 14 " "	630	'H/L'	-	-	-	-	-						

CODING: - 'H/L' = Helicopter Aircraft Spray Treatment with Liquid Herbicide. 'H/P' = Helicopter Aircraft Spray Treatment with Pellet Herbicide.

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INFORMATION CHART. BRUSH CONTROL. VARIOUS TRAINING AREAS. C. F. B. GAGETOWN N.B. Sheet 2 of 2 Sheets

Summary Sheet.

TOTAL VALUE OF CONTRACTS:	Year of application.																							
	1970		1971		1972		1973		1974		1975		1976		1977		1978		1979		1980			
	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢		
Helicopter Treatment 'L'	222,850	50	276,718	75	355,388	39	257,500	00	249,681	50	257,613	20												
" " 'P'																								
T o t a l s :	222,850	50	276,718	75	355,388	39	257,500	00	249,681	50	257,613	20												
AVERAGE COST PER ACRE:																								
Helicopter Treatment 'L'	27	25	28	75	30	03	29	65	39	50														
" " 'P'					37	00			30	50	42	80												
HERBICIDE USED (i)	'T-101'		'T-101'		'T-101' 'T-10K'		'T-101'		'T/101' 'T-10K'		'T-10K'													
(ii)																								
(iii)																								

CODINGS: - Line... ... (i) 'T-101' = 1.6 gals Tordon 101 in 8.4 gals of Water applied @ 10 gals per acre. 'T-10K' = Pellets applied @ 30# per acre.
Line... ... (ii)
Line... ... (iii)

REMARKS - GENERAL.

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A0090122-12-000119

SECOND GROWTH CONTROL — TRAINING AREAS — INFORMATION CHART — CFB GAGETOWN N.B. — Sheet 1 of 2

Designation of Area	Acreage (net)	Year of application. 1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	Remarks.
		Method of application.											
Individual & Minor Tactical Training Area No. 1	497	-	-	-	-	'M'	-	-	'H'	-			
" " " " " " " 2	496	-	-	-	-	'M'	-	-	'H'	-			
" " " " " " " 3	414	-	-	-	-	'M'	-	-	'H'	-			
" " " " " " " 4	684	-	-	-	'H'	'C & G'	-	-	-	-			
" " " " " " " 5	508	-	-	-	-	'M'	-	-	-	-			
Tank Driving Area 789	~~1,017~~	-	-	-	-	'M'	-	-	-	-			
Tank Driving & Manoeuvre Area - North	1,817	-	-	'H'	-	-	-	-	'H'	-			
Tank Driving & Manoeuvre Area - South	4,469	-	'H'	-	-	-	-	'H'	-	-			
Tank Battle Range	1,024	-	'H'	-	-	-	-	-	'H'	-			
Tank Formal Range - North	1,080	-	-	'H'	-	-	-	-	Pellets	-			T-10K PELLETS
Ta Formal Range - South	1,550	'H'	-	-	-	-	'H'	-	-	-			PELLETS
Light Mortar Range	~~855~~	-	-	'H'	-	-	-	-	Pellets	-			Acres changed 8/12/7
Artillery Gun Area No. 1	271	-	-	'M'	'M'	-	-	-	'H'	-			
" " " " 2	355	-	-	'M'	'M'	'H'	-	-	-	'H'			
" " " " 3	291	-	-	'M'	'M'	-	-	-	'H'	-			
" " " " 4	370	-	-	'M'	'C & G'	-	-	-	'H'	-			
" " " " 5	1,164	-	-	'H'	'M'	-	-	-	-	-			
Artillery Target Area - Hersey	3,149	'H'	-	-	-	-	'H'	-	-	-			
" " " - Lawfield	2,348	-	'H'	-	-	-	-	'H'	-	-			
Unit Training Area No. 1 - North	926	-	'C & G'	-	-	-	'H'	-	-	-			
" " " " 1 - South	1,829	-	'C & G'	-	-	-	-	-	'H'	-			
" " " " 2	3,204	-	-	'C & G'	-	-	-	-	'H'	-			
" " " " 3	5,000	-	-	-	'H'	-	-	-	-	'H'			
" " " " 4	3,355	-	-	-	-	'H'	-	-	-	-			
" " " " 5	2,808	-	-	'H'	-	-	-	'H'	-	-			
Rocket Launcher Range	165	-	-	-	-	-	'H'	-	-	-			
N P D Warfare Range	245	-	-	-	-	-	'H'	-	-	-			
Demolition/Mine Area	3,309	-	-	'H'	-	-	-	-	-	'H'			
Sub Unit Training Area No. 1 (Original Farms)	113	-	-	-	-	-	'H'	-	-	-			'1970 Contract'
" " " " " 2 " "	144	-	-	-	-	-	'H'	-	-	-			Spot Spraying as
" " " " " 3 " "	148	-	-	-	-	-	'H'	-	-	-			necessary over all
" " " " " 4 " "	176	-	-	-	-	-	'H'	-	-	-			14 S.U.T.A's.
" " " " " 5 " "	430	-	-	-	-	-	'H'	-	-	-			resulting in 2,143
" " " " " 6 " "	251	-	-	-	-	-	'H'	-	-	-			acres sprayed, out
" " " " " 7 " "	157	-	-	-	-	-	'H'	-	-	-			of a total of
" " " " " 8 " "	139	-	-	-	-	-	'H'	-	-	-			3245 acres, all area
" " " " " 9 " "	166	-	-	-	-	-	'H'	-	-	-			
" " " " " 10 " "	139	-	-	-	-	-	'H'	-	-	-			
" " " " " 11 " "	58	-	-	-	-	-	'H'	-	-	-			
" " " " " 12 " "	246	-	-	-	-	-	'H'	-	-	-			
" " " " " 13 " "	448	-	-	-	-	-	'H'	-	-	-			
" " " " " 14 " "	630	-	-	-	-	-	'H'	-	-	-			

CODING: 'A' = Fixed Wing Aircraft Spray Treatment. 'C & G' = Cleared and Grubbed by Civil Contract. 'G' = Ground Spray Treatment. 'H' = Helicopter Aircraft Spray Tmnt
'M' = Mechanical Clearing. 'S' = Sterilization.

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SECOND GROWTH CONTROL — TRAINING AREAS — INFORMATION CHART — CFB GAGETOWN N.B. — Sheet 2

S U M M A R Y — S H E E T

	Year of application,																					
	1965		1966		1967		1968		1969		1970		1971		1972		1973		1974		1975	
TOTAL VALUE OF CONTRACTS:	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢
Air Spray	98,370	48	207,220	70	258,042	20	168,497	00	100,188	50	222,850	50	276,718	75	355,388	39	257,500	00				
Ground Spray																						
Clearing and Grubbing							40,825	00	69,300	00												
Mechanical Clearing							70,616	00														
Total	98,370	48	207,220	70	258,042	20	279,938	00	169,488	50	222,850	50	276,718	75	355,388	39	257,500	00				
AVERAGE COST PER ACRE:																						
Air Spray	21	32	26	55	29 # 12	64 11	29	54	28 ** 12	58 12	27	25	28	75	30 *** 37	03 00	29	65				
Ground Spray			* 19	05																		
Clearing and Grubbing							115	00	100	00												
Mechanical Clearing							30	00	30	00												
HERBICIDE USED (i)	'T-101R'		'T-101'		'T-101'		'T-101'		'T-101'		'T-101'		'T-101'		'T-101' 'T-10K'		'T-101*					
RESULT (ii)					'G'																	
GUARANTEE (iii)	'90K'		'90K'		'90K'		'90K'		'90K'		'90K'		'90K'									

CODINGS ;- Line (i) 'T-101R' = 'Tordon' 101R with thickening agent: One (1) gal: of the Product in Ten (10) gals: of Water per acre.

'T-101' = One decimal Six (1.6) gals: 'Tordon' 101 in Eight decimal Four (8.4) gals: of Water, applied at Ten (10) gals: per acre.

T-10K=PELLETS applied at the rate of 30 lbs per acres

Line (ii) 'G' = Good. 'F' = Fair. 'P' = Poor.

Line (iii) '90K' = Ninety per cent (90%) Kill in Twelve (12) months of the area to be re-treated at the Contractors' expense.

* = Cost per acre of 'Road-side' Ground Spray for a total of 590 acres.

\# = Cost per acre of Helicopter Aircraft Spray with Herbicide over 2,000 acres,

** = Cost per acre of Helicopter Spray with 2,4-D on A.G.A. No.2 (Application: One (1) Imperial (gallon 2,4-D; 2 gals Oil; (7 gals Water; per acre.

*** = Cost per acre of Helicopter Granular Spray with T-10K PELLETS

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s.15(1)

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IN REPLY PLEASE QUOTE

17605-G2 TD 6164 (DCEIE)

Canadian Forces Headquarters
Ottawa 4, Ontario
Jul 66

s.20(1)

Attention:

s.19(1)

Dear Sir:

This will acknowledge your letter of 9 Jun 66, concerning test plots for application of TORDON 10K at the Canadian Forces Base Gagetown, N. B.

As stated in a telephone conversation on 6 July 66, Mr. Hall, the Department of National Defence has given approval to your test project which will be carried out at no cost to the Department. s.19(1)

The Base Construction Engineer Officer, Major Bancroft, has been advised of the project and you should contact him to make further arrangements and obtain assistance in location and suitably marking the test plots. He has been advised that your representative will visit Camp Gagetown within the next week.

Yours truly,

ORIGINAL SIGNED BY
A. L. PIERCE

JUL 08 1966

(A. L. Pierce)
for Chief of the Defence Staff.

(R. Hall)/bk
DCEIE 3-3-3
20728

Distribution

PLEASE ADDRESS REPLY TO
Chief of the Defence Staff
Canadian Forces Headquarters
Ottawa 4, Ontario.
Attention: Mr. A. L. Pierce, DCEIE.

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Page(s) 000123 to/à 000129

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est(sont) exemptée(s) en vertu de(s)(l')article(s)

13(1)(a), 15(1)

of the Access to Information Act

de la Loi sur l'accès à l'information

THE VIETNAM CODE · CFB GAGETOWN · TWO STATEMENTS · ONE OVERLAP

The dates, in their own words

Neither document references the other. The overlap is their own.

STEPHEN HARPER · LEADER OF THE CONSERVATIVE PARTY OF CANADA

"A Conservative government will stand up for full and fair compensation for persons exposed to defoliant spraying during the period **from 1956 to 1984**. We'll disclose all information concerning the spraying to veterans and civilians, and we will provide medical testing to any person who may have been exposed."

Woodstock, New Brunswick · 11 January 2006 · timestamp 27:17
Researcher's own corrected transcript of his recording · broadcast as *The Promise* · CBC Radio *The House* · 19 May 2007

Twelve days after making this campaign promise, Stephen Harper was elected Prime Minister of Canada.

DONALD TRUMP · TRUTH SOCIAL

"Vietnam War: **19 years and 5 months**, 58,220 DEAD."

Truth Social · Tuesday, 21 July 2026, 3:51 PM
Consistent with U.S. Department of Defense official framing: November 1, 1955 – April 30, 1975 · DoD News Release No. 581-98, 6 November 1998

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*The United States government officially dates the Vietnam War from **November 1, 1955** to **April 30, 1975** — the day Saigon fell — nineteen years and five months. Nine months after that official start date, CFB Gagetown received its first herbicide spray. A future Canadian prime minister named Gagetown's spray program as running **from 1956 to 1984**: encompassing the entire war, and nine years beyond the fall of Saigon.*

Harper's dates (1956–1984) from his 11 January 2006 campaign statement, Woodstock, N.B. · The ex gratia fund his government subsequently created was restricted to 1966–67 only. · Trump's Vietnam duration figure confirmed against DoD News Release No. 581-98, 6 November 1998.

REMSpC Report 2006-05
August 22, 2006
Revised October 5, 2006
Revised February 25, 2007

Drift Modelling of

Aerial Herbicide Sprays at

CFB Gagetown, New Brunswick

Tier 2

Report to
Health Canada
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Ottawa, ON
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This report documents potential off-target drift and deposit from aerial herbicide programs undertaken on Canadian Forces Base Gagetown. The U.S.D.A. Forest Service model, AGDISP is used to generate data for aerial sprays. Field trials are reviewed to evaluate model performance for the prediction of deposit and one-hour average air concentration at breathing height (1.5m) to distances of 800m downwind of the spray zone. Application parameters that contribute to off-target drift are investigated from which worse-case drift scenarios are developed for bystander exposure in the near (adjacent to the spray zone) and far (800m) field. Finally, specific spray events identified by Cantox Environmental (CE) are modelled.

Literature Review and AGDISP Validation

In this report, AGDISP v8.13 is used to predict off-target deposit and one-hour average air concentration downwind of a spray block. The model developed through the US Department of Agriculture (USDA) and USDA Forest Service is based on state-of-art scientific knowledge and has not been 'tuned' to match any particular data set. The model predicts the fate of a spray cloud from release to eventual deposit. Input requirements include a full description of how the spray was made. Details on the application vehicle (type, speed, height above canopy, nozzle configuration), the spray being produced (emitted drop sizes and volume fraction), tank mix (how much is non-volatile, specific gravity) and finally the meteorological conditions (winds and evaporation potential (temperature, humidity)) are needed. Deposit predictions have been verified to 800m downwind of a spray zone. In this report, deposit and drift modelling are terminated at this distance.

Deposit predictions from the AGDISP model were 'validated' in the early 1990's by the Spray Drift Task Force (SDTF) as part of a collaborative effort with the U.S. Environmental Protection Agency (USEPA) (Bird and Perry, 1996) to bring a scientific model into the product registration process. The SDTF field trials focused on ground deposition from aerial agricultural sprays and a comparison of predicted and measured deposit to 800m downwind of the spray zone. The validation consisted of modelling each

trial using actual application characteristics (aircraft type, height, nozzle placement, drop size distribution, tank mix characteristics, meteorology) and comparing predicted deposit at sample locations downwind of the spray line. In the near field (<200m), the zone of interest to USEPA for establishing buffer zones on product labels, modelled deposit closely matched measured deposit. In the far field (approaching 800m) where measured deposit was nearly four orders of magnitude below peak deposit, AGDISP over-predicted measured deposit by four fold.

Prior to the SDTF trials, a series of aerial herbicide trials were conducted under the auspices of the Spray Efficacy Research Group (SERG). The collaborative experiment (Riley, 1992) was conducted using a mass accountancy approach. Deposit on ground plates and low vegetation was measured to 600 m downwind of the spray line. Spray drift was assessed at distances of 300m and 600m downwind of the spray line using balloon-borne Rotorod samplers deployed to heights of 150m and 300m respectively. The samplers were capable of collecting sub-10μm droplets with high efficiency (McCooeye, 1995). Overall mass accountancy for these trials was 92% (range 82-104%) (i.e. 92% of emitted spray was accounted for through integration of deposit (ground and foliage) out to 600m and total drift at 600m). No-one partition (ground deposit, deposit on foliage or drift) could be singled out as responsible for the underestimate of total mass. The experiment focussed on drift and deposit from Cessna 188 (C188) fixed wing aircraft with different nozzle types producing different drop size distributions. Within the data set was a series of trials incorporating a 250μm VMD (volume median diameter) spray. No direct comparison between AGDISP and measured drift profiles from aerial herbicide sprays exists. To establish the validity of AGDISP drift predictions, the drift data from the Riley, 1992 report were compared to the model. A subset of the 250μm VMD field trials for spray height near 20m was modelled using AGDISP. The atmosphere was stable during the field trials. Application parameters used during the trials and average meteorology were input to AGDISP and total drift calculated at 300m and 600m downwind of the spray line, the locations of the balloon-borne samplers. AGDISP was run for conditions at sunset/sunrise with little cloud cover, the most stable condition within the model. Predicted drift past 300 m and 600 m was 5.7% and 3.8% of the

emitted spray. Measured drift was 5% and 3%. Drift associated with the breathable fraction (10μm (PM10) drops and smaller) would be even less. The lowest measured drift past 600m was associated with low-wind stable conditions; the highest was a high-wind unstable case. A subsequent report (Riley et al, undated) evaluated deposit and drift in terms of aircraft height and wind speed. The authors concluded, "as wind speed and/or aircraft height increased, total deposit decreased and airborne mass increased". A doubling of the height*wind-speed parameter resulted in a two-fold increase in the ratio of airborne mass/total deposit for the 250μm spray.

A similar finding was noted in a field study of ground deposition, wind drift and bystander exposure from agricultural sprays (Crabbe and McCooeye, 1985). The experiment using mass accountancy compared off-target deposit and drift from fixed-wing aircraft and ground-rig applications. "The lowest values of wind drift occurred in light-wind speed aircraft sprays and in the ground-rig sprays". They concluded "initial deposition (within 5m downwind of the swath) from the ground rig was almost 100% in all winds"; less than 0.6% was airborne at 200m. In winds of 18kph, normalised atmospheric dosage of non-volatiles at 1.5m agl from ground-rig sprays was a factor of six lower at 200m and 500m downwind of the spray zone than from low flying fixed-wing aircraft. For the ground-rig trials, stable conditions produced less drift and lower exposure at the 1.5m height.

A recent paper (Hoffman, 2006) compared AGDISP predicted transport with measured drift over a 10m height at 50 m downwind from an aerial agricultural spray. On average, AGDISP predictions were two- to three-fold greater than deposit on a monofilament line.

From the limited model-field comparisons, AGDISP appears to over-predict both measured deposit and drift in the far field, perhaps a consequence of the small values found in the far field and the difficulty in making accurate measurements of these small drops.

Factors Contributing to Off-target Drift

Throughout this report, deposit is expressed in L/ha of non-volatile (non-evaporating) component where the emission rate of non-volatiles is 1 L/ha. One-hour average air concentrations are at breathing height (1.5m) and consist of drops that have a final drop size that is less than 10μm (PM10). All downwind predictions assume no intervening foliage that would otherwise reduce downwind drift. Unless otherwise noted, default input parameters (Table 1) were used for all model runs.

1. *Aircraft Height*

Aircraft height has a major impact on the amount of drift from aerial sprays. As an aircraft flies higher, more time is needed for the spray to reach the ground and hence the spray cloud is blown further down range from the flight line. Small drops (<10μm) have a theoretical sedimentation velocity less than 0.2 cm/sec due to gravity. In the absence of vortex wake or background turbulence these drops would take a long time to reach the ground and would therefore travel long distances downwind of the spray line. Entrainment into the wing-tip vortices (sink velocity of vortex is 10-15 faster than settling velocity of 10μm drop) and vertical dispersion due to turbulent mixing bring the smallest drops to the ground much quicker. However, aircraft height still remains a principle factor for determining the amount of off-target drift.

The height of a spray aircraft is dictated by the condition of the area to be treated. Large clear-cut areas allow the applicator to fly relatively low over the treatment area. Areas with residuals (individual trees within the treatment remain standing) or areas of mature forest require higher spray heights. For this report, these application scenarios are represented by spray heights of 5 m and 20.7 m. When spray height is 20.7m and winds are 16kph (label maximum), deposit just downwind of the block edge is similar to that on the block (Fig 1). With a low spray height, little spray deposits off target in the vicinity of the spray zone. With increasing distance away from the spray zone, higher deposit is associated with high spray height. By 800m downwind, little deposit is expected from the low height spray while deposit approaching 5% of application rate could be expected from a high height application.

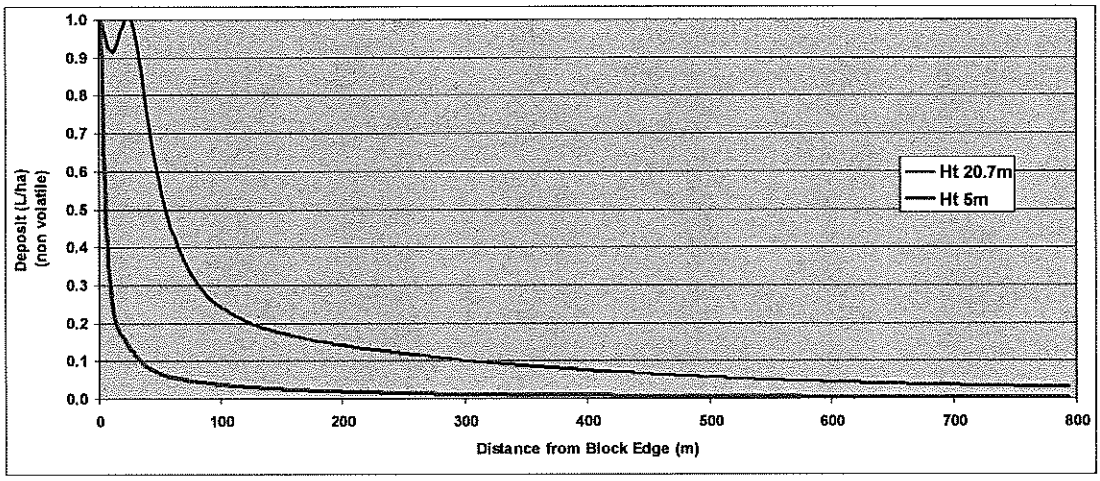


Figure 1. Downwind deposit from two spray heights. Wind 16kph.

Spray height also impacts inhalation exposure to drift. With a low height spray, one-hour average air concentration just outside the spray zone (0m) is 2.5 fold greater than with a 20.7m spray (Fig 2). With downwind distance, one-hour average air concentration remains relatively uniform out to 800m when a high spray height is used. As drops deposit out of the low release, air concentration decreases with distance approaching values from the 20.7 m spray at distances of 800 m.

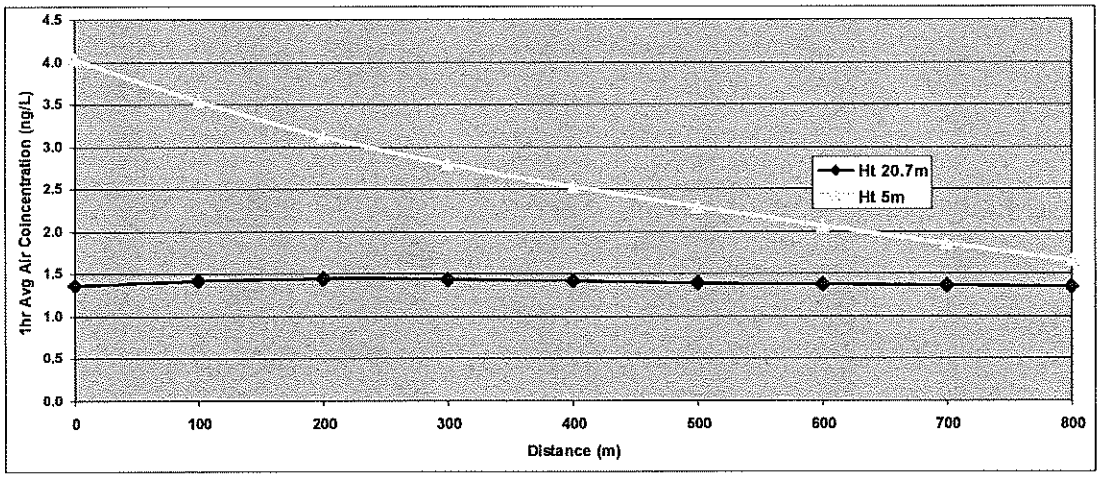


Figure 2. One-hour average air concentration of 10μm and smaller drops from aerial sprays at two different heights. Wind 16kph.

2. *Drop sizes*

Drop sizes impact how much spray deposits close to the spray line and how much drifts away. The drop sizes and associated volume emitted from a nozzle are characterised in a wind tunnel where the impacts of wind speed, nozzle orientation, boom pressure and flow can be investigated. Drop sizes ranging from sub-5μm to above 1000μm are measured and associated volume in each drop class determined. Nozzles can be characterised by the volume median diameter (VMD) of the spray and the span (difference between the diameter below which 90% of the volume is found and the diameter below which 10% of the volume is found divided by the VMD). Sprays with a smaller VMD will result in more drift away from the block. Sprays with larger spans will contain a larger fraction of very small drops, important when estimating inhalation exposure. A review of spray records at CFB Gagetown indicated that the nozzles used had VMDs above 300μm. The largest span was 1.55. Based on these data, a spray emission with a VMD of 300μm and a span of 1.55 (Fig 3) was used to model potential off-target drift and deposit. For this

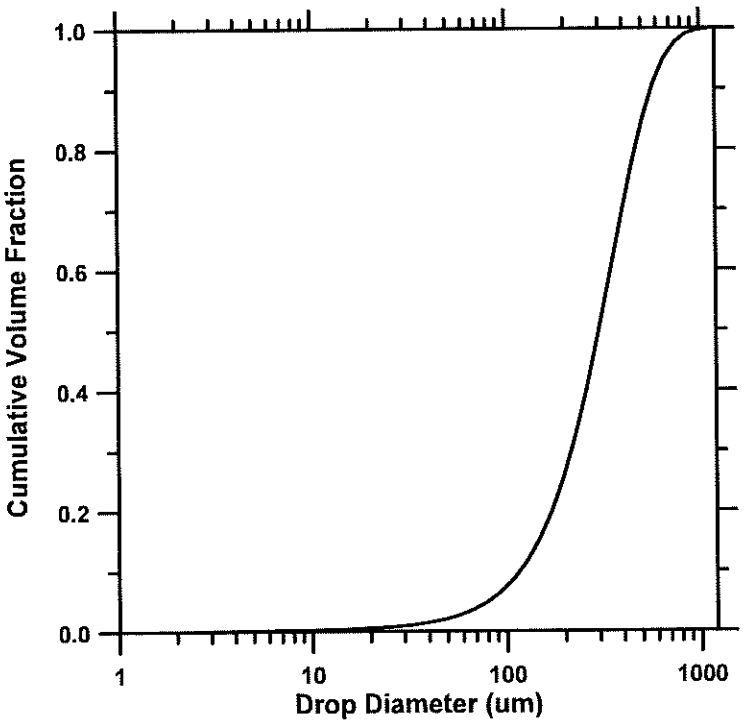


Figure 3. Cumulative volume fraction curve of spray from a nozzle with a 300μm VMD and span of 1.55.

nozzle, 0.57% of the emitted spray volume is in drops less than 20μm, 0.29% in drops less than 10μm.

3. *Evaporation*

As spray drifts, the water component of the droplet evaporates thereby reducing drop size and making it more prone to drift farther downwind. The speed at which a drop evaporates depends on the temperature and relative humidity of the atmosphere. Hot-dry conditions lead to rapid evaporation, cool-wet conditions result in slow evaporation. While large drops will evaporate slowly, small drops (<20μm) will evaporate almost instantaneously in hot-dry conditions. The amount of water that can evaporate depends on the non-volatile fraction (NVF) in each drop. Tank mixes (and hence drops) that have a low NVF (i.e. tank mix is mostly water) will result in drops that can be significantly reduced in size due to evaporation. With a NVF of 12.5%, a drop can evaporate to half its original size. If the NVF is 50%, a drop can evaporate to 79% of its original size. Recorded meteorology during CFS Gagetown sprays indicated sprays occurred in temperatures as high as 25°C and relative humidity as low as 45%.

Evaporation will impact deposit downwind of the spray zone. As evaporation reduces spray drop size, the drops take longer to reach the ground thereby increasing deposit in the far-field (Fig 4). For the high height spray, differences manifest themselves beyond

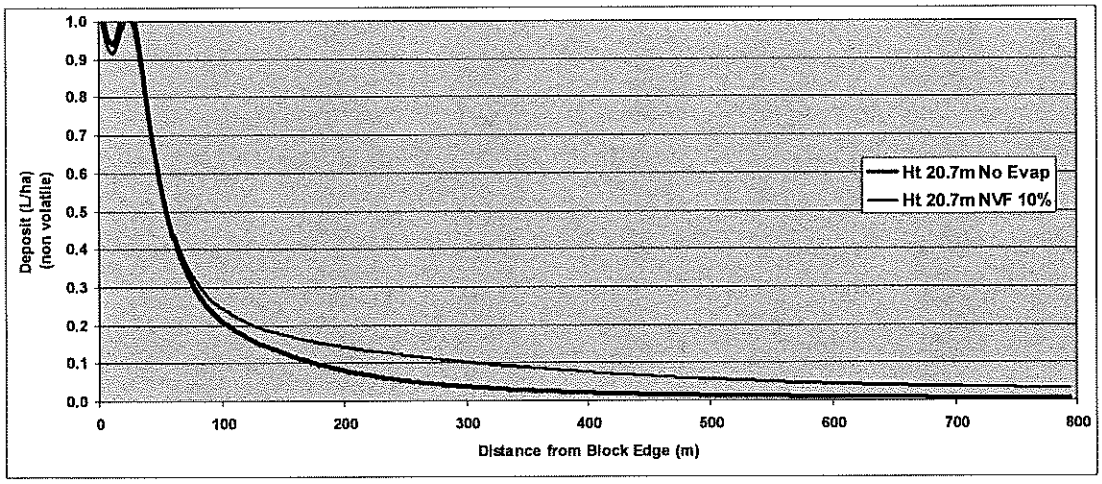


Figure 4. Downwind deposit with and without evaporation. Height 20.7m, wind 16kph, temperature 25°C, relative humidity 45%.

50m downwind of the spray zone.

With a decreasing non-volatile component, a larger fraction of the emitted spray can evaporate to drop sizes less than 10μm (PM10). As stated above, with a NVF of 12.5%, 20μm and smaller drops will evaporate to drops smaller than 10μm, for a 50% NVF, 13μm and smaller drops evaporate to 10μm or smaller. For the 300μm VMD spray, this translates into 0.57% of emitted spray when VNF is 10% and 0.35% for a NVF of 50%. Consequently, the one-hour air concentration for sub-10μm droplets or less is nearly 1.6 fold greater when the tank mix has a 10% NVF (Fig 5.) than for the 50% NVF tank mix.

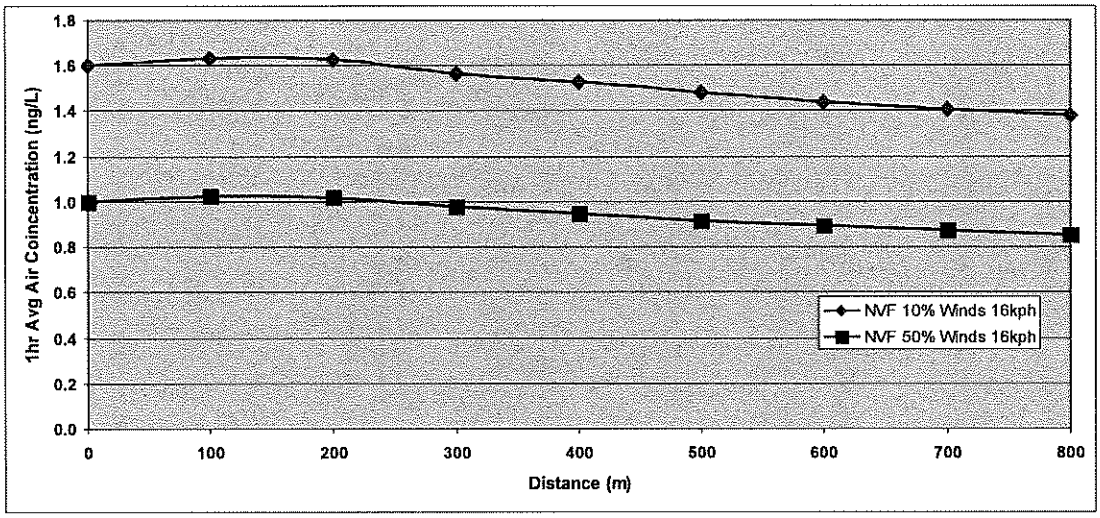


Figure 5. One-hour average air concentration of 10μm or smaller drops. Height 20.7m.

4. *Wind Speed*

Wind speed coupled with residence time of the spray cloud combine to determine the downwind distance that the drift cloud will travel. While the time for the spray cloud to impact the ground is relatively independent of wind speed, the distance that the cloud will travel during that time is directly proportional to the wind speed. While high-height spraying in high (16kph) winds can lead to measurable deposit (5%) at distances of 800m

downwind of the spray zone, spraying in near calm conditions from the same height will result in little deposit past 200 m (Fig 6).

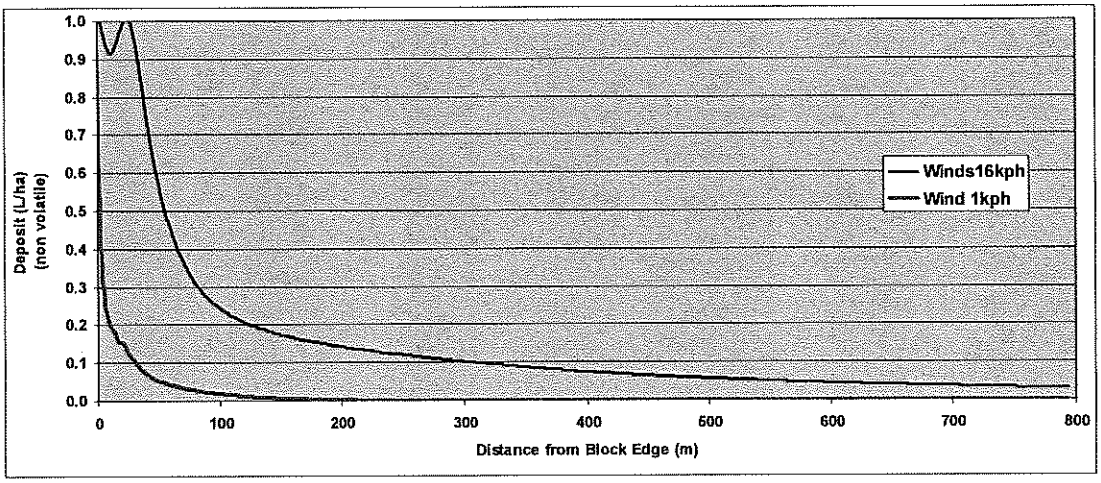


Figure 6. Comparison of deposit for high height spray in high and low winds. Bell 47G, height 20.76m, NVF 10%.

While low winds result in little downwind deposit, the fact that the spray cloud quickly reaches the ground increases the one-hour average air concentration of sub-10μm drops in the vicinity of the spray lines (Fig 7). In low winds, one-hour air concentration increases nearly 3-fold at the spray zone boundary.

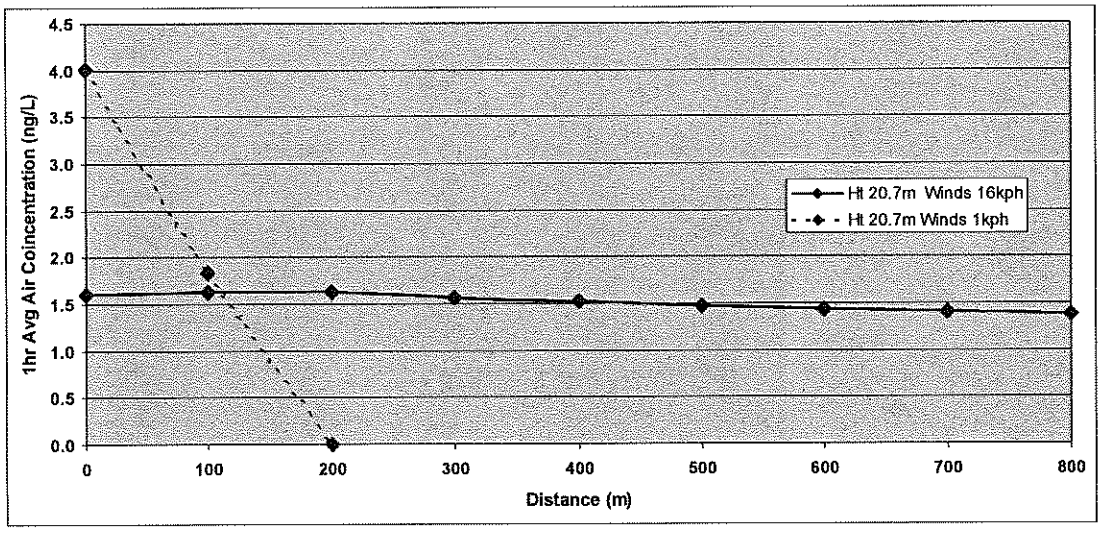


Figure 7. One-hour average air concentration of 10μm or smaller drops for spraying in different wind speeds. Bell 47G, NVF 10%.

5. *Aircraft Type*

For the herbicide sprays at CFS Gagetown, both fixed wing aircraft and helicopters were used. No specifics were given on the fixed wing aircraft type and so a Cessna 188 (C188) was used as the default aircraft. Helicopters listed included Bell 46/47G and 206B JetRanger, Hiller 12E and Hughes 300C. Generally helicopters provide greater manoeuvrability over small blocks and therefore potentially lower spray heights. Flying at lower airspeeds, the vortex strength of helicopters is generally greater and hence small drops are moved to the ground quicker. A deposit comparison of a Bell 47G helicopter and Cessna 188 flying at 20.7m in 16kph (Fig 8) indicates deposit differences near 50% at 100 to 200 m. By 800 m downwind, aircraft influence is not as pronounced.

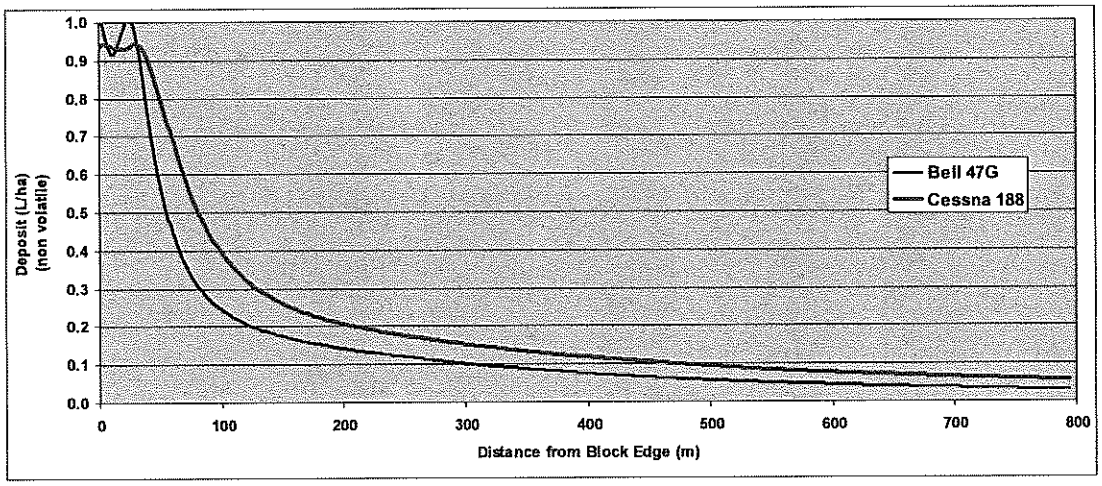


Figure 8. Comparison of off-target deposit from a Bell 47G helicopter and a Cessna 188 fixed wing aircraft. Height 20.7 m, wind 16kph, NVF 10%.

6. *Other factors*

Placement of nozzles on the wing can impact deposit when aircraft are flying close to the ground. Generally, out-board nozzles should not exceed 69% of the wing span. Vortices that entrain droplets are centred at 75% of the wing span. Drops released beyond this distance have an initial upward motion imposed on them as they are swept above the wing in the trailing vortices. Generally, the boom set up was not documented for the CFS Gagetown sprays. However, in one instance, the reported boom length was 96% of the rotor diameter.

Development of Worse Case Scenarios

Building upon the results of the sensitivity study above, a number of spray scenarios were modelled. Sensitivity studies indicate that high wind conditions will lead to maximum off-target deposit for both fixed wing aircraft and helicopters. A high spray height will also increase off-target deposit. A tank mix with a small NVF sprayed in warm dry conditions will maximise evaporation, reducing drop sizes and increasing the potential for off-target drift and deposit. Maximum one-hour average air concentration is found close to the spray zone when the aircraft is low and winds are light. Because of differences between fixed wing aircraft and helicopters, separate scenarios are completed for both.

Default input parameters for AGDISP included:

Aircraft Type	Helicopter (Bell 47G) and Fixed Wing (Cessna 188)
Aircraft height	20.76m agl (represents height over forest or clear cut with residuals)
	5m agl (represents height over clear cut)
Drop Size Distribution	VMD 300μm , span 1.55
Nozzle placement	41 equally spaced nozzles extending to 100% of wing span or rotor diameter
Swath	25m
Block	50 spray lines (max allowed within AGDISP) i.e.1250m block width
Wind Speed	Minimum 1 kph
	Maximum 16 kph (label)
Temperature	25°C (maximum listed in spray records)
Relative Humidity	44% (minimum listed in spray records)
Stability	Night (sunset to 1 hr after sunrise) with less than 3/8th overcast
Non-volatile Fraction	10% (minimum listed in spray records)

Table 1. Default input parameters for AGDISP model runs.

Helicopter (Bell 47G)

Off-target deposit

Predicted deposit downwind of the block boundary is summarised in figure 9. Winds are 16kph. Block width is 1250m (156ha if square). With a boom height of 20.76 m, deposit at 800m is 3% of application rate. In the vicinity of the block boundary, deposit is close to the application rate of 1 L/ha. Unless otherwise indicated, default conditions (Table 1) were used.

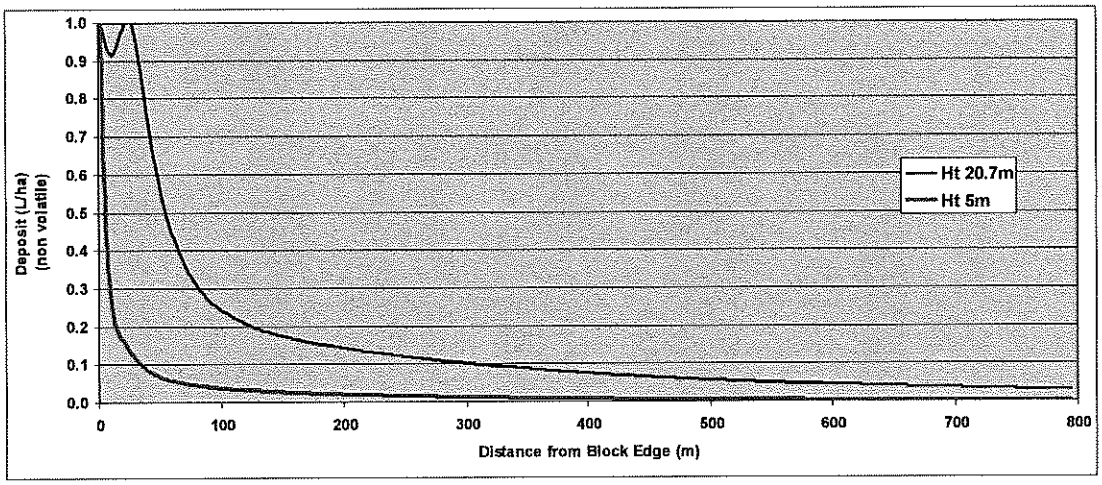


Figure 9. Deposit from a Bell 47G with booms at 5 and 20.7 m. Wind speed is 16kph. Other parameters are listed in Table 1.

Worse Case Conditions : (Deposit is tabulated in Appendix 1)

High wind, high spray height, low NVF

One-hour average air concentrations.

Predicted one-hour average air concentrations are summarised in figure 10 where combinations of spray height and wind speed have been plotted for the Bell 47G. Conditions for peak average air concentrations differ depending on bystander location relative to the spray zone. The highest average air concentration is found at the downwind edge of the spray zone (0m) in proximity to the last downwind spray line. Maximum concentration occurs during light wind, low height sprays where a bystander would be exposed to the spray cloud as it drifted past the location. In the far field, the low

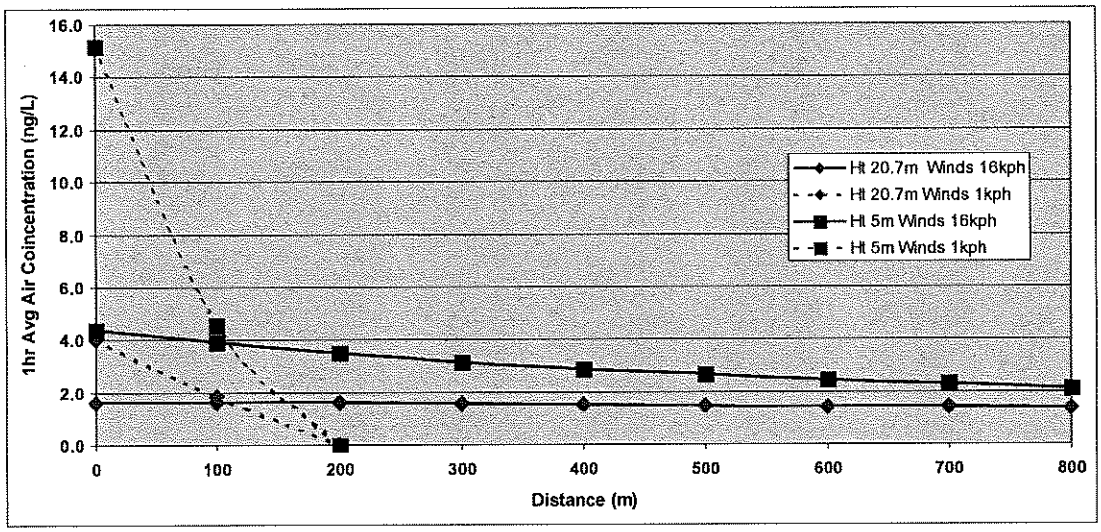


Figure 10. One-hour average air concentrations downwind of spray zone for high and low wind –aircraft height combinations. Other parameters are listed in Table 1.

height, high wind scenario provides the highest air concentrations, nearly 55% greater than the high wind – high height scenario. Beyond 800m given the slope of the curves with distance, one-hour average air concentrations should be comparable regardless of spray height.

Worse Case Conditions : (One-hour average air concentration is tabulated in Appendix 2)

Near Field (bystander close to spray line): low wind, low height spray

Far Field (800m): Low height, high wind conditions

Cessna 188 (fixed wing)

Off-target deposit

Predicted deposit downwind of the spray zone for a fixed wing aircraft is presented in figure 11. In the far field (800m), maximum deposit is found for a high wind, high height spray. Deposit is somewhat higher than for the helicopter case, being 5.6% of the application rate.

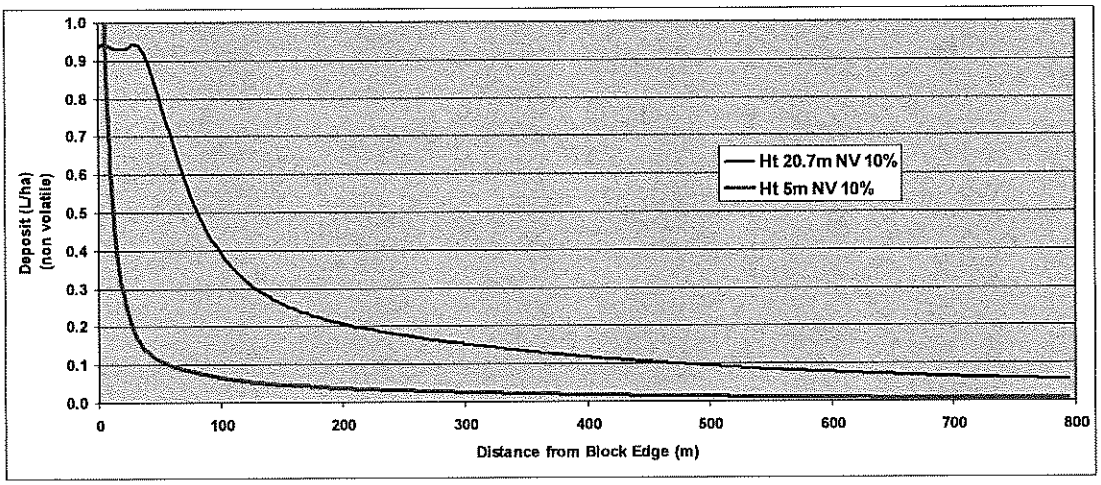


Figure 11. Off-target deposit from a Cessna 188 at two spray heights in 16kph winds. Other parameters are listed in Table 1.

Worse Case Conditions: (Deposit tabulated in Appendix 1)

High wind, high spray height, low NVF.

One-hour average air concentrations

One-hour average air concentrations downwind of the spray zone are plotted in figure 12 and are similar to the results for the Bell 47G. The highest air concentration is found just

downwind of the block boundary with peak concentrations associated with light wind-low height sprays.

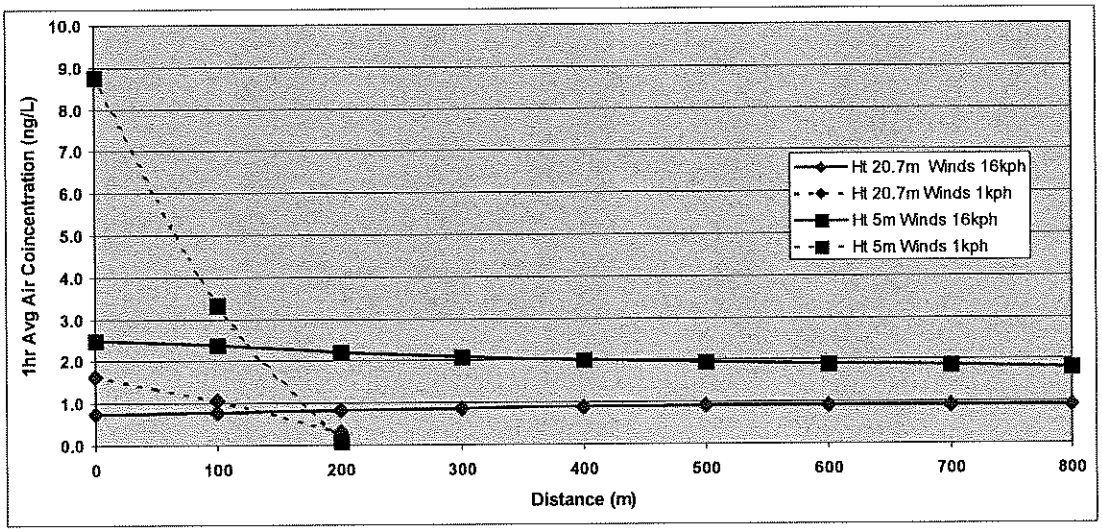


Figure 12. One-hour average air concentrations downwind of spray zone for high and low wind –aircraft height combinations. Other parameters are listed in Table 1.

Worse Case Conditions : ***(One-hour average air concentration is tabulated in Appendix 3)***

Near Field (bystander close to spray line): low wind, low height spray

Far Field (800m): Low height, high wind conditions

Application to Specific Herbicide Sprays at CFS Gagetown

For their Tier 2 toxicological risk assessment of exposure associated with herbicide spraying operations at Canadian Forces Base (CFB) Gagetown, Cantox Environmental (CE) identified specific herbicide spray events. In particular, treatments requiring further evaluation regarding potential off-site drift were identified for the Enniskillen and SA5 areas (Table 2). Only aerial sprays are discussed. Field trials (Crabbe and McCooeye, 1985) found significantly less drift and off-target deposit from ground rig sprays.

Enniskillen area herbicide applications
(Does not include test plots for 1966/1967 by Canadian Forestry Service)

Year	1979	1985	1988
Application Date	07/02/79-07/18/79	07/26/85-08/07/85	07/09/88
Application Date Ref	1979-1	1985-1	1988-11
Location Description	Enniskillen Training Area	Roads: Shirley, Kings Hill, Brown Town, Corner, Enniskillen, Willinton, Hastins, Rancy	Area 1 (Enniskillen)
Application type	Aerial	Ground	Aerial
Herbicide Product	Tordon 10K	Dycleer LH; Silvaprop	Dycleer; LV Brush Killer 700

SA5 Area

year	1978	1958	2004	1958	1978
Notes	1978-2	1958-1	2004-2	1958-1	1978-2
Location Description	Wellington Range	Greenfield Impact including ICM Impact to Northing 78 in Area 5	Greenfield Impact AH-05	Argus Impact extending Northwest including sentry posts #3 and #2	Argus Impact (Tank Classification Range North)
Application type	Aerial	Aerial	Aerial	Aerial	Aerial
Herbicide Product	Tordon 10K	Mixture of Active Ingredients	Diurex 80W; Roundup Transorb	Mixture of Active Ingredients	Tordon 10K

year	1960	2001	1960	2001	2004	1960
Notes	1960-1	2001-2	1960-1	2001-2	2004-1	1960-1
Location Description	Wellington Rocket Launching Range	Wellington Range	NBCW and Assault Grenade Ranges	Argus Impact	Argus Impact	Proposed Sniper Range
Application type	Ground	Ground	Ground	Ground	Ground	Ground
Herbicide Product	Mixture of Active Ingredients	Karmex DF; Arsenal	Mixture of Active Ingredients	Karmex DF; Arsenal	Diurex 80W; Roundup Transorb	Mixture of Active Ingredients

Table 2. Specific spray events identified by CE for Tier 2 assessment.

Documentation on most CFB Gagetown sprays was incomplete regarding key inputs for the AGDISP model. Missing input requirements were replaced with worse-case parameters (Table 1) that would lead to the highest drift potential.

SA5 Area

The 2004-02 application from the spray records near SA5 was rejected as an aerial application. Details obtained for the 2004-02 spray application near SA5 were inconsistent. The vehicle configuration was listed not as an aircraft but as a Toyota Tundra 4x4 truck. For this reason the 2004-02 application was removed from the list of aerial application scenarios

Tordon 10K is a granular herbicide. This is consistent with the broadcast treatment listed in the spray records (1978-2). Model requirements for granular treatments include pellet size range, shape and associated mass fraction. Any off-target movement from aerial granular treatments is associated with dust of which no data is available. Granular treatments therefore were not modelled.

Clarification from CE indicated applications at Greenfield (1958-1) and Argus (1958-1) were liquid although no information on the application was documented other than it was done by fixed-wing aircraft. Worse case scenarios for fixed wing aircraft would apply.

Enniskillen Area

Modelling of granular Tordon 10K (1979-1) was not completed for reasons given above.

1988-11

Location Description :	Area 1 (Enniskillen)
Application Date:	07/09/88

Model Parameters

Block Size	157.99ha 1257m on each side if square Note: Maximum number of spray lines for AGDISP is 50. Therefore an area 1km wide (50 * 20m) was modelled.
Product	Dycleer; LV Brush Killer 700
Application	
Bell 206B	96kph @20.76m and 5m agl
Swath	20m
8020 Flat Fan	45° back, VMD 396μm, Span 1.55 (USDA-ARS Nozzle Model) 41 evenly spaced nozzles along 9.8m boom (96% of rotor diameter)
Meteorology	
Ta	22C (max recorded during spray)
RH	44% (min recorded for other sprays)
Winds	11kph (max recorded during spray)
Direction	Perpendicular to flight line (W-SW recorded)
Stability	Stable with less than 3/8th overcast
Tank Mix	12.7% non-volatile Specific Gravity 1.0

Application rate in the model was adjusted to provide 1L/ha of non-volatile being emitted from the aircraft. Deposit expressed in L/ha and 1-hr average air concentration in ng/L assume the specific gravity of the non-volatile component is 1.0.

Predicted deposit and 1-hour average air concentration are presented in figures 13 and 14 (Appendix 1,4). At 800m, predicted deposit is only 1% of application when spraying from 20.7 m. Spraying at 5 m, results in deposit beyond 250m being less than 1%. One – hour average air concentration just downwind of the spray zone is predicted to have been 4 ng/L if a low spray height was used. By 800m, predicted air concentration is close to 1.5 ng/L, regardless of application height. Tabulated one-hour air concentration is tabulated in Appendix 4.

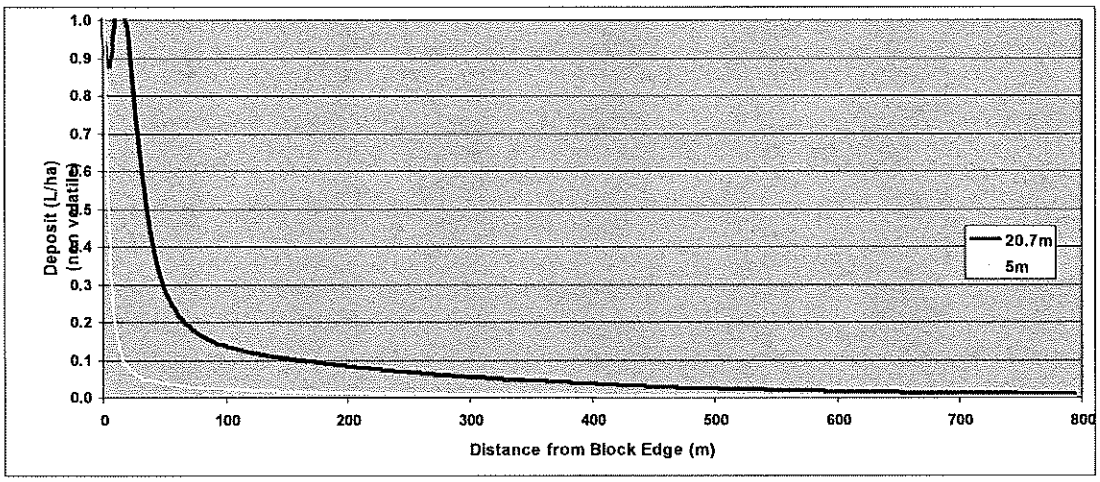


Figure 13. Predicted downwind deposit from 1988-11 spray.

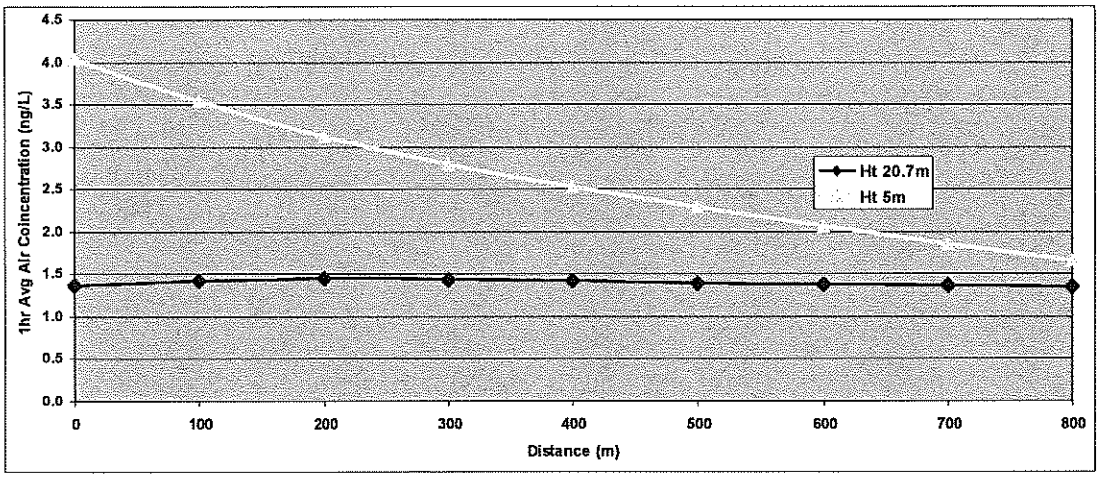


Figure 14. Predicted one-hour average air concentration from 1988-11 spray.

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Appendix 1

Predicted Off-target Deposit for
Worse Case Bell 47G Spray
Worse Case Cessna 188 Spray
Enniskilen Area 1988-11

Bell 47G		Cessna 188		Enniskillen 1988-11	
Distance (m)	Deposit (L/ha)	Distance (m)	Deposit (L/ha)	Distance (m)	Deposit (L/ha)
0	1.014	0	0.935	0	0.976
2	1.000	2	0.940	2	0.918
4	0.977	4	0.942	4	0.884
6	0.953	6	0.942	6	0.878
8	0.932	8	0.940	8	0.931
10	0.920	10	0.937	10	1.003
12	0.916	12	0.934	12	1.032
14	0.924	14	0.932	14	1.058
16	0.939	16	0.931	16	1.058
18	0.960	18	0.931	18	1.027
20	0.985	20	0.931	20	0.976
22	1.006	22	0.931	22	0.912
24	1.015	24	0.935	24	0.837
26	1.009	26	0.938	26	0.766
28	0.990	28	0.943	28	0.707
30	0.963	30	0.943	30	0.649
32	0.930	32	0.941	32	0.595
34	0.891	34	0.936	34	0.543
36	0.848	36	0.929	36	0.495
38	0.802	38	0.918	38	0.454
40	0.757	40	0.904	40	0.419
42	0.715	42	0.887	42	0.388
44	0.676	44	0.868	44	0.359
46	0.641	46	0.847	46	0.333
48	0.608	48	0.826	48	0.312
50	0.577	50	0.805	50	0.293
52	0.547	52	0.783	52	0.277
54	0.520	54	0.761	54	0.263
56	0.494	56	0.739	56	0.249
58	0.472	58	0.717	58	0.237
60	0.451	60	0.696	60	0.227
62	0.431	62	0.675	62	0.217
64	0.413	64	0.654	64	0.209
66	0.396	66	0.633	66	0.201
68	0.381	68	0.613	68	0.195
70	0.367	70	0.594	70	0.189
72	0.354	72	0.576	72	0.184
74	0.342	74	0.558	74	0.178
76	0.331	76	0.542	76	0.174
78	0.321	78	0.526	78	0.169
80	0.311	80	0.511	80	0.165

82	0.302	82	0.497	82	0.161
84	0.294	84	0.484	84	0.158
86	0.286	86	0.471	86	0.155
88	0.279	88	0.459	88	0.152
90	0.272	90	0.447	90	0.149
92	0.266	92	0.435	92	0.146
94	0.260	94	0.424	94	0.143
96	0.255	96	0.414	96	0.141
98	0.250	98	0.404	98	0.139
100	0.245	100	0.395	100	0.136
102	0.240	102	0.386	102	0.134
104	0.236	104	0.378	104	0.132
106	0.232	106	0.370	106	0.131
108	0.228	108	0.363	108	0.129
110	0.224	110	0.356	110	0.127
112	0.220	112	0.349	112	0.126
114	0.217	114	0.343	114	0.124
116	0.213	116	0.336	116	0.123
118	0.210	118	0.330	118	0.121
120	0.207	120	0.324	120	0.120
122	0.205	122	0.319	122	0.119
124	0.202	124	0.313	124	0.117
126	0.199	126	0.308	126	0.116
128	0.197	128	0.303	128	0.115
130	0.195	130	0.299	130	0.114
132	0.192	132	0.294	132	0.113
134	0.190	134	0.290	134	0.112
136	0.188	136	0.286	136	0.110
138	0.185	138	0.282	138	0.109
140	0.183	140	0.278	140	0.108
142	0.181	142	0.275	142	0.107
144	0.179	144	0.271	144	0.106
146	0.177	146	0.267	146	0.105
148	0.176	148	0.264	148	0.104
150	0.174	150	0.261	150	0.103
152	0.173	152	0.258	152	0.102
154	0.171	154	0.255	154	0.101
156	0.169	156	0.252	156	0.101
158	0.168	158	0.250	158	0.100
160	0.166	160	0.247	160	0.099
162	0.165	162	0.244	162	0.098
164	0.163	164	0.242	164	0.097
166	0.162	166	0.239	166	0.096
168	0.161	168	0.237	168	0.095

170	0.159	170	0.234	170	0.094
172	0.158	172	0.232	172	0.094
174	0.157	174	0.230	174	0.093
176	0.155	176	0.228	176	0.092
178	0.154	178	0.226	178	0.092
180	0.153	180	0.224	180	0.091
182	0.152	182	0.222	182	0.090
184	0.151	184	0.220	184	0.089
186	0.150	186	0.218	186	0.089
188	0.148	188	0.217	188	0.088
190	0.147	190	0.215	190	0.087
192	0.146	192	0.213	192	0.086
194	0.145	194	0.211	194	0.086
196	0.144	196	0.210	196	0.085
198	0.143	198	0.208	198	0.084
200	0.142	200	0.206	200	0.084
202	0.141	202	0.205	202	0.083
204	0.140	204	0.204	204	0.082
206	0.139	206	0.202	206	0.082
208	0.138	208	0.201	208	0.081
210	0.137	210	0.200	210	0.080
212	0.136	212	0.198	212	0.079
214	0.135	214	0.197	214	0.079
216	0.134	216	0.196	216	0.078
218	0.133	218	0.194	218	0.077
220	0.132	220	0.193	220	0.077
222	0.131	222	0.192	222	0.076
224	0.131	224	0.191	224	0.075
226	0.130	226	0.189	226	0.075
228	0.129	228	0.188	228	0.074
230	0.128	230	0.187	230	0.073
232	0.127	232	0.186	232	0.073
234	0.127	234	0.185	234	0.072
236	0.126	236	0.184	236	0.072
238	0.125	238	0.182	238	0.071
240	0.124	240	0.181	240	0.071
242	0.123	242	0.180	242	0.070
244	0.123	244	0.179	244	0.069
246	0.122	246	0.178	246	0.069
248	0.121	248	0.177	248	0.068
250	0.120	250	0.176	250	0.068
252	0.120	252	0.175	252	0.067
254	0.119	254	0.174	254	0.066
256	0.118	256	0.173	256	0.066

258	0.117	258	0.172	258	0.065
260	0.116	260	0.171	260	0.065
262	0.116	262	0.170	262	0.064
264	0.115	264	0.169	264	0.064
266	0.114	266	0.168	266	0.063
268	0.113	268	0.167	268	0.063
270	0.112	270	0.166	270	0.062
272	0.112	272	0.165	272	0.062
274	0.111	274	0.164	274	0.061
276	0.110	276	0.163	276	0.061
278	0.109	278	0.162	278	0.060
280	0.109	280	0.161	280	0.060
282	0.108	282	0.160	282	0.059
284	0.107	284	0.159	284	0.059
286	0.106	286	0.158	286	0.058
288	0.106	288	0.158	288	0.058
290	0.105	290	0.157	290	0.057
292	0.104	292	0.156	292	0.057
294	0.104	294	0.155	294	0.056
296	0.103	296	0.154	296	0.056
298	0.102	298	0.153	298	0.056
300	0.102	300	0.153	300	0.055
302	0.101	302	0.152	302	0.055
304	0.100	304	0.151	304	0.054
306	0.100	306	0.150	306	0.054
308	0.099	308	0.149	308	0.053
310	0.099	310	0.149	310	0.053
312	0.098	312	0.148	312	0.052
314	0.097	314	0.147	314	0.052
316	0.097	316	0.146	316	0.052
318	0.096	318	0.146	318	0.051
320	0.096	320	0.145	320	0.051
322	0.095	322	0.144	322	0.050
324	0.095	324	0.143	324	0.050
326	0.094	326	0.143	326	0.050
328	0.093	328	0.142	328	0.049
330	0.093	330	0.141	330	0.049
332	0.092	332	0.140	332	0.048
334	0.092	334	0.140	334	0.048
336	0.091	336	0.139	336	0.048
338	0.091	338	0.138	338	0.047
340	0.090	340	0.138	340	0.047
342	0.090	342	0.137	342	0.047
344	0.089	344	0.136	344	0.046

346	0.089	346	0.136	346	0.046
348	0.088	348	0.135	348	0.046
350	0.088	350	0.134	350	0.045
352	0.087	352	0.134	352	0.045
354	0.086	354	0.133	354	0.044
356	0.086	356	0.132	356	0.044
358	0.085	358	0.131	358	0.044
360	0.085	360	0.131	360	0.043
362	0.084	362	0.130	362	0.043
364	0.084	364	0.129	364	0.043
366	0.083	366	0.129	366	0.042
368	0.083	368	0.128	368	0.042
370	0.082	370	0.127	370	0.042
372	0.082	372	0.127	372	0.041
374	0.081	374	0.126	374	0.041
376	0.081	376	0.126	376	0.041
378	0.080	378	0.125	378	0.040
380	0.080	380	0.124	380	0.040
382	0.079	382	0.124	382	0.040
384	0.079	384	0.123	384	0.039
386	0.078	386	0.123	386	0.039
388	0.078	388	0.122	388	0.039
390	0.077	390	0.121	390	0.038
392	0.077	392	0.121	392	0.038
394	0.077	394	0.120	394	0.038
396	0.076	396	0.120	396	0.038
398	0.076	398	0.119	398	0.037
400	0.075	400	0.119	400	0.037
402	0.075	402	0.118	402	0.037
404	0.074	404	0.117	404	0.036
406	0.074	406	0.117	406	0.036
408	0.073	408	0.116	408	0.036
410	0.073	410	0.116	410	0.035
412	0.073	412	0.115	412	0.035
414	0.072	414	0.115	414	0.035
416	0.072	416	0.114	416	0.034
418	0.071	418	0.114	418	0.034
420	0.071	420	0.113	420	0.034
422	0.071	422	0.113	422	0.033
424	0.070	424	0.112	424	0.033
426	0.070	426	0.112	426	0.033
428	0.069	428	0.111	428	0.032
430	0.069	430	0.111	430	0.032
432	0.069	432	0.110	432	0.032

434	0.068	434	0.110	434	0.031
436	0.068	436	0.109	436	0.031
438	0.067	438	0.109	438	0.031
440	0.067	440	0.108	440	0.031
442	0.067	442	0.108	442	0.030
444	0.066	444	0.107	444	0.030
446	0.066	446	0.107	446	0.030
448	0.066	448	0.106	448	0.030
450	0.065	450	0.106	450	0.029
452	0.065	452	0.105	452	0.029
454	0.065	454	0.105	454	0.029
456	0.064	456	0.105	456	0.029
458	0.064	458	0.104	458	0.028
460	0.064	460	0.104	460	0.028
462	0.063	462	0.103	462	0.028
464	0.063	464	0.103	464	0.028
466	0.062	466	0.102	466	0.027
468	0.062	468	0.102	468	0.027
470	0.062	470	0.101	470	0.027
472	0.061	472	0.101	472	0.027
474	0.061	474	0.100	474	0.026
476	0.061	476	0.100	476	0.026
478	0.060	478	0.099	478	0.026
480	0.060	480	0.099	480	0.026
482	0.060	482	0.098	482	0.026
484	0.059	484	0.098	484	0.025
486	0.059	486	0.098	486	0.025
488	0.059	488	0.097	488	0.025
490	0.059	490	0.097	490	0.025
492	0.058	492	0.096	492	0.025
494	0.058	494	0.096	494	0.025
496	0.058	496	0.095	496	0.024
498	0.057	498	0.095	498	0.024
500	0.057	500	0.095	500	0.024
502	0.057	502	0.094	502	0.024
504	0.056	504	0.094	504	0.024
506	0.056	506	0.093	506	0.023
508	0.056	508	0.093	508	0.023
510	0.056	510	0.093	510	0.023
512	0.055	512	0.092	512	0.023
514	0.055	514	0.092	514	0.023
516	0.055	516	0.091	516	0.023
518	0.055	518	0.091	518	0.022
520	0.054	520	0.091	520	0.022

522	0.054	522	0.090	522	0.022
524	0.054	524	0.090	524	0.022
526	0.053	526	0.089	526	0.022
528	0.053	528	0.089	528	0.022
530	0.053	530	0.089	530	0.022
532	0.053	532	0.088	532	0.021
534	0.052	534	0.088	534	0.021
536	0.052	536	0.088	536	0.021
538	0.052	538	0.087	538	0.021
540	0.052	540	0.087	540	0.021
542	0.051	542	0.086	542	0.021
544	0.051	544	0.086	544	0.020
546	0.051	546	0.086	546	0.020
548	0.051	548	0.085	548	0.020
550	0.050	550	0.085	550	0.020
552	0.050	552	0.085	552	0.020
554	0.050	554	0.084	554	0.020
556	0.050	556	0.084	556	0.020
558	0.049	558	0.084	558	0.019
560	0.049	560	0.083	560	0.019
562	0.049	562	0.083	562	0.019
564	0.049	564	0.083	564	0.019
566	0.048	566	0.082	566	0.019
568	0.048	568	0.082	568	0.019
570	0.048	570	0.082	570	0.019
572	0.048	572	0.081	572	0.019
574	0.048	574	0.081	574	0.018
576	0.047	576	0.081	576	0.018
578	0.047	578	0.080	578	0.018
580	0.047	580	0.080	580	0.018
582	0.047	582	0.080	582	0.018
584	0.046	584	0.080	584	0.018
586	0.046	586	0.079	586	0.018
588	0.046	588	0.079	588	0.018
590	0.046	590	0.079	590	0.017
592	0.046	592	0.078	592	0.017
594	0.045	594	0.078	594	0.017
596	0.045	596	0.078	596	0.017
598	0.045	598	0.078	598	0.017
600	0.045	600	0.077	600	0.017
602	0.045	602	0.077	602	0.017
604	0.044	604	0.077	604	0.017
606	0.044	606	0.077	606	0.016
608	0.044	608	0.076	608	0.016

610	0.044	610	0.076	610	0.016
612	0.044	612	0.076	612	0.016
614	0.043	614	0.075	614	0.016
616	0.043	616	0.075	616	0.016
618	0.043	618	0.075	618	0.016
620	0.043	620	0.075	620	0.016
622	0.043	622	0.074	622	0.016
624	0.043	624	0.074	624	0.016
626	0.042	626	0.074	626	0.015
628	0.042	628	0.074	628	0.015
630	0.042	630	0.073	630	0.015
632	0.042	632	0.073	632	0.015
634	0.042	634	0.073	634	0.015
636	0.042	636	0.073	636	0.015
638	0.041	638	0.072	638	0.015
640	0.041	640	0.072	640	0.015
642	0.041	642	0.072	642	0.015
644	0.041	644	0.072	644	0.015
646	0.041	646	0.071	646	0.014
648	0.041	648	0.071	648	0.014
650	0.040	650	0.071	650	0.014
652	0.040	652	0.071	652	0.014
654	0.040	654	0.070	654	0.014
656	0.040	656	0.070	656	0.014
658	0.040	658	0.070	658	0.014
660	0.040	660	0.070	660	0.014
662	0.039	662	0.069	662	0.014
664	0.039	664	0.069	664	0.014
666	0.039	666	0.069	666	0.014
668	0.039	668	0.069	668	0.014
670	0.039	670	0.068	670	0.013
672	0.039	672	0.068	672	0.013
674	0.038	674	0.068	674	0.013
676	0.038	676	0.068	676	0.013
678	0.038	678	0.068	678	0.013
680	0.038	680	0.067	680	0.013
682	0.038	682	0.067	682	0.013
684	0.038	684	0.067	684	0.013
686	0.038	686	0.067	686	0.013
688	0.037	688	0.066	688	0.013
690	0.037	690	0.066	690	0.013
692	0.037	692	0.066	692	0.013
694	0.037	694	0.066	694	0.013
696	0.037	696	0.066	696	0.013

698	0.037	698	0.065	698	0.013
700	0.037	700	0.065	700	0.012
702	0.036	702	0.065	702	0.012
704	0.036	704	0.065	704	0.012
706	0.036	706	0.064	706	0.012
708	0.036	708	0.064	708	0.012
710	0.036	710	0.064	710	0.012
712	0.036	712	0.064	712	0.012
714	0.036	714	0.064	714	0.012
716	0.035	716	0.063	716	0.012
718	0.035	718	0.063	718	0.012
720	0.035	720	0.063	720	0.012
722	0.035	722	0.063	722	0.012
724	0.035	724	0.063	724	0.012
726	0.035	726	0.062	726	0.012
728	0.035	728	0.062	728	0.012
730	0.034	730	0.062	730	0.012
732	0.034	732	0.062	732	0.011
734	0.034	734	0.062	734	0.011
736	0.034	736	0.061	736	0.011
738	0.034	738	0.061	738	0.011
740	0.034	740	0.061	740	0.011
742	0.034	742	0.061	742	0.011
744	0.033	744	0.061	744	0.011
746	0.033	746	0.060	746	0.011
748	0.033	748	0.060	748	0.011
750	0.033	750	0.060	750	0.011
752	0.033	752	0.060	752	0.011
754	0.033	754	0.060	754	0.011
756	0.033	756	0.059	756	0.011
758	0.033	758	0.059	758	0.011
760	0.032	760	0.059	760	0.011
762	0.032	762	0.059	762	0.011
764	0.032	764	0.059	764	0.011
766	0.032	766	0.058	766	0.011
768	0.032	768	0.058	768	0.011
770	0.032	770	0.058	770	0.011
772	0.032	772	0.058	772	0.010
774	0.032	774	0.058	774	0.010
776	0.031	776	0.058	776	0.010
778	0.031	778	0.057	778	0.010
780	0.031	780	0.057	780	0.010
782	0.031	782	0.057	782	0.010
784	0.031	784	0.057	784	0.010

786	0.031	786	0.057	786	0.010
788	0.031	788	0.057	788	0.010
790	0.031	790	0.056	790	0.010
792	0.030	792	0.056	792	0.010
794	0.030	794	0.056	794	0.010

Appendix 2

Worse case one-hour average air concentration

for Bell 47G

Wind 1 kph and 16 kph

Bell 47G - 5m					
Winds 16 kph			Winds 1 kph		
Distance (m)	Air Concentration (ng/L)	Height (m)	Distance (m)	Air Concentration (ng/L)	Height (m)
0	4.37	1.5	0	15.16004	1.5
100	3.93	1.5	100	4.546605	1.5
200	3.50	1.5	200	0.001489	1.5
300	3.16	1.5			
400	2.86	1.5			
500	2.65	1.5			
600	2.46	1.5			
700	2.28	1.5			
800	2.14	1.5			

Appendix 3

Worse case one-hour average air concentration

for Cessna 188

Wind 1 kph and 16 kph

C188 5m					
Winds 16 kph			Winds 1 kph		
Distance (m)	Air Concentration (ng/L)	Height (m)	Distance (m)	Air Concentration (ng/L)	Height (m)
0	2.507222	1.5	0	8.75282	1.5
100	2.383372	1.5	100	3.325017	1.5
200	2.220065	1.5	200	0.09904646	1.5
300	2.103851	1.5			
400	2.021695	1.5			
500	1.957623	1.5			
600	1.902731	1.5			
700	1.857549	1.5			
800	1.820414	1.5			

Appendix 4

Predicted one-hour average air concentration

for Enniskillen 1988-11 spray

Spray heights 20.7 m and 5 m.

Height 20.7 m			Height 5 m		
Distance (m)	Air Concentration (ng/L)	Height (m)	Distance (m)	Air Concentration (ng/L)	Height (m)
0	1.37	1.5	0	4.04	1.5
100	1.42	1.5	100	3.54	1.5
200	1.45	1.5	200	3.12	1.5
300	1.43	1.5	300	2.79	1.5
400	1.41	1.5	400	2.53	1.5
500	1.39	1.5	500	2.29	1.5
600	1.37	1.5	600	2.06	1.5
700	1.36	1.5	700	1.85	1.5
800	1.35	1.5	800	1.66	1.5

Government records concerning herbicide spraying at CFB Gagetown

Submitted to the Gagetown Harmful Chemical Study Commission, Maine State Legislature

By Kelly Porter Franklin, Nanaimo, British Columbia · 15 October 2026

Every document in this packet is a government record: Canadian records released under the Access to Information Act, and U.S. Army and U.S. State Department records. None is my own research or commentary. Yellow highlighting has been added to mark key passages; the pages are otherwise reproduced as released. Each exhibit begins with a short note naming the document and quoting the passage that matters.

Contents

Exhibit	What it shows	Record
A	What DND told its own Minister, May–June 2005	A0216612 A0128619 (duplicate pages omitted)
B	What Ottawa told Parliament, 22 June 2005	A0156853
C	The official spray history was compiled in a weekend — and it misses 1959	A0090122 A0098394
D	“No record” is not the same as no spraying — and the summary sheets were unverified drafts	Released under the Access to Information Act, A-2015-01866, pages 01585, 01588 and 01589
E	Maine soldiers at Gagetown, 1975	U.S. Department of State, declassified; as published by WikiLeaks (PlusD)
F	The 1966 tests were a U.S. Army program	A0156893 (second, duplicate copy omitted)
G	Agent Orange chemistry was routine DND practice in 1963	DND file HQ 5432-1 Vol 2; scanned by the submitter from a copy (original held in Hanoi)

Previously submitted, not repeated here: the half-redacted Access to Information release originally obtained by Gail Radford Ross; “The Vietnam Code”; and three videos.

Exhibit A

What DND told its own Minister, May–June 2005

Memorandum from ADM (Human Resources – Military) to the Deputy Minister, with Briefing Note to the Minister, "Agent Orange Testing at CFB Gagetown", 27 May 2005

Released under the Access to Information Act, record A0216612

Briefing Note to the Minister, "Herbicide Spraying at CFB Gagetown", 10 June 2005

Released under the Access to Information Act, record A0128619 (duplicate pages omitted)

Key passages

"In 1964, CFB Gagetown sprayed 9,365 acres of brush with a 50-50 mixture of registered 2,4-D and 2,4,5-T products (Agent Orange mixture)." (27 May 2005, para. 2)

A 1964 "spraying accident" in which a weather inversion and strong winds carried 2,4-D/2,4,5-T spray to the Upper Gagetown and Sheffield area; "The Crown paid approximately $250 000.00" to market gardeners. (10 June 2005, para. 7)

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Sous-Ministre de la Défense Nationale

MAY 27 2005

Deputy Minister of National Defence

s.21(1)(a)
s.21(1)(b) 27 May 05

Assistant Deputy Minister
(Human Resources - Military)

Sous-ministre adjoint
(Ressources humaines - Militaires)

DM

AGENT ORANGE TESTING AT CFB GAGETOWN

1. You will find enclosed for your endorsement a proposed briefing note to the Minister on this subject. It has been reviewed by my counterpart at VAC as well as ADM(IE), ADM(PA), CFLA, CLS and my medical experts.

2. Please note in particular the conclusion, which highlights the manner in which we are interpreting the Minister's remarks. Given that the huge numbers that would be involved by any broader interpretation and given the minimal risks to humans by any lesser exposure than our flagmen may have experienced, I believe this interpretation is reasonable. ADM(PA) has also discussed this interpretation with the Minister's press secretary who, at first blush, deems this reasonable. I have also discussed this with VAC, and they would be very comfortable to conduct a targeted outreach on this basis.

3. ADM(PA) is now starting to work on the Comms Strategy, and . It will be important as we move forward that we are precise in our words as to ' until we have considerably more detail on all the circumstances involved.

4. I am available should you wish to discuss.

VAdm Greg Jarvis
ADM(HR Mil)
27 May 05

CC: CDS

National Defence Défense nationale

Canada

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27/5/2005

BRIEFING NOTE TO THE MINISTER

AGENT ORANGE TESTING AT CFB GAGETOWN

AIM

1. To provide the Minister with updated information on Agent Orange testing at CFB Gagetown.

BACKGROUND

2. As early as the 1950s, herbicides were used in very large volumes worldwide. At that time, no reported adverse effects on human or animal health were indicated. One of the herbicides used had chemical mixtures similar to what would later be named Agent Orange. In 1964, CFB Gagetown sprayed 9,365 acres of brush with a 50-50 mixture of registered 2,4-D and 2,4,5-T products (Agent Orange mixture). 2,4,5-T became the subject of extensive investigations beginning in the 1970s when certain samples were found to be contaminated with dioxins. In 1985 manufacturers withdrew the chemical from North American registrations. There is no evidence to suggest that the effects of dioxins were known in the 1950s and 60s.

3. In June 1966 and 1967, aerial spray tests were conducted at CFB Gagetown by DOW Chemical, under contract to CFB Gagetown, under the guidance of personnel from the Biological Sciences Laboratory, Fort Derrick, Maryland. At the time, CFB Gagetown measured 427 square miles, 80 percent of which was heavily forested. A total of 153 plots in a dense and undisturbed forest on base, measuring 200 by 660 feet and separated by 100 to 200 feet, were sprayed by US Army and contracted helicopters with up to 15 mostly commercial herbicides and desiccants to determine the effectiveness of compounds and combinations. One of the herbicides was Agent Orange. Plots were flagged for the pilot with plot markers and by Canadian soldiers acting as flagmen. Records show that spraying was conducted when there was little or no wind.

4. While Canadian Forces (CF) personnel participated in the conduct of the tests (but not as human subjects), there is no evidence that DND civilians or civilians in the adjoining communities were placed at risk. Between 1966 and 1985, over 150,000 CF personnel were trained at CFB Gagetown, and other than two confirmed veterans who were awarded a VAC pension for illness associated with exposure to Agent Orange, there are no indications that CF personnel who served in Gagetown since the testing have suffered ill health effects. It is not possible to determine the names of everyone who served at CFB Gagetown during and since the testing because there are no nominal rolls that date back to the mid 1960s.

5. A CBC news story in February 2002 reported that New Brunswick Power also used Agent Orange in the 1950s and 60s to clear leaves from its power lines. The report states that the utility company announced that it would settle a lawsuit brought by a group of workers exposed to the herbicide. It is not known whether the lawsuit has been settled.

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DISCUSSION

6. The health effects of Agent Orange exposure remain controversial. The US Institute of Medicine (IOM) is considered the leading expert in this regard and has found 'associations' between exposure and certain illnesses. Contrary to general public and media perception, however, the IOM has not found that exposure to Agent Orange is the cause of any illnesses. It is also important to note that the possible associations are based primarily on agricultural and industrial workers with far greater exposure than Vietnam veterans involved in Agent Orange spraying. These Vietnam veterans, in turn, generally had far greater exposure than CF members involved in the Gagetown spraying. The Canadian Forces Surgeon General and her expert staff have confidence in the quality of the Institute of Medicine's analysis and findings.

7. A recent article by Boehmer et al in the Archives of Internal Medicine studying mortality rates of Vietnam veterans found the following: "Death rates from disease-related chronic conditions, including cancers and circulatory system diseases, did not differ between Vietnam veterans and their peers, despite the increasing age of the cohort (mean age, 53 years) and the longer follow-up (average, 30 years)." The Institute of Medicine, in its 2002 update on Agent Orange, noted "The committee believes that there is sufficient evidence to reach general conclusions about associations between herbicide exposure and the health outcomes, but the lack of adequate data on Vietnam veterans themselves makes it difficult to reach conclusions about increased risk of disease among Vietnam veterans."

8. Veterans Affairs Canada (VAC) has the mandate to provide a disability pension and health care services to veterans who suffer a service-related illness or disability. A claim for a disability pension as a result of exposure to Agent Orange must follow the same application and adjudication process as for any other claimed condition. The applicant must demonstrate that the condition was associated with exposure to Agent Orange. Where there is uncertainty, VAC's pension adjudication process gives the benefit of the doubt to the veteran.

9. Between April 2000 and May 2005, twenty-five (25) pension claims have been ruled on by Veterans Affairs Canada. Two (2) resulted in favorable rulings and twenty-three (23) resulted in unfavourable rulings. Four of these were in respect to service in Vietnam. VAC officials have determined that it may be appropriate to formally review, under section 82 of the Pension Act, nineteen (19) cases that have been previously considered (i.e. only those cases that have not been the subject of review/appeal by the Veterans Review and Appeal Board (VRAB).

10. While there is no indication that DND civilian personnel were directly involved or exposed to the testing, those former or currently serving DND employees who claim they have health problems as a result of exposure to Agent Orange will be able to apply for compensation through the Government Employees Compensation Act (GECA), which is administered by Human Resources Skills Development Canada (HRSDC). Civilian

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contractor personnel could apply through their employer's workers compensation plan. Finally, civilians who live(d) in the area of the base who claim ill effects from the testing would be required to submit a claim against the Crown. The communication outreach strategy for civilians has yet to be determined.

CONCLUSION

11. We are interpreting the Minister's statement in the House that "We are working to trace every member of the armed forces who was there" to mean that DND will work with VAC to develop a communications strategy to identify those specific CF members who were directly involved in Agent Orange testing as flagmen. With no oath of secrecy associated with exposure to Agent Orange, the ability of these individuals to come forward to VAC to apply for a disability pension if they feel they have an illness associated with the testing is not limited in any way.

Prepared by: Col J.D. Guérin, SA ADM (HR-Mil), 992-2982

Responsible Group Principal: VAdm G.E. Jarvis, ADM (HR-Mil) 992-7582

Date: 27 May 2005

APPROVED/~~NOT APPROVED~~

Ward P.D. Elcock

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BRIEFING NOTE TO THE MINISTER

HERBICIDE SPRAYING AT CFB GAGETOWN

AIM

1. To provide you with updated information on herbicide spraying in general and Agent Orange testing specifically at CFB Gagetown.

BACKGROUND

2. Since the 1950s, various types of herbicides have been applied at CFB Gagetown to reduce brush in the training areas and reduce the risk of forest fires. Some of these applications were composed of the same mixture of chemicals that make up Agent Orange. The two chemicals are 2,4-D and 2,4,5-T. Both of these are herbicides in their own right and were commercially available in Canada. We are checking on whether these herbicides were officially registered. Agent Orange first became a concern as a result of its use as a defoliant in the Vietnam War. It is estimated that 72 million litres of Agent Orange was sprayed in Vietnam from 1965 to 1971. In 1970 it was discovered that as a result of the manufacturing process, Agent Orange and possibly other herbicides containing 2,4,5-T were contaminated with varying levels of dioxin, a toxic and persistent substance. 2,4,5-T registrations were cancelled in the US and the product voluntarily removed by the manufacturers in 1985.

3. Precision regarding how Gagetown was selected for testing of Agent Orange forty (40) years ago is difficult to obtain. It does appear from one set of available records that the US Department of the Army, Fort Detrick, Maryland, was charged with finding effective chemical agents that would cause rapid defoliation of woody and herbaceous vegetation. To further develop these objectives, large areas similar in density to those of interest in were needed. In March 1965, the Canadian Ministry of Defence offered large areas of densely forested land located at CFB Gagetown for experimental tests of defoliant chemicals. This land was suitable in size and density to meet US objectives. Another record indicates that in a cooperative effort with the US, it was apparent both countries would benefit from brush control testing and evaluation. Throughout the years 1955 to 1964, CFB Gagetown personnel had difficulty in controlling seedling growth and timber regrowth. The same document suggests that Canada would benefit from the technical advice, which could be given by US experts. It also indicates that the US would benefit by being given the use of tracts of first and second growth timber in an environment similar to that of the where new herbicides, which had never been employed in this type of climatic zone, could be tested. The United States interest in this trial was related to evaluating effective measures for reducing foliage coverage.

s.15(1)

s.15(1)

4. In June 1966 and 1967, aerial spray tests were conducted at CFB Gagetown under the guidance of personnel from the Biological Sciences Laboratory. A total of 153 plots were sprayed with up to 15 mostly commercial herbicides and desiccants to determine the

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effectiveness of compounds and combinations. One of the herbicides was Agent Orange. In 1966 it was tested on 14 plots and in 1967 it was tested on 2 plots. This herbicide was sprayed in an unused area of the base, not in proximity to any residential or working areas, under strictly controlled conditions. Records show that spraying was conducted when there was little or no wind. The test plots were in a relatively small zone about 6.4 kilometres from the airstrip.

5. One of the reports from the testing in 1966 indicates that the test plots were flagged for helicopter pilots with poles that extended to a height of 50 feet. A flag was attached to the tip of the poles. The flagman stood on the trail halfway between pole markers, and the helicopter doing the spraying flew over the flags. Occasionally trees hid the flag and the pilot had to request ignition of smoke pots. This suggests that there were people on the ground during the 1966 tests. Another document about the same set of tests lists 13 Canadians (11 military and 2 civilians) and 9 Americans who were involved in the planning and execution from 1964 to 1966 for the tests in 1966, but this list may not include everyone who was involved in the actual tests nor does it indicate if any of the listed individuals were actually on the ground during the testing. At this time, ADM(IE) has not seen a list of individuals who may have been involved in the 1967 test. There could be more individuals who assisted in the tests in 1966 and 1967 who have not been identified to date. We are not aware of any way for DND to confirm categorically everyone involved in the tests. People would have to self-identify to permit compilation of a fuller list, which again, may not be complete.

6. Since 1966, more than 150,000 CF personnel were trained at CFB Gagetown. Other than one confirmed veteran who was awarded a Veterans' Affairs Canada (VAC) pension for illness associated with exposure to Agent Orange at Gagetown, there are no indications that CF personnel who served in Gagetown since the testing have suffered ill health effects. (It should be noted that another veteran is in receipt of benefits through VAC for an illness associated to Agent Orange exposure in Vietnam.) It is not possible to determine the names of everyone who served at CFB Gagetown during the testing or who traversed the test plots since 1966, as there are no nominal rolls that date back to the mid 1960s.

6. A previous briefing note mentioned that soil testing had been done in 1985 and nothing was found. It was thought that this testing pertained to the Agent Orange test area. This is not accurate. To the best of our knowledge, the testing was on a related issue, at a burial site for barrels that were suspected of containing Agent Orange. To date, we are not aware of any soil testing that has been done in the actual test areas. The department will investigate and do soil and vegetation samples within the next year.

7. We have also found a briefing by a DND representative to the Province of New Brunswick Cabinet in 1985 entitled "CFB Gagetown Brush Regrowth Control Program". The briefing included a reference to a spraying accident in 1964 where the combination of 2,4-D and 2,4,5-T were being applied. Due to a weather inversion, the spray stayed suspended longer than expected. Later, strong winds carried the spray to the upper Gagetown and Sheffield area. The Crown paid approximately $250 000.00 to several

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market gardens in the area as reparation for the damage to their crops. This information was part of an Access to Information release last year.

8. A CBC news story in December 2001 reported that New Brunswick Power also used contaminated 2,4,5-T herbicide in the 1950s and 60s to clear vegetation from its power lines. The report states that the utility company announced that it was settling a lawsuit brought by a group of workers exposed to the herbicide. We have confirmed with plaintiffs' counsel that the lawsuit has been settled.

9. While there has been some reference to the work of The Chemical Warfare Agent Testing Recognition Program in the press of late, media coverage has incorrectly linked chemicals such as Agent Orange, to chemical warfare agents such as mustard gas. Further, some media have erroneously associated the benefits and services available from VAC with *ex gratia* payments awarded as recognition for service for those who were chemical warfare agent test subjects.

10. DND implemented the Chemical Warfare Agent Testing Recognition Program in February 2004 to compensate veterans who participated in chemical warfare testing in Suffield and Ottawa. The rationale for the program was that the veterans were used as actual test subjects for the chemical warfare agents, which in several cases resulted in injuries. There was a causal linkage from exposure to the chemical warfare agents and the injuries. In some cases, the secrecy of the trials impeded access to disability pension benefits under the Pension Act. Eligible veterans can obtain a tax-free $24,000 *ex-gratia* payment in recognition of their service.

11. Agent Orange is a defoliant (herbicide), not a chemical warfare agent. Furthermore, it was not tested on human subjects in Gagetown in 1966 and 1967. Individuals concerned about Agent Orange, who have contacted the Chemical Warfare Agent Testing Recognition Program with the intent of making an application for the *ex gratia* payment, are informed of these important distinctions and are referred to VAC if the subject of health conditions is raised.

DISCUSSION

12. The health effects of Agent Orange exposure remain controversial. The US Institute of Medicine (IOM) is considered the leading expert in this regard and has found 'associations' between exposure and certain illnesses. Contrary to general public and media perception, however, the IOM has not found that exposure to Agent Orange is the cause of any illnesses. It is also important to note that the possible associations are based primarily on agricultural and industrial workers with far greater exposure than Vietnam veterans involved in Agent Orange spraying. These Vietnam veterans, in turn, had far greater exposure than CF members involved in the Gagetown spraying. The Canadian Forces Surgeon General and her expert staff have confidence in the quality of the Institute of Medicine's analysis and findings.

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13. The potential health risks associated with Agent Orange spraying at Gagetown in 1966 and 1967 can be summarized as follows:

- Scientific evidence linking exposure to the ingredients of Agent Orange and adverse health effects are largely based on heavily exposed populations and only provide evidence of associations, not of causation.

- Test sites in the United States where far greater amounts of spraying took place do not suggest that environmental contamination of any human health significance could have persisted.

- Based on U.S. studies, the C.F. Surgeon General has advised that spray drift beyond the borders of target areas in low wind conditions (as was the case in Gagetown) would be extremely unlikely and that any herbicide remaining in the air would be rapidly degraded by sunlight. The vast majority of Agent Orange sprayed in Gagetown would have been absorbed by the forest canopy or would have broken down in sunlight, with very little reaching the ground. It is extremely unlikely that individuals travelling through the Gagetown test area, even shortly after spraying, could have received an exposure to Agent Orange of any health significance. In the absence of deliberate ingestion of large amounts of contaminated material, there is virtually no risk of significant exposure related to the spraying among CF members who subsequently trained in Gagetown. Even most US ground troops who served in Vietnam are unlikely to have experienced exposure of any health significance. The Surgeon General's assessment is supported by a recent study by the University of Oklahoma at Eglin Air Force Base, Florida, on the environmental fate of Agent Orange, which demonstrated that the majority of the dioxins sprayed on the testing grid were broken down by sunlight within hours of application. Studies also indicated that the half-life of dioxins in soils ranged from 2 to 14 years.

14. VAC has the mandate to provide a disability pension and health care services to veterans who suffer a service-related illness or disability. A claim for a disability pension as a result of exposure to Agent Orange must follow the same application and adjudication process as for any other claimed condition. The applicant must demonstrate that the condition was associated with exposure to Agent Orange. Where there is uncertainty, VAC's pension adjudication process gives the benefit of the doubt to the veteran. With no oath of secrecy associated with exposure to Agent Orange, the ability of these individuals to come forward to VAC to apply for a disability pension, if they feel they have an illness associated with the testing, is not limited in any way.

15. Between April 2000 and May 2005, twenty-five (25) pension claims related to exposure to Agent Orange have been ruled on by VAC. Two (2) resulted in rulings in favour of the claim and twenty-three (23) resulted in rulings not in favour of the claim. Four of the 25 (including one of the two successful applicants) were in respect to service in Vietnam. The Pension Act allows a review of a decision made by the Minister or the Commission under certain conditions. VAC officials have determined that it may be

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appropriate to formally review nineteen (19) cases that have been previously considered (i.e., only those cases that have not been the subject of review/appeal by the Veterans Review and Appeal Board.)

16. Those former or currently serving DND employees who claim they have health problems as a result of exposure to Agent Orange during the performance of their duties will be able to apply for compensation through the Government Employees Compensation Act. This Act is administered by Human Resources Skills Development Canada. Civilian contractor personnel with concerns can apply through their employer's workers compensation plan.

17. CFLA is currently researching the U.S. policy for compensation of U.S. veterans as it relates to Agent Orange. However the CF Surgeon General advises that the US Veterans Administration presumes that all military personnel who served in Vietnam were exposed to Agent Orange, and federal law presumes that certain illnesses are a result of that exposure. This so-called "presumptive policy" simplifies the process of receiving compensation for these diseases since Veteran Administration foregoes the normal requirements of proving that an illness began or was worsened during military service. The U.S. Congress legislated that the Veterans Administration grant compensation and certain other benefits to Vietnam veterans suffering any of these conditions without the need to demonstrate exposure or a causal relationship.

s.23

19. An interdepartmental meeting is being organized as quickly as possible so that other potentially concerned departments can be briefed and consulted on the file. PCO officials have been contacted and will be included in this meeting. The outstanding question of non-DND civilian claims will be discussed at the meeting and as soon as we have formalized our advice on this matter in consultation with other relevant departments, we will brief you.

20. After you have approved a policy approach, we will prepare appropriate fact sheets that will be placed on the DND and VAC websites to provide background on the tests and information about health issues and Agent Orange. The fact sheets will provide

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information about where and when the tests occurred and the latest medical information related to Agent Orange. This document will be provided to VAC for their use and will be the basis for other DND communications tools.

s.21(1)(a)

21. The Department will attempt to identify all of the herbicides including their chemical compositions that were used at Gagetown and at other military sites across Canada. This study will likely take well more than a year to complete, as there are more than 50 years of files to be researched from sites all over Canada. A risk assessment will also be required as part of this study.

PUBLIC ENVIRONMENT

22. To the best of our knowledge the issue of Agent Orange spraying at CFB Gagetown first surfaced in the Canadian public domain in January 1981 through several media stories from such organizations as Canadian Press, Globe and Mail, Montreal Gazette, etc. It was raised again a few times in the intervening years primarily in New Brunswick. Most recently, the issue re-emerged on May 15, 2005 when Sun Media columnist, Greg Weston, reported that Veterans Affairs Canada had awarded a disability pension to who served in Gagetown in 1966/67 and later contracted lymphocytic leukemia. Several subsequent articles from various media outlets across Canada followed Weston's story.

s.19(1)

23. Although the media queries on this issue have lessened in recent days, public interest, especially in south central New Brunswick, is still considered to be very high. Your office, the DND General Inquiries Office, and the DND/VAC Casualty Support Office continue to receive calls from veterans, CF members and civilians asking for information or seeking compensation. We also have one pending media query.

s.19(1)

NB Telegraph-Journal, has spoken with a veteran, , who claims he was a flagman during the spraying. The reporter is attempting, through ATI, to confirm the man's service record. He intends to incorporate DND/CF comments in his story in the next few days. In addition, on 1 June, CBC Newsworld aired a story about Agent Orange spraying and its speculative link to the high rate of cancer in the town of Enniskillen, which is one of the closest communities to CFB Gagetown. A similar story appeared in the New Brunswick Reader in May 2003.

24. It was reported in the New Brunswick Telegraph Journal today (2 June 05), that Greg Thompson, a New Brunswick Conservative MP, is drafting legislation as a private member's bill or motion, to require the Federal Government "to compensate all victims from the spraying of Agent Orange at CFB Gagetown 40 years ago." The same article also reported that the "local New Brunswick MLA, Jody Carr, has already written to federal Defence Minister Bill Graham demanding that civilians also be assisted with their lingering health effects."

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CONCLUSION

25. There was an Access to Information request to DND pertaining to all documents relating to Agent Orange in 2004. All released files were reviewed in the preparation of this note.

26. In summary, Agent Orange was tested at CFB Gagetown on two occasions (1966 and 1967). It is not possible at this time to identify all of the individuals that were involved in the tests in 1966 and 1967. It should also be noted that since the 1950's, herbicides have been used and continue to be used at Gagetown and other Canadian bases.

27. This BN is based on factual information available as of this date. We have requested available files from Base Gagetown to corroborate the information provided. As new information becomes available, this BN will be updated.

28. The information program that is being put in place will allow concerned individuals who feel they may have been exposed to the Agent Orange tests to have the facts as we know them and allow them to make informed decisions about the best course of action.

29. There is a clear way ahead on avenues for veterans and civilian employees of DND and non-DND contract employees.

- veterans and current CF members can apply for a disability pension as a result of exposure to Agent Orange and must follow the same application and adjudication process as for any other claimed condition

- former or currently serving DND civilian employees who claim they have health problems as a result of exposure to Agent Orange during the performance of their duties, will be able to apply for compensation through the Government Employees Compensation Act which is administered by Human Resources and Social Development Canada

- civilian contractor personnel with concerns can apply through their employer's workers compensation plan

s.21(1)(a)

Prepared by: Ginger Stones, DGE, 995-0923
Responsible Group Principal: Karen Ellis, ADM(IE), 945-7545
Date prepared: 3 June 2005

7/7

Exhibit B

What Ottawa told Parliament, 22 June 2005

Veterans Affairs Canada, opening statement before the House of Commons Standing Committee on National Defence and Veterans Affairs, 22 June 2005
Released under the Access to Information Act, record A0156853

Key passages

The spraying “took place at CFB Gagetown over a seven day period in June 1966 and June 1967”, and spraying “was confined to remote parts of the base and took place over a total of 7 days”.

This was said to Parliament twelve days after the Minister’s briefing note of 10 June 2005, and four weeks after the 27 May note recording 9,365 acres sprayed with the Agent Orange mixture in 1964 (Exhibit A). The statement uses the seven-day framing to explain why the U.S. presumptive approach should not apply in Canada.

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Veterans Affairs Canada
[redacted]

Anciens Combattants Canada

Opening Statement before the

Standing Committee on National Defence and Veterans Affairs

Mr. Bryson Guptill
Veterans Affairs Canada

Anciens Combattants Canada

Veterans Affairs Canada Approach to Serving Veterans Concerned about Exposure to Agent Orange at CFB Gagetown

June 22, 2005

Please check against delivery

Comparer au discours prononcé

Canada

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Let me start by saying that Veterans Affairs Canada welcomes the opportunity to speak to you this morning about this issue. Clearly, the spraying of Agent Orange that took place at CFB Gagetown over a seven day period in June 1966 and June 1967 is of great interest to Parliamentarians, Veterans and their families, as well as other Canadians. This Committee is well aware that anything that has a potential impact on Veterans is also of great concern to the Department of Veterans Affairs. This is particularly true when the health of Veterans may be impacted.

As you know, Veterans Affairs Canada has a mandate to provide disability pensions to former and still serving Canadian Forces members who incur an illness or injury related to military service. This morning, I would like to outline what the Department is doing to respond to Veterans who believe that their health may have been compromised by exposure to Agent Orange at CFB Gagetown.

I trust that by sharing this information with Committee members that you will understand just how seriously the Department is taking this matter and, more important, what action is being taken to serve Veterans and their families.

At the outset, I would like to echo the words of my colleague from National Defence with respect to the priority that is placed on this file and to emphasize that we are working closely with DND and other departments to ensure an effective and appropriate response. We are doing everything possible within our mandate to address this issue.

More specifically, here are some details on what were are doing.

First, a special Review Team led by an experienced Pension Adjudicator and supported by a small team with expertise in adjudicating exposure-related claims has been set up. This will

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ensure that all new, incoming applications are processed as expeditiously as possible. As you know, we have been actively encouraging all current and former Canadian Forces members who think they have an illness or disability related to the test sprays at CFB Gagetown to come forward. The Department is ready to deal with these claims.

In addition, this team will review all existing cases where an unfavourable decision has been rendered. More specifically, since 2000 when the Department began keeping statistics on Agent Orange claims, we have ruled on twenty-five (25) cases. To date, three (3) disability pensions have been awarded - one in December 2000, the others in June 2004 and November 2004. Two of these cases involved exposure to Agent Orange in Vietnam. The nineteen (19) cases that have been denied, and are under the jurisdiction of the Department, are being re-examined to determine if further action is warranted. The Department is also making every effort to search our client database to identify unfavourable cases prior to 2000. Rest assured that Veterans Affairs staff are following up on the eighteen (18) cases mentioned by my colleague from DND and will be actively looking for more.

I would like to take a few minutes to tell you about the criteria that the Department will be using in the review and adjudication of claims. The normal process will be followed - that is to say the same basic pension adjudication process that is used for any other claim. We consider all published medical literature regarding the health effects of Agent Orange, including the findings from the US National Academy of Sciences Institute of Medicine (the IOM). The organization has conducted comprehensive, science-based analysis of the health effects of Agent Orange exposure and is the scientific authority used by the US in relation to these kinds of claims. Indeed, it is considered the leading expert on all defolients sprayed in Vietnam, including Agent Orange. This approach will ensure all factors are taken into consideration regarding exposure to Agent Orange and associations with various diseases and medical conditions.

One important fact that you will be quite familiar with is the fact that VAC's pension process is non-adversarial, and Veterans are afforded the benefit of the doubt. Where there is no credible

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evidence to the contrary, any doubt that arises in weighing evidence regarding a service-related illness is resolved in the applicant's favour. As you know, the Department is obliged to do this under the *Pension Act*.

I want to emphasize that VAC is committed to being fair, flexible and reasonable in reviewing these applications. Furthermore, as is the case with any pension application, should a client be dissatisfied with his or her first decision, there are processes in place for a departmental review as well as a review or appeal to the Veterans Review and Appeal Board.

I know this is a simple overview. I am prepared to answer your questions if you want to know more about our pension processes.

I understand that the Committee has expressed interest in hearing how the American approach of "presumptive rulings" compares to the approach that is being taken in Canada. There are two important aspects to consider. In Canada, after determining that there is a disability, VAC's pension adjudicators must answer two other questions: 1) was the applicant exposed to Agent Orange/Agent Purple in the course of military service and 2) if so, is the illness or disability linked to that exposure. With respect to the first question, the US presumes that all Vietnam veterans were exposed to Agent Orange or other herbicides. This means that individual veterans are not required to ~~prove~~ show exposure given the widespread use of herbicides in Vietnam.

It is critical to bear in mind that the scope and magnitude of Agent Orange exposure in Canada when compared to the US. Between 1961 and 1971, the US military sprayed more than 72 million litres of Agent Orange and similar agents for defoliation and crop destruction. The most widely used herbicide was Agent Orange. Millions of acres were sprayed.

7 Gagetown
83 acres

This is a very different scenario than we are dealing with at CFB Gagetown. DND has reported that spraying was confined to remote parts of the base and took place over a total of 7 days (3 in June 1966 and 4 in June 1967). In addition, reports suggest there were a limited number of

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people on the ground during the 1966 test. These are very important considerations when seeking to compare the US response following the Vietnam War to the approach we have taken in Canada. This does not mean that some Canadian Forces members were not affected; they were and we are doing ~~something about~~ it.

policy appropriate action

In Canada , exposure must be demonstrated based on the evidence presented. Adjudicators do have flexibility in determining what form this evidence can take. In this way, our "benefit of the doubt" provisions are similar to the US presumptive rulings.

With respect to answering the second question on whether the disability is linked to the exposure, we apply the same ~~scientific~~ evidence as the Americans. In the United States, exposure or presumption of exposure to Agent Orange does not qualify Vietnam veterans for disability pensions. Similar to Canada, payments are based on disabilities. In fact, many Vietnam veterans who were exposed to Agent Orange have no serious medical problems, while others have disabilities that are clearly unrelated to their military service.

As I stated earlier, the findings of the National Academy of Sciences IOM are also considered by Veterans Affairs Canada in the adjudication of pension applications concerning exposure to Agent Orange. We are applying the same interpretation to illness associated with exposure to Agent Orange/Agent Purple as the US VA.

On the communications front, we are assisting DND in carrying out an outreach to our veterans to encourage any member who believes that they suffer a service-related disability as a result of exposures to make themselves known to us. Our priority has been to make sure that Veterans know they can contact the department if they think they have an illness that is related to this exposure and that we are ready to accept disability pension applications.

We have a notice on our website and in the upcoming edition of *Salute!* our client newsletter with a readership of over 250,000, urging them to come forward. We have received more than

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350 inquiries through our National Client Contact Network. Staff responding to callers have been able to provide valuable information, including information on our disability pension application process.

The VAC- DND Centre is also receiving calls, to the point where we have provided additional resources to assist their staff in responding to inquiries. So we are already seeing some success in these efforts. New pension applications are also starting to come in - approximately 120 have already been received and we've been contacted by Veterans whose claims pre-date 2000.

In closing, I want to stress the department's commitment to Canada's Veterans and their families. VAC will continue to make this matter a priority and to encourage any Veterans who think they have an illness that is related to exposure to Agent Orange, or any aspect of their service, to contact the department and apply for a disability pension.

Thank you.

Exhibit C

The official spray history was compiled in a weekend — and it misses 1959

Memorandum 7600-2 (CE), February 1981, “Second Growth Control CFB Gagetown 1956 to 1975”

Released under the Access to Information Act (A-2004-00207), record A0090122

DND (Army) specification, Job G5607, “Brush Control”, CFB Gagetown, 16 July 1959

Released under the Access to Information Act, record A0098394

Key passages

The 1981 memo is the base document behind later official spray histories. It states it was compiled “from three separate source documents” and that “a thorough review of this material has not been possible.” It lists 1959 as “Nil”.

Yet the 16 July 1959 contract specification (Job G5607) provides for “the placing of a railroad tank car containing herbicide” on a DND siding at Gagetown.

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COPY

MEMORANDUM

7600-2 (CE)

08 Feb 81

Requirements Officer

SECOND GROWTH CONTROL
CFB GAGETOWN 1956 TO 1975

1. Annex A details the quantities of herbicide and the areas treated for the period Aug 1956 to Aug 1975. This information has been compiled from three separate source documents contained in CE Coy Property Records.

2. Tasking to prepare this report was received at 1500 hrs, 06 Feb 81 with submission by 1200 hrs, 09 Feb 81. Due to this restriction of time, a thorough review of this material has not been possible.

3. This report should be read in conjunction with map MCE 24, Edition 11 TR 79, dated 1979.

D.S. Fisher
Capt
Acting Engineering Officer

Enclosures: 2

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YEAR		AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1956	1.	Area 32 and west to easting 98 in Area 31.	3687	Aerial Spray/Fixed Using	24 oz 2,4D and 2,4.5 T mix per acre	4 km to Enniskillen Station
1957	1.	Hersey Impact extending north into demolition area only of Area 6	3149	Aerial Spray/Fixed Using	24 oz 2,4D and 2,4.5 T mix per acre	5 km to Upper Gagetown
1958	1.	Greenfield Impact including ICM Impact to Northing 78 in Area 5	4469	Aerial Spray/Fixed Using	32 oz 2,4.5 T Mix per acre	4 km to Burton Station; 5 km to Burpees' Corner
	2.	Argus Impact extending Northwest including sentry posts #3 and #2	2639	Aerial Spray/Fixed Using	32 oz 2,4.5 T Mix per acre	4 km to Haneytown
	3.	Lawfield OP including sentry posts #13, 14 & 15 extending northwest to Boundary of Lawfield Impact	500 out of 1661	Aerial Spray/Fixed Using	32 oz 2,4.5 T Mix per acre	7 km to Pleasant Villa
	4.	NBCW and Assault Grenade Ranges	245	Ground Spray	Ammate	4 km to Geary
	5.	Proposed Sniper Range (Sentry Post =18)	165	Ground Spray	Ammate	2 km to Geary
1959		Nil	Nil	Nil	Nil	Nil
1960	1.	Area Bounded: N: Camp Argonaut S: Heliport E: Lindsay Brook W: Town Limit Line	509	Aerial Spray/Fixed Using	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	1 km to Burton Station
	2.	Area 4	1617	Aerial Spray/Fixed Using	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	2 km to Haneytown

YEAR		AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1960 (cont'd)	3.	Hersey Impact extending north into demolition area only of Area 6	3149	Aerial Spray/Fixed Using	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	5 km to Upper Gagetown
	4.	Area 32 and west to Easting 98 in Area 31	3687	Aerial Spray/Fixed Using	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	4 km to Enniskillen Station
	5.	NBCW and Assault Grenade Ranges	245	Ground Spray	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	4 km to Geary
	6.	Proposed Sniper Range	165	Ground Spray	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	2 km to Geary
	7.	Wellington Rocket Launching Range	236	Ground Spray	32 oz 2,4.5 T in Mix 20% fuel oil 80% water 3.5 gal/acre	7 km to Haneytown
196[illegible]	1.	Area 5 North of Northing 78	[illegible]1	Aerial Spray/Fixed Using	40 oz 2,4.5 T in Mix 20% fuel oil 80% water 4 gal/acre	5 km to Burton Station
	2.	Area 5 Bounded N: Northing 80 S: Northing 78 E: Casting 06 W: Casting 04	[illegible]104	Aerial Spray Fixed Using	40 oz 2,4.5 T in Mix 20% fuel oil 80% water 4 gal/acre	7 km to Forbes's Corner
	3.	Canfield Target	[illegible]51	Aerial Spray Fixed Using	40 oz 2,4.5 T in Mix 20% fuel oil 80% water 4 gal/acre	6 km to Mail Road

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YEAR	AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1962	Nil	Nil	Nil	Nil	Nil
1963	1. Area 4	1017	Aerial Spray/Fixed Using	40 oz 2,4.0 and 40 oz 2,4.5 T in one gal fuel oil at 5 gal/acre	2 km to Haneytown
	2. Argus Impact extending NW including sentry posts 2 and 3	2639	Aerial Spray/Fixed Using	40 oz 2,4.0 and 40 oz 2,4.5 T in one gal fuel oil at 5 gal/acre	4 km to Haneytown
	3. Lawfield OP including sentry posts 13, 14, 15 extending NW to boundary of Lawfield Impact	500 out of 1661	Aerial Spray/Fixed Using	40 oz 2,4.0 and 40 oz 2,4.5 T in one gal fuel oil at 5 gal/acre	7 km to Pleasant Villa
	4. Hersey Impact extending North into Demolition Area only of Area 6	3149	Aerial Spray/Fixed Using	40 oz 2,4.0 and 40 oz 2,4.5 T in one gal fuel oil at 5 gal/acre	6 km to Upper Sagetown
	5. Lawfield Impact	1951	Aerial Spray/Fixed Using	40 oz 2,4.0 and 40 oz 2,4.5 T in one gal fuel oil at 5 gal/acre	6 km to Mill Road
1964	1. Area Bounded N: Camp Argonaut S: Heliport E: Town Limit Line W: Lindsay Brook	508	Aerial Spray/Fixed Using	40 oz 2,4.0 40 oz 2,4.5 T in 1 gal oil, 5 gal/acre	1 km to Burton Station
	2. Area 2 and Area 1 East of Shanks Road	1437	Aerial Spray/Fixed Using	40 oz 2,4.0 40 oz 2,4.5 T in 1 gal oil, 5 gal/acre	Adjacent to Burton Station
	3. Area 5 North of Northing 78	1017	Aerial Spray/Fixed Using	40 oz 2,4.0 40 oz 2,4.5 T in 1 gal oil, 5 gal/acre	5 km to Burton Station
	4. Greenfield Impact including ICM Impact extending North into Area 5 to Northing 78	4469	Aerial Spray/Fixed Using	40 oz 2,4.0 40 oz 2,4.5 T in 1 gal oil, 5 gal/acre	4 km to Burton Station 5 km to Burpee's Corner

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YEAR		AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1964 (cont'd)	5.	Area 5 Bounded: N: Northing 78 S: Northing 75 E: Easting 06 W: Easting 04	1024	Aerial Spray/Fixed Using	40 oz 2,4.0 40 oz 2,4.5 T in 1 gal oil, 5 gal/acre	7 km to Burpee's Corner
	6.	Lawfield OP including sentry posts 13, 14 & 15 extending Northwest to boundary of Lawfield Impact	500 out of 1661	Aerial Spray/Fixed Using	40 oz 2,4.0 40 oz 2,4.5 T in 1 gal oil, 5 gal/acre	7 km to Pleasant Villa
1965	1.	Argus Impact extending NW including sentry posts 2 & 3	1559 out of 2639	Aerial Spray/Fixed Using	Torden 101R with thickening agent 1 gal product to 10 gal water per acre	4 km to Haneytown
	2.	Hersey Impact extending North into demolition area of Area 6	3149	Aerial Spray/Fixed Using	Torden 101R with thickening agent 1 gal product to 10 gal water per acre	5 km to Upper Gagetown
1966	1.	Greenfield Impact including ICM Impact extending North into Area 5 of Northing 78	4469	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	4 km to Burton Station 5 km to Burpee's Corner
	2.	Area 6 Bounded N: Northing 76 S: Northing 75 E: Easting 06 W: Easting 04	1114	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	7 km to Burpee's Corner
	3.	Lawfield Impact	1081	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	6 km to Mill Pond

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YEAR		AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1967	1.	Area 5 North of Northing 78	1817	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	5 km to Burton Station
	2.	Argus Impact extending NW including sentry posts 2 and 3	1080 out of 2639	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	4 km to Haneytown
	3.	Lawfield OP including sentry posts 13, 14, 15 extending NW to boundary of Lawfield Impact	1661	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	7 km to Pleasant Villa
	4.	Area 28, 29, 37	2000 out of 10,883 (various parcels of original farmland)	Aerial Spray Helicopter	1.0 gal 2,4D in 2 gal oil and 7 gals water - applied at 5 gal/acre	8 km to Central Hampstead
	5.	Wellington Rocket Launching Range	438	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	7 km to Hampstead
	6.	Area 32 and West to Easting 98 in Area 31	3012 out of 3687	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	4 km to Enniskillen Station
1968	1.	Area Bounded by N: Northing 81 S: Northing 79 E: Easting 01 W: Easting 00	604	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	1 km to Burton Station
	2.	Areas 28, 29 and Area 37 South of Northing 78	3000	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	7 km to Central Hampstead

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YEAR		AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1969	1.	Area 3 bounded on NW by Allen Brook	355	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	Adjacent to Upper Gagetown
	2.	Area 37 NW of Hampstead Rd; Area 28 west of MacKenzie Rd: Area 27 and 36 NW of Lawfield Road	3355	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	14 km to Hampstead
1970	1.	Argus Impact	1550	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	7 km to Geary
	2.	Hersey Impact	3149	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	5 km to Upper Gagetown
	3.	Area Bounded by: N: Northing 65 S: Northing 62 E: Easting 15 W: Easting 13	936	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	6 km to Pleasant Ville
	4.	Proposed Sniper Range (SP 18)	166	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	2 km to Geary
	5.	NBCW and Assault Grenade Ranges	245	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	2 km to Geary
	6.	Var Training Areas & SP's 45, 58, [illegible] & SP 069563. Camp Petersville; Bridges - pd .. Mem .. .. s. Crozier, Scout Camp; Pears Bivouac	3215	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	Various distances ranging from [illegible] to 10 km to Petersville

YEAR		AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1971	1.	Greenfield Impact including ICM Impact extending North into Area 5 to Northing 78	4469	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water; 10 gals/acre	4 km to Burton Station 5 km to Burpee's Corner
	2.	Lawfield Impact	2348	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	6 km to Mill Pond
	3.	Area 29 South of Hampstead Rd	2808	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	7 km to Hampstead
1972	1.	Area 1 and 2	1407	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	Adjacent to Burton Station
	2.	Area 5 north of Northing 78	1817	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water	5 km to Burton Station
	3.	In Area 6, 1 km North of SP 10 centered on airstrip No. 1	872	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	1 km to Howat Creek
	4.	In Area 7, centered on airstrip No. 2	291	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	2 km to Waterloo Station
	5.	In Area 7, centered on airstrip No. 3	872	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	1 km to Mill Road
	6.	Area 17	[illegible]	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	2 km to Pleasant Valley

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YEAR		AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1972 (cont'd)	7.	Argus Impact extending North Including SP's 2 and 3	1080	Aerial Spray Helicopter	Torden 10K pellet applied @ 30 lbs/acre	4 km to Haneytown
	8.	Wellington RL Range	255	Aerial Spray Helicopter	Torden 10K pellet applied @ 30 lbs/acre	4 km to Haneytown
1973	1.	Area 3 bounded on NW by Allen Brook	253	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	Adjacent to Upper Gagetown
	2.	Area 28, 29 and area 17 South of Northing 59	5000	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	7 km to Central Hampstead
	3.	Area 32 and West to Easting 98 in Area 31	3309 out of 3687	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	4 km to Enniskillen Station
1974	1.	Area 4	789	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	2 km to Haneytown
	2.	Area 37 NW of Hampstead Rd; Area 28 west of Mackenzie Rd; Area 27 and 36 NW to Lawfield Rd.	3359	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	14 km to Hampstead
	3.	Hersey Impact	4149	Aerial Spray Helicopter	Torden 10K pellet 30 lb/acre	6 km to Upper Gagetown

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YEAR	AREA	ACREAGE	APPLICATION METHOD	CHEMICAL	NEAREST COMMUNITY
1975	1. Area Bounded by: N: Camp Argonaut S: Heliport E: Town Limit Line W: Lindsay Brook	508	Aerial Spray Helicopter	Torden 10K Pellet 30 lbs/acre	1 km to Burton Station
	2. Area 5 North of Northing 78	1817	Aerial Spray Helicopter	Torden 10K Pellet 30 lbs/acre	5 km to Burton Station
	3. Garfield Impact including ICM Impact extending North into Area 5 to Northing 78	4469	Aerial Spray Helicopter	Torden 10K Pellet 30 lbs/acre	4 km to Burton Station 5 km to Burpee's Corner
	4. Argus Impact	1550	Aerial Spray Helicopter	Torden 10K Pellet 30 lbs/acre	7 km to Geary
	5. Proposed Sniper Range	165	Aerial Spray Helicopter	Torden 10K Pellet 30 lbs/acre	2 km to Geary

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INFORMATION CHART. BRUSH CONTROL. VARIOUS TRAINING AREAS. C. F. B. GAGETOWN N.B. Sheet 1 of 2

IGNATION of AREAS	Acreage (net)	Year of application. 1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Remarks
		Method of application.											
Indivi... Minor Tactical Training Area No. 1	497	-	-	'H/L'	-	-	-						
" " " " " " " 2	496	-	-	'H/L'	-	-	-						
" " " " " " " 3	414	-	-	'H/L'	-	-	-						
" " " " " " " 4	684	-	-	-	-	-	-						
" " " " " " " 5	508	-	-	-	-	-	'H/P'						extra 1975
Tank Driving Area	789	-	-	-	-	'H/L'	-						
Tank Driving & Manoeuvre Area - North	1,817	-	-	'H/L'	-	-	'H/P'						extra 1975
Tank Driving & Manoeuvre Area - South	4,469	-	'H/L'	-	-	-	'H/P'						
Tank Battle Range	1,024	-	-	'H/L'	-	-	-						
Tank Formal Range - North	1,080	-	-	'H/P'	-	-	-						
Ta... Formal Range - South	1,550	'H/L'	-	-	-	-	'H/P'						
Light Mortar Range	255	-	-	'H/P'	-	-	-						
Artillery Gun Area No. 1	271	-	-	'H/L'	-	-	-						
" " " " 2	355	-	-	-	'H/L'	-	-						
" " " " 3	291	-	-	'H/L'	-	-	-						
" " " " 4	370	-	-	'H/L'	-	-	-						
" " " " 5	1,164	-	-	-	-	-	-						
Artillery Target Area - Hersey	3,149	'H/L'	-	-	-	'H/P'	-						
" " " - Lawfield	2,348	-	'H/L'	-	-	-	-						
Unit Training Area No. 1 - North	926	'H/L'	-	-	-	-	-						
" " " " 1 - South	1,829	-	-	'H/L'	-	-	-						
" " " " 2	3,204	-	-	'H/L'	-	-	-						
" " " " 3	5,000	-	-	-	'H/L'	-	-						
" " " " 4	3,355	-	-	-	-	'H/L'	-						
" " " " 5	2,808	-	'H/L'	-	-	-	-						
Rocket Launcher Range	165	'H/L'	-	-	-	-	'H/P'						extra 1975
N... W Range	245	'H/L'	-	-	-	-	-						
Demolition & Mining Area	3,309	-	-	-	'H/L'	-	-						
Sub Unit Training Area No. 1 (Original Farmland)	113	'H/L'	-	-	-	-	-						
" " " " " 2 " "	114	'H/L'	-	-	-	-	-						
" " " " " 3 " "	148	'H/L'	-	-	-	-	-						
" " " " " 4 " "	176	'H/L'	-	-	-	-	-						
" " " " " 5 " "	430	'H/L'	-	-	-	-	-						
" " " " " 6 " "	251	'H/L'	-	-	-	-	-						
" " " " " 7 " "	157	'H/L'	-	-	-	-	-						
" " " " " 8 " "	139	'H/L'	-	-	-	-	-						
" " " " " 9 " "	166	'H/L'	-	-	-	-	-						
" " " " " 10 " "	139	'H/L'	-	-	-	-	-						
" " " " " 11 " "	58	'H/L'	-	-	-	-	-						
" " " " " 12 " "	246	'H/L'	-	-	-	-	-						
" " " " " 13 " "	448	'H/L'	-	-	-	-	-						
" " " " " 14 " "	630	'H/L'	-	-	-	-	-						

CODING: - 'H/L' = Helicopter Aircraft Spray Treatment with Liquid Herbicide. 'H/P' = Helicopter Aircraft Spray Treatment with Pellet Herbicide.

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INFORMATION CHART. BRUSH CONTROL. VARIOUS TRAINING AREAS. C. F. B. GAGETOWN N.B.

Summary Sheet.

	Year of application.																					
TOTAL VALUE OF CONTRACTS:	1970		1971		1972		1973		1974		1975		1976		1977		1978		1979		1980	
	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢
Helicopter Treatment 'L'	222,850	50	276,718	75	355,388	39	257,500	00	249,681	50	257,613	20										
" " 'P'																						
Totals:	222,850	50	276,718	75	355,388	39	257,500	00	249,681	50	257,613	20										
AVERAGE COST PER ACRE:																						
Helicopter Treatment 'L'	27	25	28	75	30	03	29	65	39	50												
" " 'P'					37	00			30	50	42	80										
HERBICIDE USED (i)	'T-101'		'T-101'		'T-101' 'T-10K'		'T-101'		'T/101' 'T-10K'		'T-10K'											
(ii)																						
(iii)																						

CODINGS: - Line... ... (i) 'T-101' = 1.6 gals Tordon 101 in 8.4 gals of Water applied @ 10 gals per acre. 'T-10K' = Pellets applied @ 30# per acre.
Line... ... (ii)
Line... ... (iii)

REMARKS - GENERAL.

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SECOND GROWTH CONTROL — TRAINING AREAS — INFORMATION CHART — CFB GAGETOWN N.B.

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Designation of Area	Acreage (net)	Year of application. 1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	Remarks.
		Method of application.											
Individual & Minor Tactical Training Area No. 1	497	-	-	-	-	'M'	-	-	'H'	-			
" " " " " " " 2	496	-	-	-	-	'M'	-	-	'H'	-			
" " " " " " " 3	414	-	-	-	-	'M'	-	-	'H'	-			
" " " " " " " 4	684	-	-	-	'H'	'C & G'	-	-	-	-			
" " " " " " " 5	508	-	-	-	-	'M'	-	-	-	-			
Tank Driving Area	~~1,017~~	-	-	-	-	'M'	-	-	-	-			
Tank Driving & Manoeuvre Area - North	1,817	-	-	'H'	-	-	-	-	'H'	-			
Tank Driving & Manoeuvre Area - South	4,469	-	'H'	-	-	-	-	'H'	-	-			
Tank Battle Range	1,024	-	'H'	-	-	-	-	-	'H'	-			
Tank Formal Range - North	1,080	-	-	'H'	-	-	-	-	Pellets	-			T-10K PELLETS
Ta Formal Range - South	1,550	'H'	-	-	-	-	'H'	-	-	-			PELLETS
Light Mortar Range	~~855~~	-	-	'H'	-	-	-	-	Pellets	-			Acres changed 8/02/7
Artillery Gun Area No. 1	271	-	-	'M'	'M'	-	-	-	'H'	-			
" " " " 2	355	-	-	'M'	'M'	'H'	-	-	-	'H'			
" " " " 3	291	-	-	'M'	'M'	-	-	-	'H'	-			
" " " " 4	370	-	-	'M'	'C & G'	-	-	-	'H'	-			
" " " " 5	1,164	-	-	'H'	'M'	-	-	-	-	-			
Artillery Target Area - Hersey	3,149	'H'	-	-	-	-	'H'	-	-	-			
" " " - Lawfield	2,348	-	'H'	-	-	-	-	'H'	-	-			
Unit Training Area No. 1 - North	926	-	'C & G'	-	-	-	'H'	-	-	-			
" " " " 1 - South	1,829	-	'C & G'	-	-	-	-	-	'H'	-			
" " " " 2	3,204	-	-	'C & G'	-	-	-	-	'H'	-			
" " " " 3	5,000	-	-	-	'H'	-	-	-	-	'H'			
" " " " 4	3,355	-	-	-	-	'H'	-	-	-	-			
" " " " 5	2,808	-	-	'H'	-	-	-	'H'	-	-			
Rocket Launcher Range	165	-	-	-	-	-	'H'	-	-	-			
N P D Warfare Range	245	-	-	-	-	-	'H'	-	-	-			
Demolition/Mine Area	3,309	-	-	'H'	-	-	-	-	-	'H'			
Sub Unit Training Area No. 1 (Original Farms)	113	-	-	-	-	-	'H'	-	-	-			'1970 Contract' Spot Spraying as necessary over all 14 S.U.T.A's. resulting in 2,143 acres sprayed, out of a total of 3245 acres, all area
" " " " " 2 " "	144	-	-	-	-	-	'H'	-	-	-			
" " " " " 3 " "	148	-	-	-	-	-	'H'	-	-	-			
" " " " " 4 " "	176	-	-	-	-	-	'H'	-	-	-			
" " " " " 5 " "	430	-	-	-	-	-	'H'	-	-	-			
" " " " " 6 " "	251	-	-	-	-	-	'H'	-	-	-			
" " " " " 7 " "	157	-	-	-	-	-	'H'	-	-	-			
" " " " " 8 " "	139	-	-	-	-	-	'H'	-	-	-			
" " " " " 9 " "	166	-	-	-	-	-	'H'	-	-	-			
" " " " " 10 " "	139	-	-	-	-	-	'H'	-	-	-			
" " " " " 11 " "	58	-	-	-	-	-	'H'	-	-	-			
" " " " " 12 " "	246	-	-	-	-	-	'H'	-	-	-			
" " " " " 13 " "	448	-	-	-	-	-	'H'	-	-	-			
" " " " " 14 " "	630	-	-	-	-	-	'H'	-	-	-			

CODING: 'A' = Fixed Wing Aircraft Spray Treatment. 'C & G' = Cleared and Grubbed by Civil Contract. 'G' = Ground Spray Treatment. 'H' = Helicopter Aircraft Spray Tmnt
'M' = Mechanical Clearing. 'S' = Sterilization.

SECOND GROWTH CONTROL — TRAINING AREAS — INFORMATION CHART — CFB GAGETOWN N.B.

S U M M A R Y — S H E E T

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	Year of application.																					
	1965		1966		1967		1968		1969		1970		1971		1972		1973		1974		1975	
TOTAL VALUE OF CONTRACTS:	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢	$	¢
Air Spray	98,370	48	207,220	70	258,042	20	168,497	00	100,188	50	222,850	50	276,718	75	355,388	39	257,500	00				
Ground Spray																						
Clearing and Grubbing							40,825	00	69,300	00												
Mechanical Clearing							70,616	00														
Total	98,370	48	207,220	70	258,042	20	279,938	00	169,488	50	222,850	50	276,718	75	355,388	39	257,500	00				
AVERAGE COST PER ACRE:						29	64			28	58					30	03					
Air Spray	21	32	26	55	# 12	11	29	54	** 12	12	27	25	28	75	*** 37	00	29	65				
Ground Spray			* 19	05																		
Clearing and Grubbing							115	00	100	00												
Mechanical Clearing							30	00	30	00												
HERBICIDE USED (i)	'T-101R'		'T-101'		'T-101'		'T-101'		'T-101'		'T-101'		'T-101'		'T-101' 'T-10K'		'T-101'					
RESULT (ii)					'G'																	
GUARANTEE (iii)	'90K'		'90K'		'90K'		'90K'		'90K'		'90K'		'90K'									

C O D I N G S ; - Line (i) 'T-101R' = 'Tordon' 101R with thickening agent: One (1) gal: of the Product in Ten (10) gals: of Water per acre.

'T-101' = One decimal Six (1.6) gals: 'Tordon' 101 in Eight decimal Four (8.4) gals: of Water, applied at Ten (10) gals: per acre.

T-10K=PELLETS applied at the rate of 30 lbs per acres

Line (ii) 'G' = Good. 'F' = Fair. 'P' = Poor.

Line (iii) '90K' = Ninety per cent (90%) Kill in Twelve (12) months of the area to be re-treated at the Contractors' expense.

* = Cost per acre of 'Road-side' Ground Spray for a total of 590 acres.

\# = Cost per acre of Helicopter Aircraft Spray with Herbicide over 2,000 acres,

** = Cost per acre of Helicopter Spray with 2,4-D on A.G.A. No.2 (Application: One (1) Imperial (gallon 2,4-D; 2 gals Oil; (7 gals Water; per acre.

*** = Cost per acre of Helicopter Granular Spray with T-10K PELLETS

s.15(1)

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DE. IMENT OF NATIONAL DEFENCE (ARM.

RECEIVED
AUG 6 1959
B WKS. COY.
R.C.E.

Specifications

BRUSH CONTROL (SECOND GROUND SPRAY)

VARIOUS AREAS, CAMP GAGETOWN, N B

Job No G5607

16 Jul 59

Section No 1

GENERAL CONTRACT WORK

1.1 GENERAL CONDITIONS

The General Conditions of the Contract and the Labour Conditions are a part of these Specifications and shall apply to and govern the work included in this contract.

1.2 SPECIFICATIONS AND DRAWINGS

(a) The Contractor shall instruct all Trades to read Section No 1. The following Sections are included in these Specifications:

Section No.	Title	Clause Nos.
1	General Contract Work	1.1 - 1.22
2	Ground Spraying	2.1 - 2.12

(b) The following drawing is complementary to these specifications:

Drawing No.	Title	Dated
G-24-GSP-6-6	Camp Gagetown	22 Jan 57

1.3 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS

(a) Words, phrases and abbreviations that have a well-known technical or trade meaning shall have that meaning in these specifications and drawings.

(b) The drawings and specifications are complementary and what is called for by either shall be as binding as if called for by both. The Contractor shall not take advantage, to the detriment of the Crown's interest, of any manifestly unintentional errors or omissions should such exist. Where the quality of Workmanship or materials is not specifically stated, the best quality known to the trade shall be provided.

(c) Where Clauses entitled "Work Included" or "Scope of Work" appear in any Section of these Specifications, it shall be understood by the Contractor that the items listed thereunder are not to be interpreted as representing a summary of all labour and materials required under the Section concerned. The purpose of such Clauses is to serve merely as an index, not necessarily comprehensive, to the general contents of the Section for the convenience of those reading the Specifications. No claim for payment, additional to the original contract sum, based upon the fact that an item is not included under such Clauses will be allowed, provided that such item is specified in one or more of the subsequent Clauses of the Section.

1.4 WORK INCLUDED

The Contractor shall provide all labour, materials, equipment and supervision necessary to complete the work of all Trades as shown or described by, or reasonably inferable from the specifications and drawings including the following:

...../2

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GENERAL CONTRACT WORK

1.4 WORK INCLUDED (CONT'D)

(a) Co-ordination of the work of all trades.

(b) Preliminary examination of the site.

(c) General Protection.

(d) Insurance.

(e) Responsibility for spray damage to non-DND property.

(f) Guarantee.

(g) Temporary roads, structures, and services.

(h) Damage to existing facilities by Contractor.

(j) Enforcement of regulations.

(h) Keep specifications and drawings on the job.

(l) Control of debris and final clean-up.

(m) Unit prices.

(n) Written report of herbicides, concentrations and dates of application.

1.5 CO-ORDINATION OF THE WORK

(a) The Contractor shall be responsible for the co-ordination of the work of all Trades to the end that the combined work shall produce a first-class result, without delays.

(b) The Contractor shall expedite the ordering and delivery of all materials and equipment required. No claims will be allowed for delays or additional expenses resulting from failure to place orders in ample time.

1.6 DEFINITION OF "ENGINEER"

"Engineer" shall mean the Chief Engineer of DCL or any person or corporation acting for or on behalf of the said Chief Engineer, including the Director of Works, Department of National Defence (Army) or any other persons appointed by the President of DCL to supersede such persons either temporarily or for the duration of the contract.

1.7 EXAMINATION OF THE SITE

Before submitting a tender the Contractor shall visit the site of the project and acquaint himself with all ascertainable conditions that might affect his work, and shall consult the Engineer regarding services available, the location and use of railroad sidings, and the limitations on access to portions of the training area which will be imposed when training exercises are being carried out.

1.8 GENERAL PROTECTION

The Contractor shall provide adequate protection at all times against possible accidents to workmen or other persons, by means of fences, railings, lights, warning signs, and other suitable precautions.

1.9 QUALIFICATIONS OF CONTRACTOR

Contractor tendering for this contract shall have been engaged in commercial weed and brush control for the past two years or more.

...../3

Franklin submission to the Maine Gagetown Harmful Chemical Study Commission, 23 Oct 2020 – page 51 of 61

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GENERAL CONTRACT WORK

1.10 RESPONSIBILITY FOR SPRAY DAMAGE

The Contractor shall be responsible for any damage to non-DND property caused by the drift of chemicals or the inadvertent spraying of areas not included in this contract.

1.11 GUARANTEE

The Contractor shall guarantee all materials and workmanship embodied in this contract for a period of one growing season after the initial spray application is made. He shall make good any defects arising during that period at his own expense.

1.12 USE OF PREMISES

The Contractor shall confine his equipment, materials and the operations of his workmen to limits indicated by law, ordinances and the directions given by the Engineer.

1.13 USE OF DND FACILITIES

(a) Water

(1) The water required for this contract will be made available without charge to the Contractor from the DND water system in the area. The points in the distribution system at which water may be obtained or connections may be made, will be indicated by the Engineer.

(2) The costs of making connections, supplying and laying temporary pipe and hose lines, and other work necessary to conduct water to the site of the work, shall be borne by the Contractor. All connected lines and appurtenances must meet the approval of the Engineer.

(b) Railroad Siding

The Contractor shall be permitted the free use of a DND railroad siding for the placing of a railroad tank car containing herbicide.

1.14 TEMPORARY ROADS, STRUCTURES AND SERVICES

Except as stated in Clause 1-13, the Contractor shall provide at his own expense, all the temporary roads, structures, and services which he requires for the carrying out of this contract. These facilities shall be located where directed by the Engineer, and shall be removed from the site by the Contractor on completion of the work.

1.15 REGULATIONS

The Contractor shall acquaint himself with, and abide by, such fire, security and safety regulations as may be laid down by DND and the Department of Northern Affairs and National Resources, Forestry Branch.

1.16 DAMAGE TO EXISTING FACILITIES BY THE CONTRACTOR

(a) The Contractor shall take all necessary precautions to protect and prevent damage to any structures, new buildings, new construction, utilities above or below ground and all surrounding property and installations from any cause whatsoever all existing facilities and services. In the event of loss, damage, and/or interruption of facilities the Contractor shall immediately comply with the relevant terms, conditions and procedures set out in Clauses 22 and 24, Construction Conditions DCL-32, to the complete satisfaction of the Engineer.

...../4

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GENERAL CONTRACT WORK

1.16 DAMAGE TO EXISTING FACILITIES BY THE CONTRACTOR (CONT'D)

(b) In the event that the Contractor fails or is unable to immediately effect repairs, replacement or put an end to the interruption, the Engineer may, in his sole discretion, authorize that part of the work to be done by persons other than the Contractor and the cost of such work shall be deducted from the amount due or to become due to the Contractor under the terms of the contract.

(c) Repairs, replacement or temporary connections made by the Contractor or other persons shall be made according to the original plans and specifications pertaining to the damaged or affected parts or according to the instruction of the Engineer.

1.17 DRAWINGS AND SPECIFICATIONS OF THE JOB

The Contractor shall keep in good order on the job, one complete set of all drawings and specifications, available to sub-contractors and the Engineer.

1.18 CONTROL OF DEBRIS AND FINAL CLEAN-UP

The Contractor shall keep the site free from accumulations of general rubbish, and on completion of the contract, shall remove all his rubbish and surplus materials from the site.

1.19 BASIS OF BIDDING

Unit price bids shall be made for all items involved in the contract, as outlined in Clause 1.21, Schedule of Prices. All prices tendered shall be deemed to be for complete installations, and to include all such sums as the contractor considers necessary for expenses and profit for the completion of the work required to fulfill these specifications. The estimated quantities given are not guaranteed. They are given for the purpose of comparing bids, and as a basis for calculating the value of any additional work which may be authorized, or work which may be omitted from this project.

1.20 BASIS OF PAYMENT

The Basis of Payment under this Contract will be the actual amount of work done, as measured on the site by the Engineer. The Contractor shall make no claim for loss, damages, anticipated profits, or otherwise, on account of any difference which may be found between the quantities of work actually done under this Contract, and the DND estimated quantities.

1.21 SCHEDULE OF PRICES

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL
1.	Spraying Light Mortar Range -	260	Acres		
2.	Spraying Rocket Launcher Range -	165	Acres		
3.	Spraying ABCD Warfare Range -	240	Acres		
4.	Spraying Roadside	195	Acres		
5.	Spraying Boundary	72	Acres		

...../5

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GENERAL CONTRACT WORK

1.22 APPROVAL OF MATERIALS

The contractor, in tendering shall base his price on the original specifications and addenda thereto, and shall not allow in his tender for substitution of materials which have been or may be approved by the Inter-Service Equivalents Board (Construction)

(a) Equivalents

Where in the specifications any product, equipment or method is specified, whether or not provision is made for the use of an "equal" product, an equivalent product, equipment or method may be employed provided the Inter-Service Equivalents Board (Construction) shall have issued to the supplier a certificate authorizing its use as an equivalent. An approved Equivalent will be considered to have, after tenders have closed, the same status, as if it had been originally specified in the Specifications or Drawings. No extra cost will be allowed for approved equivalents.

(b) Acceptable Alternatives

Where the Owner is prepared to permit the use of a product, equipment or method as an "Acceptable Alternative" to any product, equipment or method specified, such acceptable alternative may be employed provided the Inter-Service Equivalents Board (Construction) shall have issued to the Supplier a certificate authorizing its use as an "Acceptable Alternative," this Certificate becoming valid only after price adjustment has been negotiated and a suitable credit approved by the Engineer.

(c) Address

Manufacturers or Suppliers seeking a Certificate of Approval shall apply to:

Executive Secretary,
Inter-Service Equivalents Board (Construction),
Department of National Defence,
Building No 18,
Victoria Island, Ottawa, Ontario

(d) Data Required

All submission shall be accompanied by sufficient data on the proposed product including the following:

(1) Delivery.

(2) Country of manufacture.

(3) Specifications of product being offered as alternative.

(4) Test passed (Test Reports by recognized and acceptable Canadian, British or American Testing Agencies) will be considered.

(5) Specific project (ie, building and location on which product will be used. If several buildings each must be listed).

(6) Governing section and paragraph number of Specification.

(7) Specified material, method or equipment for which the proposed product is offered for approval.

SIX COPIES OF THE ABOVE INFORMATION IS TO BE PROVIDED

...../6

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GENERAL CONTRACT WORK

1.22 APPROVAL OF MATERIALS (CONT'D)

(e) Cost Information

Information on cost of a proposed product although not always essential, may often be of assistance to the Board in assessment of the product, and for future reference in recommending materials for Specifications.

(f) Approval of Equivalent or Acceptable Alternative

(1) Approvals by the Board will be issued to the Supplier, Manufacturer or Contractor who has made application and will indicate whether the material is approved as "Acceptable Alternative" or an "Equivalent".

(2) The issuance of a certificate of approval for a product for one project does not necessarily set a precedent for the approval of that product for another project.

(3) CERTIFICATES GIVING "BLANKET" OR GENERAL APPROVAL WILL NOT BE ISSUED FOR ANY PRODUCT.

(g) Renewals

When a certificate has expired the Supplier, Manufacturer or Contractor may request that a new certificate be issued. Renewals will not be issued by the Board without a request by the supplier or manufacturer. The fact that a certificate has been issued for a product places no obligation on the Board to re-issue or renew that certificate unless, in the opinion of the Board, such action is warranted.

(h) Purpose

The purpose of this instruction is to provide a method whereby a Supplier or Manufacturer, whose product is not mentioned in the Specifications, may obtain evidence that such product is acceptable, either as an equivalent or as an Acceptable Alternative to that specified. Nothing herein or in any certificate of approval shall be deemed to amend the provisions of the Specifications or Contract except:

(1) Determination of an "Equivalent" will be by the Inter-Service Equivalents Board (Construction) instead of the Engineer.

(2) Variation in the terms of the contract may result from the use of an Acceptable Alternative approved by the Inter-Service Equivalents Board (Construction) but such approval shall not become valid until after any price adjustment required has been negotiated and approved by the Engineer.

(j) Technical Requirements Responsibility

(1) The issuance of a Certificate of Approval for a product does not eliminate the necessity that the approved item complies with all governing technical requirements and conditions shown on the Drawings or mentioned in the Specification.

(2) It is the responsibility of the Contractor who selects the approved item to ensure that the item can comply with these conditions, and no extra cost will be allowed for any changes in any trade which may be required to accommodate such approved items.

Exhibit D

“No record” is not the same as no spraying — and the summary sheets were unverified drafts

3 ASG Engineer Branch, Property Management Office, CFB Gagetown: covering note of 17 August 2005 (E. Doreen Hiscock, Assistant Property Officer) and “Second Growth Control Summary” sheets for 1962 and 1959

Released under the Access to Information Act, A-2015-01866, pages 01585, 01588 and 01589

Key passages

The 1959 sheet states: “There was no record of a spray program during 1959.” The 1962 sheet states: “There was no recorded spray program during 1962.” Yet the 16 July 1959 contract specification for herbicide spraying at Gagetown exists (Exhibit C).

The covering note sent with these sheets to the consultants on 17 August 2005 describes them as “Draft” summary sheets and says: “Not all years have been updated and the data contained in these sheets are not verified.”

Each sheet also states that it “does not reflect the application of Agent Orange/Agent Purple/Agent White or any other defoliants that may have been tested by the US Army”.

DND’s consultant (Jacques Whitford, Stage 1A report, December 2005) concluded: “for 1962 we have no record of chemical vegetation management at CFB Gagetown. It is not known if spraying took place in 1962.”

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August 17th 2005

The following is a list of documentation that was forwarded to NDHQ for the Consultants Review on 17th August 2005 by Purolator (one box).

1. The following are files/documentation that were identified in original shipment of July 21st, that required maps or drawings:

Volume 39 – 1 Map & 18 Drawings
Volume 41 – 2 Maps
Volume 42 – 1 Map
Volume 43 – 1 Map

2. One Library reference manual entitled 24.58A – A Secondary Growth Control Study for Canadian Forces Base Gagetown including 6 drawings.

3. The following list is documentation that has been found in other BD Files or located in our Drafting Office on Second Growth Control (SGC) since the original shipment. New BD file #'s have been created as indicated:

BD 5-390 Vol 1B SGC 1958 (two files)
BD 5-390 Vol 1D SGC 1960 (three files)
BD 5-390 Vol 2 SGC 1961
BD 5-390 Vol 3 SGC 1961
BD 5-390 Vol 4 SGC 1963 (two files)
BD 5-390 Vol 22 SGC 1983
BD 5-390 Vol 101 SGC 1956
BD 5-390 Vol 102 SGC 1957

4. BD 5-390 Vol 9 SGC 1968 – Additional Map
BD 5-390 Vol 10 SGC 1969 – 5 Maps that are cleared than originally sent
BD 5-390 Vol 11 SGC 1969 – 4 Additional Maps
BD 5-390 Vol 20 SGC 1978 - 6 Additional Maps

5. Envelope contains a hard copy and an electronic copy of the "**Draft**" Second Growth Control Summary Sheets for years 1956 – 2004. Not all years have been updated and the data contained in these sheets are not verified as indicated.

E. Doreen Hiscock
Assistant Property Officer
(506) 422-2000 ext 2720

A0500234_24-A-2015-01866--01585

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NOTE: THERE WAS NO RECORDED SPRAY PROGRAM DURING 1962

Information Accuracy Disclaimer:

The 3ASG Engineer Branch Property Management Office does not warrant or guarantee the accuracy, quality, completeness or validity of any information contained within. This information is a summary of the data extracted from the Base Development Files held by the Property Management Office.

NOTE: The data contained within this document does not reflect the application of Agent Orange/Agent Purple/Agent White or any other defoliants that may have been tested by the US Army, independent of CFB Gagetown's Second Growth Control Program.

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DIVULGUÉ EN VERTU DE LA LAI - RENSEIGNEMENTS NON CLASSIFIÉS

NOTE: THERE WAS NO RECORD OF A SPRAY PROGRAM DURING 1959

Information Accuracy Disclaimer:

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NOTE: The data contained within this document does not reflect the application of Agent Orange/Agent Purple/Agent White or any other defoliants that may have been tested by the US Army, independent of CFB Gagetown's Second Growth Control Program.

Exhibit E

Maine soldiers at Gagetown, 1975

U.S. Embassy Ottawa cable to the Secretary of State, “Request for Cross Border Clearance for U.S. Military Unit”, 26 March 1975 (1975OTTAWA01139)

U.S. Department of State, declassified; as published by WikiLeaks (PlusD)

Key passages

Canada authorized “the movement of the First Battalion, 152nd Artillery, Maine Army National Guard to Camp Gagetown, New Brunswick for training during the period August 15 to August 19, 1975.”

PUBLIC LIBRARY OF US DIPLOMACY

(//search.wikileaks.org/plusd/) View Map (/plusd/map) Make Timegraph (/plusd/graph) View Tags (/plusd/tags/) Image Library (/plusd/imagelibrary/)

REQUEST FOR CROSS BORDER CLEARANCE FOR U.S. MILITARY UNIT

Date: 1975 March 26, 22:49 (Wednesday)
Original Classification: UNCLASSIFIED
Handling Restrictions -- N/A or Blank --
Executive Order: -- N/A or Blank --
TAGS: CA - Canada (/plusd/?q=&qftags=CA#result) | MARR - Military and Defense Affairs--Military and Defense Arrangements (/plusd/?q=&qftags=MARR#result) | US - United States (/plusd/?q=&qftags=US#result)

Enclosure: -- N/A or Blank --
Office Origin: -- N/A OR BLANK --
Office Action: ACTION EUR - BUREAU OF EUROPEAN AND EURASIAN AFFAIRS
From: CANADA OTTAWA (/PLUSD/?Q=&QFORIGIN=CANADA%23%23OTTAWA#RESULT)

To: DEPARTMENT OF STATE (/PLUSD/?Q=&QFDESTINATION=DEPARTMENT OF STATE#RESULT) | SECRETARY OF STATE (/PLUSD/?Q=&QFDESTINATION=SECRETARY OF STATE#RESULT)

Canonical ID: 1975OTTAWA01139_b
Current Classification: UNCLASSIFIED
Character Count: 1155
Locator: TEXT ON MICROFILM,TEXT ONLINE
Concepts: BORDER CONTROLS (/plusd/?q=&qfconcept=BORDER+CONTROLS#result) | MILITARY CLEARANCES (/plusd/?q=&qfconcept=MILITARY+CLEARANCES#result) | MILITARY TRAINING (/plusd/?q=&qfconcept=MILITARY+TRAINING#result)
Type: TE - Telegram (cable)
Archive Status: Electronic Telegrams

Markings: Margaret P. Grafeld Declassified/Released US Department of State EO Systematic Review 05 JUL 2006

1. THE EMBASSY HAS RECEIVED NOTE DFR-573 FROM THE CANADIAN DEPARTMENT OF EXTERNAL AFFAIRS AUTHORIZING THE MOVEMENT OF THE FIRST BATTALION, 152NDARTILLERY, MAINE ARMY NATIONAL GUARD TO CAMP GAGETOWN, NEW BRUNSWICK FOR TRAINING DURING THE PERIOD AUGUST 15 TO AUGUST 19, 1975.

2. THE NOTE GOES ON TO STATE THAT:

"THE MOVEMENT OF THE BATTALION AND THE USE OF CAMP GAGETOWN TRANING FACILITIES WILL TAKE PLACE IN ACCORDANCE WITH SUCH REQUIREMENTS AS MAY BE ESTABLISHED BY THE APPROPRIATE CANADIAN CIVILIAN AND MILITARY AUTHORITIES. THE PROVISIONS OF THE NATO STATUS OF FORCES AGREEMENT SHALL APPLY TO THE FIRST BATTALION, 152ND ARTILLERY, MAINE ARMY NATIONAL GUARD DURING ITS STAY IN CANADA."

3. FULL TEXT OF NOTE BY POUCH TO EUR/CAN.
PORTER

UNCLASSIFIED

NNN

References to this document in other cables

1974STATE091670 (/plusd/cables/1974STATE091670.html)

References in this document to other cables

1975ACCRA01975 (/plusd/cables/1975ACCRA01975.html)
1975ALGIER01975 (/plusd/cables/1975ALGIER01975.html)
1975ATHENS01975 (/plusd/cables/1975ATHENS01975.html)
1975BELGRA01975 (/plusd/cables/1975BELGRA01975.html)
1975BRUSSE01975 (/plusd/cables/1975BRUSSE01975.html)
1975BUCHAR01975 (/plusd/cables/1975BUCHAR01975.html)
1975CAIRO01975 (/plusd/cables/1975CAIRO01975.html)
1975CARACA01975 (/plusd/cables/1975CARACA01975.html)
1975COLOMB01975 (/plusd/cables/1975COLOMB01975.html)
1975DAMASC01975 (/plusd/cables/1975DAMASC01975.html)
1975DARES01975 (/plusd/cables/1975DARES01975.html)
1975FREETO01975 (/plusd/cables/1975FREETO01975.html)
1975GUATEM01975 (/plusd/cables/1975GUATEM01975.html)
1975KINGST01975 (/plusd/cables/1975KINGST01975.html)
1975KINSHA01975 (/plusd/cables/1975KINSHA01975.html)
1975LIBREV01975 (/plusd/cables/1975LIBREV01975.html)
1975LIMA01975 (/plusd/cables/1975LIMA01975.html)
1975LUSAKA01975 (/plusd/cables/1975LUSAKA01975.html)
1975MANILA01975 (/plusd/cables/1975MANILA01975.html)
1975MILAN01975 (/plusd/cables/1975MILAN01975.html)
1975MONTEV01975 (/plusd/cables/1975MONTEV01975.html)
1975MONTRE01975 (/plusd/cables/1975MONTRE01975.html)
1975MOSCOW01975 (/plusd/cables/1975MOSCOW01975.html)
1975NASSAU01975 (/plusd/cables/1975NASSAU01975.html)
1975NATO01975 (/plusd/cables/1975NATO01975.html)
1975NATOB01975 (/plusd/cables/1975NATOB01975.html)
1975OTTAWA01975 (/plusd/cables/1975OTTAWA01975.html)
1975PARIS01975 (/plusd/cables/1975PARIS01975.html)
1975PEKING01975 (/plusd/cables/1975PEKING01975.html)
1975PORTA01975 (/plusd/cables/1975PORTA01975.html)
1975PORTO01975 (/plusd/cables/1975PORTO01975.html)
1975QUITO01975 (/plusd/cables/1975QUITO01975.html)
1975RANGOO01975 (/plusd/cables/1975RANGOO01975.html)
1975SANA01975 (/plusd/cables/1975SANA01975.html)
1975SANTIA01975 (/plusd/cables/1975SANTIA01975.html)
1975SEOUL01975 (/plusd/cables/1975SEOUL01975.html)
1975SOFIA01975 (/plusd/cables/1975SOFIA01975.html)
1975TEHRAN01975 (/plusd/cables/1975TEHRAN01975.html)
1975THEHA01975 (/plusd/cables/1975THEHA01975.html)
1975UDORN01975 (/plusd/cables/1975UDORN01975.html)
1975USBERL01975 (/plusd/cables/1975USBERL01975.html)
1975USUNN01975 (/plusd/cables/1975USUNN01975.html)
1975VIENTI01975 (/plusd/cables/1975VIENTI01975.html)
1975WARSAW01975 (/plusd/cables/1975WARSAW01975.html)
1975WELLIN01975 (/plusd/cables/1975WELLIN01975.html)

If the reference is ambiguous all possibilities are listed.

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WL Research Community - user contributed research based on documents published by WikiLeaks.
(https://our.wikileaks.org)

Tor is an encrypted anonymising network that makes it harder to intercept internet communications, or see where communications are coming from or going to.
(https://www.torproject.org/)

Tails is a live operating system, that you can start on almost any computer from a DVD, USB stick, or SD card. It aims at preserving your privacy and anonymity.
(https://tails.boum.org/)

The Courage Foundation is an international organisation that supports those who risk life or liberty to make significant contributions to the historical record.
(https://www.couragefound.org/)

Bitcoin uses peer-to-peer technology to operate with no central authority or banks; managing transactions and the issuing of bitcoins is carried out collectively by the network.
(https://www.bitcoin.org/)

(https://www.facebook.com/wikileaks) (https://twitter.com/wikileaks)

Exhibit F

The 1966 tests were a U.S. Army program

U.S. Army Biological Center, Fort Detrick, “Program for Experimental Herbicidal Sprays, Base Gagetown, New Brunswick, Canada”, K.D. Demaree, project leader, August 1966

Released under the Access to Information Act, record A0156893 (second, duplicate copy omitted)

Key passages

Sprays were applied “to approximately 110 plots” by H-19 helicopter on 14–16 June 1966. The chemicals list includes Agent Orange, a 70/30 2,4-D/2,4,5-T ester mix, Tordon products and Phytar (cacodylic acid, the basis of Agent Blue), with U.S. suppliers and prices.

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LL2295-62

7685-62

D-1 FORESTAL
M.C. BOYNTON

DEPARTMENT OF THE ARMY
FORT DETRICK, FREDERICK, MARYLAND

PROGRAM FOR EXPERIMENTAL HERBICIDAL SPRAYS

BASE GAGETOWN, NEW BRUNSWICK, CANADA

Kenneth D. Demaree
Project Leader

CROPS DEPARTMENT

BIOLOGICAL SCIENCES LABORATORY

Project Number 1C522301A06101

August, 1966

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PERSONNEL

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Dr. George B. Truchelut

Mr. Walter J. Hart

TECHNICAL INFORMATION DIVISION

Mr. Paul Riley

TRANSPORTATION MOTOR POOL

Mr. George Sheetenhelm

U. S. ARMY AVIATION TEST BOARD, FORT RUCKER, ALABAMA

Mr. Richard McCrary, Pilot

CANADIAN FORCES, BASE GAGETOWN, OROMOCTO, CANADA

Col. C. D. Simpson	**C.O. Base Gagetown**
Maj. C. E. Murdoch	**Range Officer**
Capt. William Wright	**Co-pilot- AOP**

Enlisted men from: 7 Coy RCASC Royal Canadian Army Service Corps

1 RCHA Royal Canadian Horse Artillery

AOP Air Observation Post

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INTRODUCTION

Herbicidal sprays were applied to approximately 110 plots* in a forested area by an H-19 helicopter fitted with the HIDAL spraying system, with 15 check valves and # 8010 nozzle tips on each boom. The spraying system was calibrated to deliver 1 gallon per acre. On plots receiving 2 and 3 gallons per acre, the plots were flown over 2 and 3 times, respectively. The areas were sprayed between 0600 to 1800 on 14 June, 0500 to 1900 on 15 June, and 0500 to 1200 on 16 June.

This particular area was chosen because it consisted of virgin forest, second-growth brush, hardwoods, soft woods, and conifers. The canopy consisted of spruce, hemlock, white pine, white birch, beech, red maple, striped maple, alder, and some oaks.

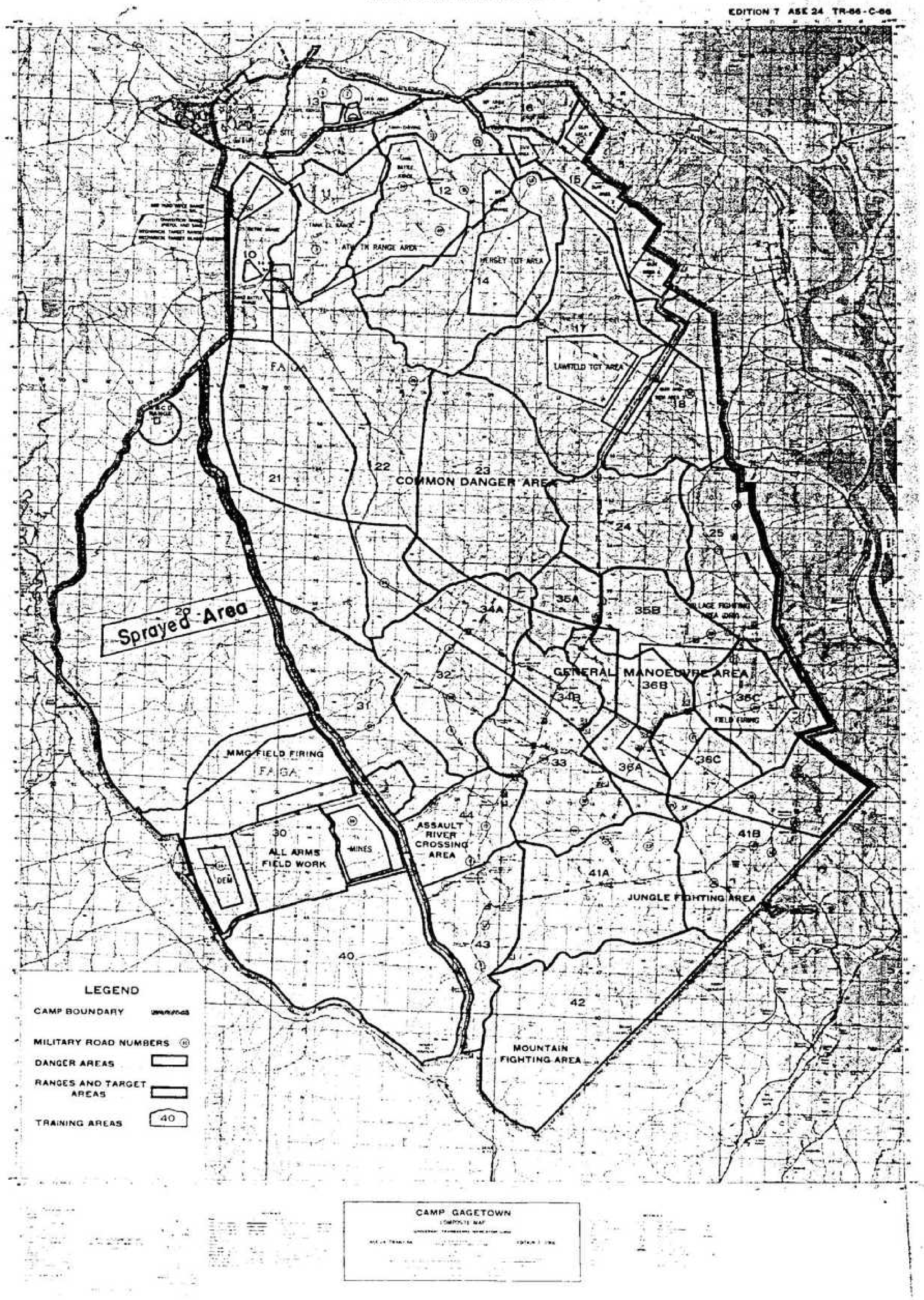
* From map, plots are about 5 acres in area, but only portion of area shown may have been sprayed. (Surely there would be an isolation strip between treatments?)

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RANGES AND TRAINING AREAS

EDITION 7 ASE 24 TR-66-C-66



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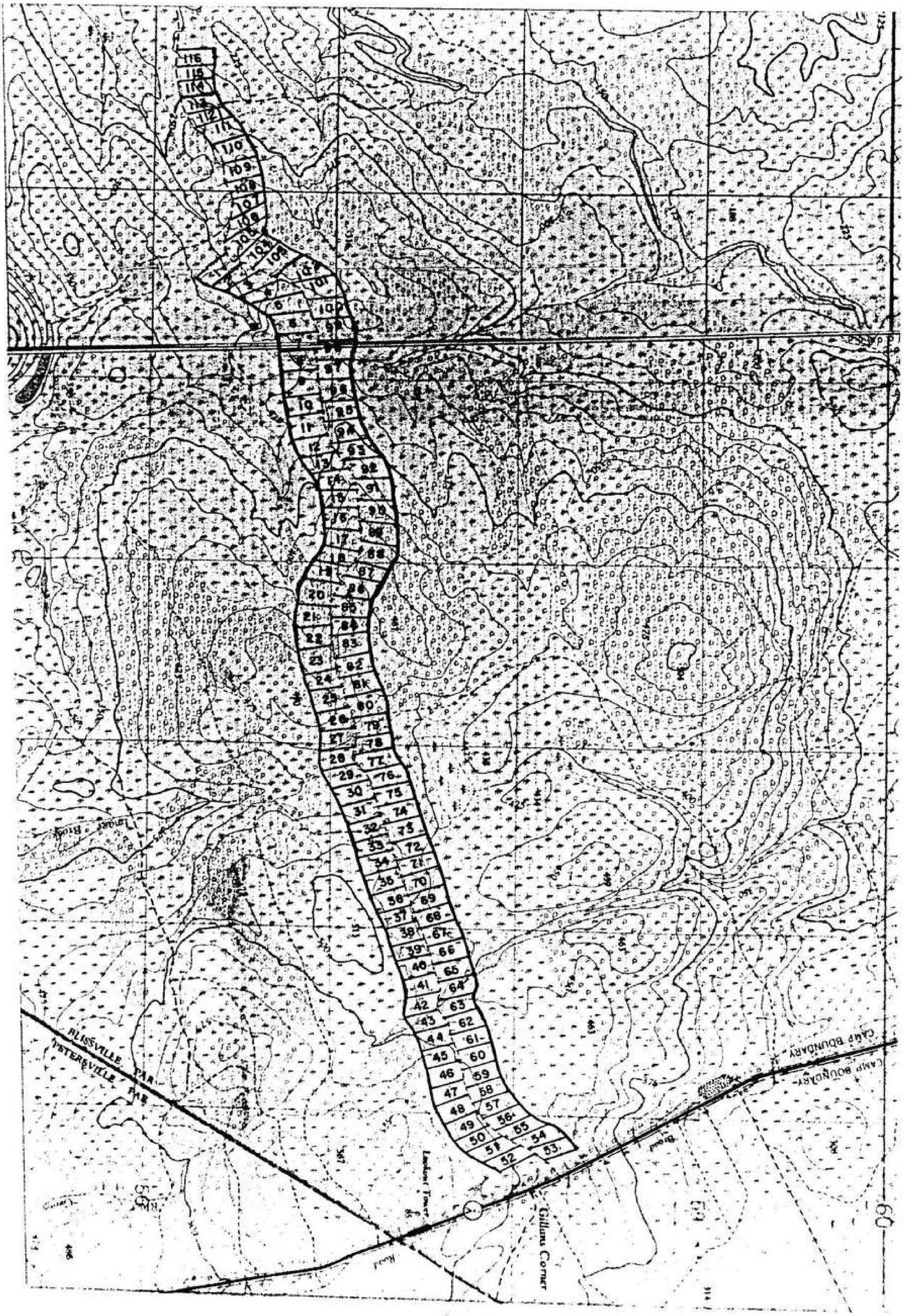


Table 1. Chemicals used in test program and their characteristics.

NAME	TYPE	TREATMENT EFFECTS	FORMULATION	SOURCE	COST
DIQUAT (1,1'-ethylene-2,2'dipyridylium dibromide)	Fast-acting desiccant	Non-selective		On franchise from ICI Chevron Chemical Co. Ortho Division, San Francisco, Calif.	Approx. $14.00/gal.
TORDON 101 (4 amino-3,5,6-trichloro-picolinic acid)	Slow acting	Wide spectrum of plant species, probably best on pines.	½ lb Tordon + 2 lb 2,4-D	Dow Chemical Co. Midland, Michigan	Approx. $15.00/gal.
TORDON 22K (4 amino-3,5,6-trichloro-picolinic acid)	Slow acting	Wide spectrum of plant species	2 lb potassium salt per gallon	Dow Chemical Co. Midland, Michigan	Approx. $32.00/gal.
PHYTAR 160 (Sodium cacodylate and dimethylarsinic acid + surfactant)	Fast-acting desiccant	Non-selective	3.25 lb active ingredient + 5% surfactant/gal	Ansul Chemical Co. Marinette, Wisconsin	Approx. $5.00/gal
PHYTAR 560 (Sodium cacodylate and dimethylarsinic acid + surfactant)	Fast-acting desiccant	Non-selective	2.48 lb active ingredient + 1 qt. surfactant/gal	Ansul Chemical Co. Marinette, Wisconsin	Approx. $5.00/gal
M-2993 (iso-octyl ester of Tordon)		Wide spectrum	1 lb Tordon + 4 lb 2,4,5-T/gal, oil soluble form of Tordon	Dow Chemical Co. Midland, Michigan	
70D + 30T (n-butyl esters of 2,4-D and 2,4,5-T)	Slow acting	Non-selective	70% 2,4-D + 30% 2,4,5-T; 10.5 lbs active ingredients /gal in combined form	Dow, Monsanto, Hercules Powder, or Allied Chemical Companies	Approx. $6.50/gal
ORANGE (50-50 mixture n-butyl esters of 2,4-D and 2,4,5-T)		Wide spectrum, not effective on conifers	10.5 lbs active ingredients/gal	Dow, Monsanto, Hercules Powder, or Allied Chemical Companies	Approx. $6.50/gal
PURPLE (50% n-butyl ester 2,4-D 30% n-butyl ester 2,4,5-T 20% iso-butyl ester 2,4,5-T		wide spectrum not effective on conifers	10.5 lbs active ingredients/gal	Dow, Monsanto, Hercules Powder,and Allied Chemcial Companies	Approx. $6.50/gal

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Franklin submission to the Maine Dioxytown Harmful Chemical Study Commi
ssion, 15 Oct 2020 - page 56 of 81

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TABLE 2. SUMMARY OF CHEMICALS AND PLOT NUMBERS.

COMPOUND	PLOTS
Diquat (no diluent)	116, 113, 111, 107, 105, 103
Diquat + DMSO	112, 110, 108, 106, 104, 102
Diquat + Water	99, 97, 95, 93, 91, ~~90~~ 89
Diquat + Tordon 101	80, 78, 76, 74
Diquat + Tordon 22K	72, 70, 68, 66
Phytar 160 (no diluent)	71, 69, 67, 65, 63, 61
Phytar 160 + Water	59, 57, 55, 54, 53, 51, 49, 47
Phytar 160 + Tordon 101	88, 86, 82
Phytar 160 + Tordon 22K	84, 64, 60
Phytar 560 + Water	87, 85, 83, 81, 79, 77, 75, 73
Tordon 22K + Water	100, 98, 96, 94, 92, (90)
M-2993 + Diesel ✓	62, 58, 52, 50, 48, 46
70% D + 30% T (no diluent) ✓	44, 42, 39, 38, 36, 32
70% D + 30% T + Diesel ✓	30, 27, 26, 24, 22, 20
Orange (no diluent) ✓	21, 19, 17, 15, 13, 11
Orange + Diesel ✓	37, 35, 33, 31, 29, 28, 25, 23
Purple (no diluent) ✓	18, 16, 14, ~~12~~, ~~10~~, 9
Purple + Diesel ✓	8, 7, 6, 5, 4, 3, 2, 1

Not sprayed

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TABLE 3. CHEMICALS AND CHEMICAL COMBINATIONS WITH TOTAL VOLUME OF APPLICATION, RATE, AND PLOT NUMBERS.

CHEMICAL	VOLUME RATE gal/acre	VOLUME RATE lb/acre	PLOT NO.
DIQUAT			
DIQUAT, no diluent (ND)	1	2	116, 107
	2	4	113, 105
	3	6	111, 103
DIQUAT + DMSO (10%)	2	3.2 + .8	112, 106
	3	4.8 + 1.2	110, 104
	4	6.4 + 1.6	108, 102
DIQUAT + WATER (1:1)	2	2	99, 93
	3	3	97, 91
	4	4	95, 89
DIQUAT + TORDON 101 (1:1)	1	1 + (0.27 + 1)	80, 76
	2	2 + (0.54 + 2)	78, 74
DIQUAT + TORDON 22K (1:1)	1	1 + 1	72, 68
	2	2 + 2	70, 66
PHYTAR 160			
PHYTAR 160 (ND)	1	3.25	71, 65
	2	6.50	63
	3	9.75	61, 69
	4	13.00	67
PHYTAR 160 + WATER (1:2)	1	1.08	59, 55
PHYTAR 160 + WATER (1:1)	1	1.63	53, 51
	2	3.25	57, 49
	3	4.88	54, 47
PHYTAR 160 + TORDON 101 (1:1)	1	1.63 + (0.27+1)	88, 84
	2	3.25 + (0.54+2)	86, 82

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TABLE 3.

CHEMICAL	VOLUME RATE gal/acre	VOLUME RATE lb/acre	PLOT NO.
		PHYTAR 160 (cont'd)	
PHYTAR 160 + TORDON 22K	1	2.875 + 0.5	64, 60
		PHYTAR 560	
PHYTAR 560 + WATER (1:2)	3	2.48	87, 79
PHYTAR 560 + WATER (1:1)	1	1.24	85, 77
	2	2.48	83, 75
	3	3.72	81, 73
		TORDON	
TORDON 22K + WATER (1:1)	1	1	100, 94
	2	2	98, 92
	3	3	96, 90
TORDON 22K + DIQUAT (1:1)	1	1 + 1	72, 68
	2	2 + 2	70, 66
TORDON 22K + PHYTAR 160 (1:3)	1	0.5 + 2.875	64, 60
TORDON 101 + DIQUAT (1:1)	1	(0.27 + 1) + 1	80, 76
	2	(0.54 + 2) + 2	78, 74
TORDON 101 + PHYTAR 160 (1:1)	1	(0.27 + 1) + 1	88, 84
	2	(0.54 + 2) + 2	86, 82

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BLE 3.

CHEMICAL	VOLUME RATE gal/acre	lb/acre	PLOT NO.
		M-2993 (Picloram)	
M-2993 + DIESEL (1:2)	2 Tordon	0.66 + 2.66 2,4,5-T	62, 58
M-2993 + DIESEL (1:1)	1 Tordon	0.5 + 2.0 2,4,5-T	52, 48
	2 Tordon	1.0 + 4.0 2,4,5-T	50, 46
		70% 2,4-D + 30% 2,4,5-T	
70%D + 30%T (ND)	1	10.5 (7.35D + 3.15T)	44, 38
	2	21.0 (14.7D + 6.30T)	42, 36
	3	31.5 (22.05D + 9.45T)	39, 32
70%D + 30%T + DIESEL (1:1)	1	5.25 (3.67D + 1.57T)	30, 24
	2	10.5 (7.35D + 3.15T)	27, 22
	3	15.75 (11.025D + 4.725T)	26, 20
		ORANGE	
ORANGE (ND)	1	10.5 (5.25D + 5.25T)	11, 17
	2	21.0 (10.5D + 10.5T)	13, 19
	3	31.5 (15.75D + 15.75T)	15, 21
ORANGE + DIESEL (1:1)	1	5.25 (2.625D + 2.625T)	25, 33
	2	10.5 (5.25D + 5.25T)	28, 35
	3	15.75 (7.875D + 7.875T)	29, 37
ORANGE + DIESEL (1:2)	3	10.5 (5.25D + 5.25T)	23, 31
		PURPLE	
PURPLE (ND)	1	10.5 (5.25D + 5.25T)	18, 12
	2	21.0 (10.5D + 10.5T)	16, 10
	3	31.5 (15.75D + 15.75T)	14, 9

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TABLE 4. SEQUENTIAL LIST OF PLOTS AND CHEMICAL TREATMENTS.

Plot No.	Chemical	Volume	
		gal/acre	lb/acre
1	Purple + diesel (1:1)	3	15.75
2	Purple + diesel (1:1)	2	10.50
3	Purple + diesel (1:1)	1	5.25
4	Purple + diesel (1:2)	3	10.50
5	Purple + diesel (1:1)	3	15.75
6	Purple + diesel (1:1)	2	10.50
7	Purple + diesel (1:1)	1	5.25
8	Purple + diesel (1:2)	3	10.50
9	Purple, no diluent	3	31.50
10	Purple, no diluent	2	21.00
11	Orange, no diluent	1	10.50
12	Purple, no diluent	1	10.50
13	Orange, no diluent	2	21.00
14	Purple, no diluent	3	31.50
15	Orange, no diluent	3	31.50
16	Purple, no diluent	2	21.00
17	Orange, no diluent	1	10.50
18	Purple, no diluent	1	10.50
19	Orange, no diluent	2	21.00
20	70% D + 30% T + diesel (1:1)	3	15.75
21	Orange, no diluent	3	31.50
22	70% D + 30% T + diesel (1:1)	2	10.50

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LE 4.

Plot No.	Chemical	Volume	
		gal/acre	lb/acre
23	Orange + diesel (1:2)	3	10.50
24	70% D + 30% T + diesel (1:1)	1	5.25
25	Orange + diesel (1:1)	1	5.25
26	70% D + 30% T + diesel (1:1)	3	15.75
27	70% D + 30% T + diesel (1:1)	2	10.50
28	Orange + diesel (1:1)	2	10.50
29	Orange + diesel (1:1)	3	15.75
30	70% D + 30% T + diesel (1:1)	1	5.25
31	Orange + diesel (1:1)	3	10.50
32	70% D + 30% T, no diluent	3	31.50
33	Orange + diesel (1:1)	1	5.25
34	NOT SPRAYED		
35	Orange + diesel (1:1)	2	10.50
36	70% D + 30% T, no diluent	2	21.00
37 x	Orange + diesel (1:1)	3	15.75
38 x	70% D + 30% T, no diluent	1	10.50
39 x	70% D + 30% T, no diluent	3	31.50
40 x	NOT SPRAYED		
41 x	NOT SPRAYED		
42 x	70% D + 30% T, no diluent	2	21.00
43 x	NOT SPRAYED		

x Plus grandes ?

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TABLE 4.

Plot No.	Chemical	Volume gal/acre	Volume lb/acre
44 *	70% D + 30% T, no diluent	1	10.50
45 *	NOT SPRAYED		
46	M-2993 + diesel (1:1)	2	5.00
47	Phytar 160 + water (1:1)	3	4.88
48	M-2993 + diesel (1:1)	1	2.50
49	Phytar 160 + water (1:1)	2	3.25
50	M-2993 + diesel (1:1)	2	5.00
51	Phytar 160 + water (1:1)	1	1.63
52	M-2993 + diesel (1:1)	1	2.50
53	Phytar 160 + water (1:1)	1	1.63
54	Phytar 160 + water (1:1)	3	4.88
55	Phytar 160 + water (1:2)	1	1.08
56	NOT SPRAYED		
57	Phytar 160 + water (1:1)	2	3.25
58	M-2993 + diesel (1:2)	2	3.32
59	Phytar 160 + water (1:2)	1	1.08
60	Phytar 160 + Tordon 22K (3:1)	1	3.375
61	Phytar 160, no diluent	3	9.75
62	M-2993 + diesel (1:2)	2	3.32
63	Phytar 160, no diluent	2	6.50
64	Phytar 160 + Tordon 22K (3:1)	1	3.375

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BLE 4.

Plot No.	Chemical	Volume	
		gal/acre	lb/acre
65	Phytar 160, no diluent	1	3.25
66	Diquat + Tordon 22K (1:1)	2	4.00
67	Phytar 160, no diluent	4	13.00
68	Diquat + Tordon 22K (1:1)	1	2.00
69	Phytar 160, no diluent	3	9.75
70	Diquat + Tordon 22K	2	4.00
71	Phytar 160, no diluent	1	3.25
72	Diquat + Tordon 22K (1:1)	1	2.00
73	Phytar 560 + water (1:1)	3	3.72
74	Diquat + Tordon 101 (1:1)	2	4.54
75	Phytar 560 + water (1:1)	2	2.48
76	Diquat + Tordon 101 (1:1)	1	2.27
77	Phytar 560 + water (1:1)	1	1.24
78	Diquat + Tordon 101 (1:1)	2	2.54
79	Phytar 560 + water (1:2)	3	2.48
80	Diquat + Tordon 101 (1:1)	1	2.27
81	Phytar 560 + water (1:1)	3	3.72
82	Phytar 160 + Tordon 101 (1:1)	2	5.79
83	Phytar 560 + water (1:1)	2	2.48
84	Phytar 160 + Tordon 101 (1:1)	1	2.90
85	Phytar 560 + water (1:1)	1	1.24

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LE 4.

Plot No.	Chemical	Volume	
		gal/acre	lb/acre
86	Phytar 160 + Tordon 101 (1:1)	2	5.79
87	Phytar 560 + water (1:1)	3	2.48
88	Phytar 160 + Tordon 101 (1:1)	1	2.90
89	Diquat + water (1:1)	4	4.00
90	Tordon 22K + water (1:1)	3	3.00
91	Diquat + water (1:1)	3	3.00
92	Tordon 22K + water (1:1)	2	2.00
93	Diquat + water (1:1)	2	2.00
94	Tordon 22K + water (1:1)	1	1.00
95	Diquat + water (1:1)	4	4.00
96	Tordon 22K + water (1:1)	3	3.00
97	Diquat + water (1:1)	3	3.00
98	Tordon 22K + water (1:1)	2	2.00
99	Diquat + water (1:1)	2	2.00
100	Tordon 22K + water (1:1)	1	1.00
101	NOT SPRAYED		
102	Diquat + DMSO	4	8.00
103	Diquat, no diluent	3	6.00
104	Diquat + DMSO	3	6.00
105	Diquat, no diluent	2	4.00
106	Diquat + DMSO	2	4.00
107	Diquat, no diluent	1	2.00

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TABLE 4.

Plot No.	Chemical	Volume	
		gal/acre	lb/acre
108	Diquat + DMSO	4	8.00
109	NOT SPRAYED		
110	Diquat + DMSO	3	6.00
111	Diquat, no diluent	3	6.00
112	Diquat + DMSO	2	4.00
113	Diquat, no diluent	2	4.00
114	NOT SPRAYED		
115	NOT SPRAYED		
116	Diquat, no diluent	1	2.00

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GRANULES

Plot No.	Compound	Lb./Acre
37	UROX 22	100
38	UROX 22	200
39	UROX 22	300
40	URAB	50
41	URAB	100
42	URAB	200
43	UROX 379	100
44	UROX 379	200
45	UROX 379	300

Exhibit G

Agent Orange chemistry was routine DND practice in 1963

DND Army Headquarters, specification “Brush Control (Helicopter Spraying)”, Site RI/N, Canadian Army Signal System, Carp, Ontario, 1 May 1963, with related Army HQ correspondence and Hercules Powder Company technical data
DND file HQ 5432-1 Vol 2; scanned by the submitter from a copy (original held in Hanoi)

Key passages

The specification calls for three pounds acid equivalent of 2,4-D amine and three pounds of 2,4,5-T amine per acre — the two components of Agent Orange, in equal parts — sprayed by helicopter between 1 June and 15 July 1963.

The site is the Canadian Army Signal System site at Carp, Ontario (the “Diefenbunker”). It shows that the 2,4-D/2,4,5-T mixture was standard Canadian Army practice before the 1966–67 Gagetown tests.

HERCULES POWDER COMPANY
INCORPORATED
HERCULES TOWER
910 MARKET STREET, WILMINGTON 99, DELAWARE



FIRST CLASS MAIL

Army Headquarters
Dept. of National Defence
Ottawa 4, Ontario, Canada
Attention: Colonel G. K. Wade

HQ 5432-1 (D -Wks-Maint)
Vol 2
Maint BDF 5432-1

ARMY HEADQUARTERS
OTTAWA 4, Ont., Jun 63

Hercules Powder Company,
Wilmington,
Delaware, U.S.A.

Gentlemen:

Re: Trade Literature

On checking our reference files it has been found that they are incomplete in regard to the materials manufactured or distributed by your company.

It would be appreciated therefore, if you would forward two copies of your technical literature on the invert emulsion method of herbicide spraying, especially as applied to aerial application, for information only to:

Army Headquarters,
Dept of National Defence,
Ottawa 4, Ontario.

Attention: Director of Works
(Maintenance Division).

Yours truly,

(GK Wade)
Colonel
Director of Works

G B JEFFERSON Lt-Col
ADW (Maint)

12-8350/eb

MAY 11 1963

C.P.P.A. →

HQ 5432-1 Vol 2
(D Wks-Maint)
Maint HDF 5432-1

ARMY HEADQUARTERS
OTTAWA 4, Ont., May 63

Major R. Darling,
Building Superintendent,
Canadian Army Signal System,
CARP, Ontario.

Brush Control (Helicopter Spraying)
Site RI/N

1. Attached are two copies of a suggested draft specification (Section 2 only) for proposed brush control by helicopter spraying at Site RI/N.

2. The estimated cost of this work is $3,000.00:

a.	150 acres A 18.00	$2,700.00
b.	Contingencies approx 10%	$ 300.00
c.	Total	$3,000.00

3. Commercial firms which would probably be interested are:

a. Chipman Chemicals Limited,
519 Parkdale Avenue North,
Hamilton, Ontario.

Attention: Mr. W.A. Stearman,
Railway and Industrial Supervisor,
Telephone Liberty 9-3024.

b. Okanagan Helicopters Ltd.,
Vancouver Airport, B.C.

Ottawa representative is: Mr. Glyn C. Fitzgerald,
2724 Ulster Crescent,
Ottawa 8, Ont.
Telephone RE 3-9479.

c. Dominion Helicopters Ltd.,
90 Richmond Road,
Ottawa, Ont.
Telephone PA 9-9330.

d. Norfolk AerialSpraying Ltd.,
R.R. # 7,
Simcoe, Ontario.
(This organization may not have helicopters).

4. Site visit Mr. H.C. Fisher 17Apr 63 refers.

Lt Col RDG M-ChiTlan
ADQ(

MAY
(E Churchill)
Colonel
Director of Quartering

Encl.

HCF/2-8350/eb

D R A F T

copy 3 for file

DEPARTMENT OF NATIONAL DEFENCE (ARMY)

Specifications

BRUSH CONTROL (HELICOPTER SPRAYING)
Site RI/N - Canadian Army Signal System

Job No _____ Section No. 2 1 May 63

2.1 GENERAL

The General Conditions, Labour Conditions, and other DCL documents shall be read in conjunction with these Specifications and shall govern the work of this Section. Read also Section No. 1 - General Scope of Work.

2.2 LOCATION

Site RI/N, Canadian Army Signal System.

2.3 WORK INCLUDED

Provide all labour, materials, plant, tools, equipment, aircraft, personnel and supervision necessary to complete the work described by or reasonably inferable from the specifications, including the following:

a. Areas to be treated;

~~XXXSprayingXadjacentXtoXnon-DNDXpropertyX;~~

b. Spraying not included;

c. Spraying adjacent to non-DND property;

d. Aircraft;

e. Flags and flagmen;

f. Herbicide;

g. Spray mixture and rate of application;

h. Time limits;

j. Spraying conditions;

k. Guarantee;

l. Written report;

m. Basis of tendering;

n. Basis of payment;

2.4 AREAS TO BE TREATED

The spraying included in this contract consists of the

mplete area spraying of the easterly brush-covered portion of the DND-owned

.../2

property at RI/N, with exceptions as noted in clause 2.5. The estimated total area requiring treatment is approximately 150 acres.

2.5 SPRAYING NOT INCLUDED

a. The contract shall not include spraying of the following:

(1) Areas free of brush or containing only occasional brush regrowth;

(2) Areas within ten (10) yards of the tower located in the westerly portion of the brush area, or the guy wires and antennae connected thereto;

(3) Areas within twenty (20) yards of non-DND property (refer to clause 2.6).

b. A decision as to the spraying of areas having limited infestation will be made by the Engineer as the work progresses.

2.6 SPRAYING ADJACENT TO NON-DND PROPERTY

a. The work of this contract involves spraying adjacent to non-DND property. The Contractor shall determine to his own satisfaction a safe distance for this spraying. He shall spray only as close to non-DND property as he deems is absolutely safe, and in any case, shall not spray within twenty (20) yards of non-DND property. Locating the DND property line shall be the responsibility of the Contractor.

b. Spray aircraft shall not be flown over non-DND property when loaded with herbicide.

c. Spray paths adjacent to non-DND property shall be parallel to the DND boundary.

d. The Contractor shall be responsible for spray damage caused on non-DND property.

2.7 AIRCRAFT

a. Spraying shall be carried out by helicopter.

b. Spray aircraft shall be equipped with spray discharge assemblies of the boom-and-nozzle type or equivalent, with the following characteristics:

2.7 b. (1) The discharge assembly shall provide a uniform rate of application over the effective spray width;

(2) The discharge assembly shall be equipped with check valves, or equivalent to prevent dribble after shut-off;

(3) The discharge assembly shall be adjustable as to droplet size.

c. Aircraft shall be of Canadian ownership.

2.8 FLAGS AND FLAGMEN

The Contractor shall provide and use flags and flagmen if necessary to indicate successive flight paths.

2.9 HERBICIDE

a. Herbicides used in this contract shall be commercial herbicidal products currently registered in Canada with the Pesticide Unit, Plant Products Division, Canada Department of Agriculture, Confederation Building, Ottawa, and shall have been formulated in Canada from amine salts manufactured in Canada.

b. Herbicides shall be Amine salts of 2, 4-D and 2,4,5-T.

c. Herbicides shall be delivered to the site in the manufacturers original containers and submitted unopened to the Engineer for inspection. The containers shall show clearly the technical name of the product, the manufacturers' name, the registration number, the guaranteed content of each active ingredient, and the net quantity of the product in the container.

2.10 SPRAY MIXTURE AND RATE OF APPLICATION

a. The spray mixture shall be an oil-water emulsion made up as follows:

(1) A total of six (6) pounds acid equivalent of herbicide per acre, comprised of:

(a) Three (3) pounds acid equivalent of 2,4-D Amine,

and

.../4

2.10 a. (1) (b) Three (3) pounds acid equivalent of 2,4,5-T Amine,

(2) One and four/tenths (1.4) imperial gallons fuel oil per acre,

(3) Made up to seven (7) imperial gallons of spray mixture per acre with water, using an emulsifying agent at the rate and in the manner recommended by the manufacturer of the herbicide.

b. The spray aircraft shall be calibrated and flown so as to deposit a uniform application of the spray mixture at a minimum rate of seven (7) imperial gallons per acre.

2.11 TIME LIMITS

a. Subject to b. the spraying shall be carried out between June 1st, 1963 and July 15th, 1963.

b. Permission may be granted by the Engineer in writing to extend this period of prolonged adverse weather or other circumstances beyond the control of the Contractor prevents completion of the spraying within the specified period.

2.12 SPRAYING CONDITIONS

a. Spraying with helicopters shall be done at a speed not exceeding thirty-five (35) miles per hour and from a height not exceeding ten (10) feet above the tops of the brush to be sprayed.

b. The distance between flight paths shall be such that the overlap in spray application between successive adjacent flights shall be sufficient to provide for a uniform spray coverage of the treated area.

c. Except as provided for in Clause 2.6c, flight paths shall be crosswind ~~crosswind~~ with each successive pass upwind from the previous pass.

d. Spray droplet size shall be two hundred fifty (250) microns median diameter plus or minus fifty (50) microns, with not exceeding ten (10) percent of total volume outside these size limitations.

.../5

2.12 e. No spraying shall be done when:

(1) Air turbulence will prevent a uniform application of herbicide, or

(2) The wind velocity exceeds five (5) miles per hour, or

(3) Rain is falling or is expected to fall within four (4) hours, or

(4) Rain or dew is dripping from the foliage, or

(5) The official meteoroligical air temperature is below fifty (50) degrees fahrenheit.

2.13 GUARANTEE

The Contractor shall guarantee uniform coverage of treated areas with the specified herbicide and spray mixture at the rates and within the conditions specified.

2.14 WRITTEN REPORT

The contract shall include the submission to the Building Superintendent, Canadian ArmySignal System, _____, _____, by the Contractor, of two copies of a written report containing the following information:

a. Name and Manufacturer of herbicides used;

b. Herbicide concentration and rates of application;

c. Dates of spray application;

d. Summary of weather conditions during the spray period.

2.15 BASIS OF TENDERING

Prspective bidders shall tender a lump sum price for the work based on a tendered unit price per acre at an estimated total area to be sprayed of 150 acres.

2.16 BASIS OF PAYMENT

Payment will be made for the actual number of acres sprayed, at the tendered unit price per acre, as measured on the site by the Engineer. Measurement will be made horizontally.

3. The bifluid system, in early tests, produced a fairly uniform dispersion of droplets of about 1000 microns or larger which settled rapidly and appeared to give adequate impregnation of ground foliage. Drift, in these earlier tests and demonstrations, appeared to range only a few feet beyond the effective swath, and control was uniformly good within the area under direct spraying.

In order to supply more precise data on the spray pattern characteristics produced by application of invert emulsions by means of the bifluid system, a study was initiated in 1961 which was characterized by two main objectives:

1. To evaluate the spray pattern characteristics of invert emulsions applied by helicopter with a bifluid spray system, and

2. To detect and measure differential drift of spray materials resulting from the application of invert and of standard oil-in-water emulsion sprays.

DETAILS OF TESTS AND RESULTS

This program of study, initiated in 1961, was set up to analyze by deposit collection, spray interception, air sampling, and plant indicator techniques the spray patterns from aircraft spray equipment. Two series of tests were conducted using these techniques. Series I, (June, 1961) consisted of 6 test runs which compared 2 invert emulsions under varying conditions of wind velocity, air temperature, and relative humidity. Series II (May, 1962) involved 9 test runs. Six of these compared the same invert emulsions under different meteorological conditions, and 3 runs were made using conventional emulsions and spraying equipment for comparison against both Series I and II.

Figures 1 and 2, page 4, show typical deposit patterns obtained during these test runs. Table I, page 5, gives the percent of total spray deposited 50 and 100 feet downwind of the flight line.

Since droplet size is a primary factor in determining the amount of drift to be expected, a careful determination of drop-size distribution was made. With the invert emulsions, only 0.01 percent of the spray volume tested was comprised of droplets smaller than 200 microns. On the other hand, 29.7 percent of the spray volume of the standard emulsion was composed of droplets smaller than 200 microns and 1 percent of the total volume was in droplets below 50 microns.

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At this point in the analysis of the test runs the ability of the Rhap-Trol system to control drift was fairly well established. However, a biological assay was needed to evaluate the effects of the existing drift on crops. To this end, potted tomato plants in varying growth stages were placed from 60 to 500 feet downwind of the flight lines in test Series II. Figure 3, page 5, shows the results of the biological assay on these plants.

Using epinasty and terminal phytotoxicity as an indicator it was shown that in wind velocities of 18 to 20 miles per hour herbicidal damage occurred 48 feet downwind from the effective spray swath and in operational wind velocities (less than 10 miles per hour) herbicidal damage was detected no farther downwind than 30 feet from the effective swath.

All test plants in Runs II-7, II-8, and II-9, those in which a conventional emulsion was used, died as a result of herbicide drift, except for 1 plant in Run II-9 which escaped injury at 400 feet. It should be noted that, although 500 feet was the maximum distance at which test plants were placed, abundant spray traces were recorded by the air-sampling techniques at a 30-foot elevation as far as the 700-foot mark.

After careful analysis of the data collected it was found that over 99 percent of the invert emulsion spray volume was deposited no farther than 50 feet downwind as compared to 76.7 percent for the standard spray. Thus it was clearly shown in these tests that the Rhap-Trol spray system is extremely effective in the reduction of drift and may be used in areas adjacent to susceptible crops without fear of disastrous drift.

The tests described in this bulletin were made using the Rhap-Trol system mounted on a Bell 47G helicopter. Spray applicators are available, however, which can be mounted on airplanes or truck booms. In addition, a special hand-gun applicator has been developed.

The system will be licensed to commercial spray specialists for spreading weed- and brush-killing herbicides on rights-of-way along railroads, highways, power lines, range land, and in areas adjacent to susceptible crops, and for conducting field demonstrations where this might be desirable.

It should be remembered, however, that this system requires specially formulated herbicides – Visko-Rhap* 2-4D for weeds, Visko-Rhap T for brush, and Visko-Treet* water conditioner for efficient operation. More complete details of the Rhap-Trol system and its components will be found in Bulletin AD-4.

*Hercules Trademark

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Figure 1 – DEPOSITION CURVES FOR SERIES I
Runs No. I-1, I-2, And I-3

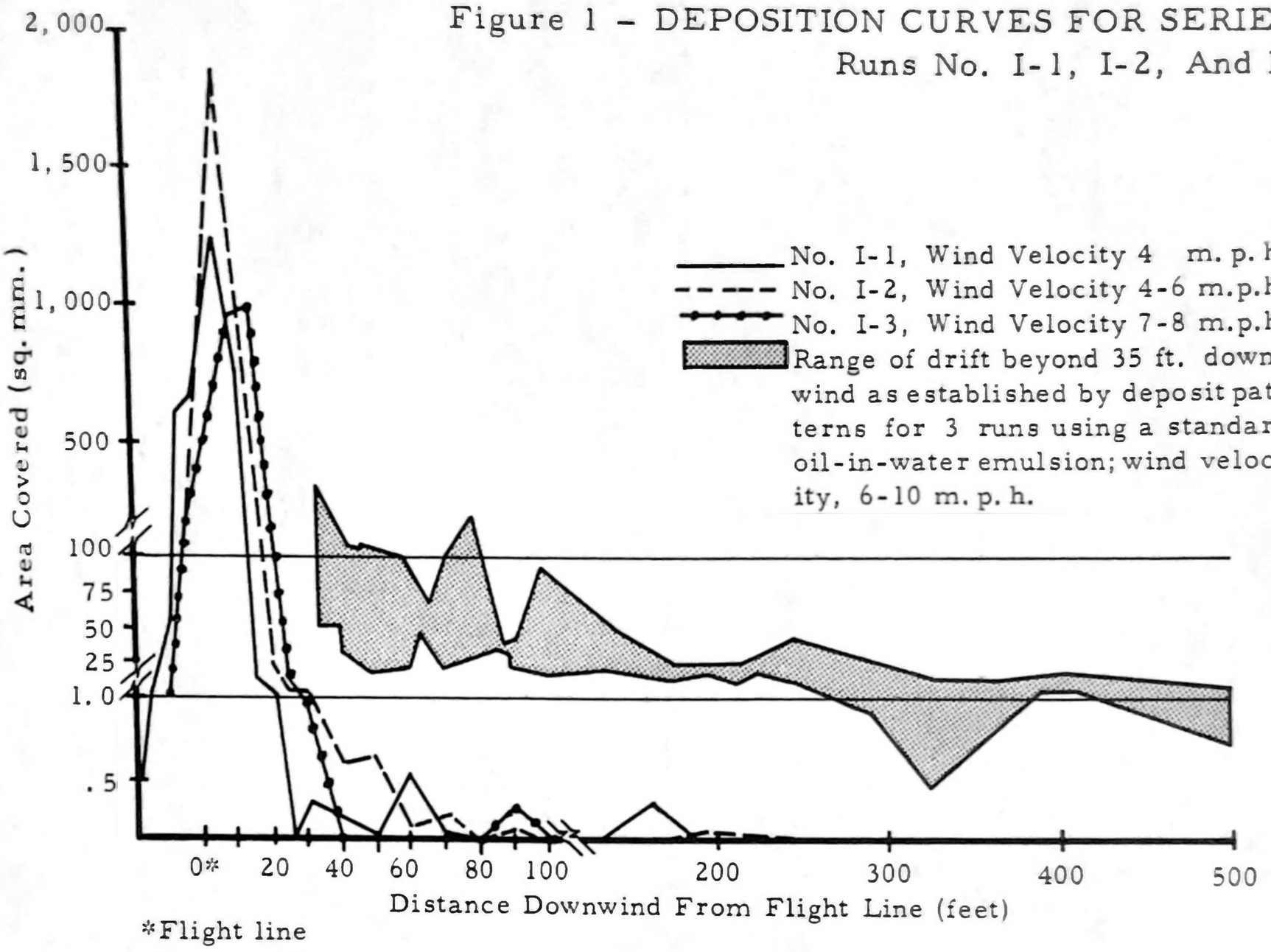


Figure 2 – DEPOSITION CURVES FOR SERIES II
Runs No. II-4, II-5, And II-6

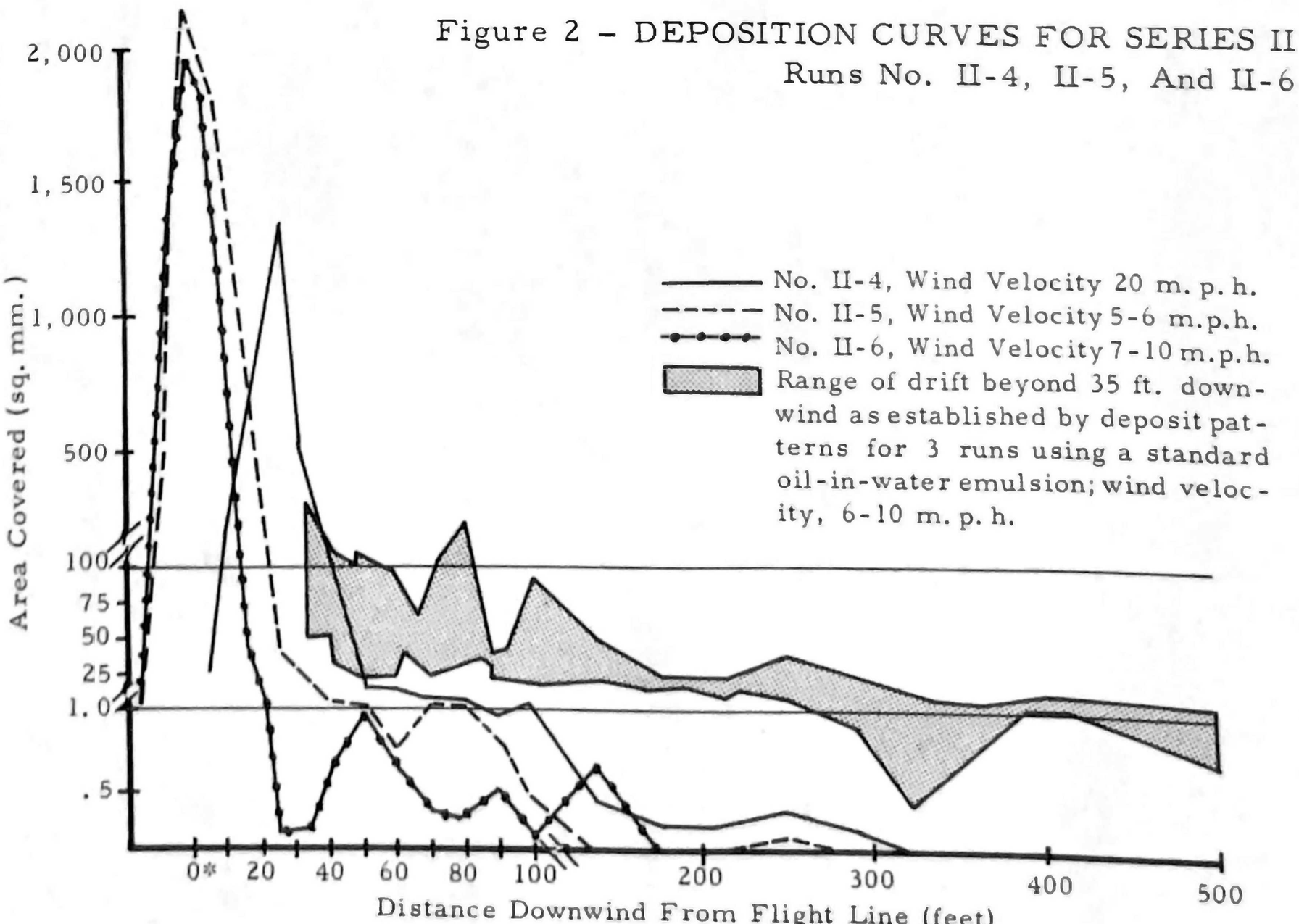


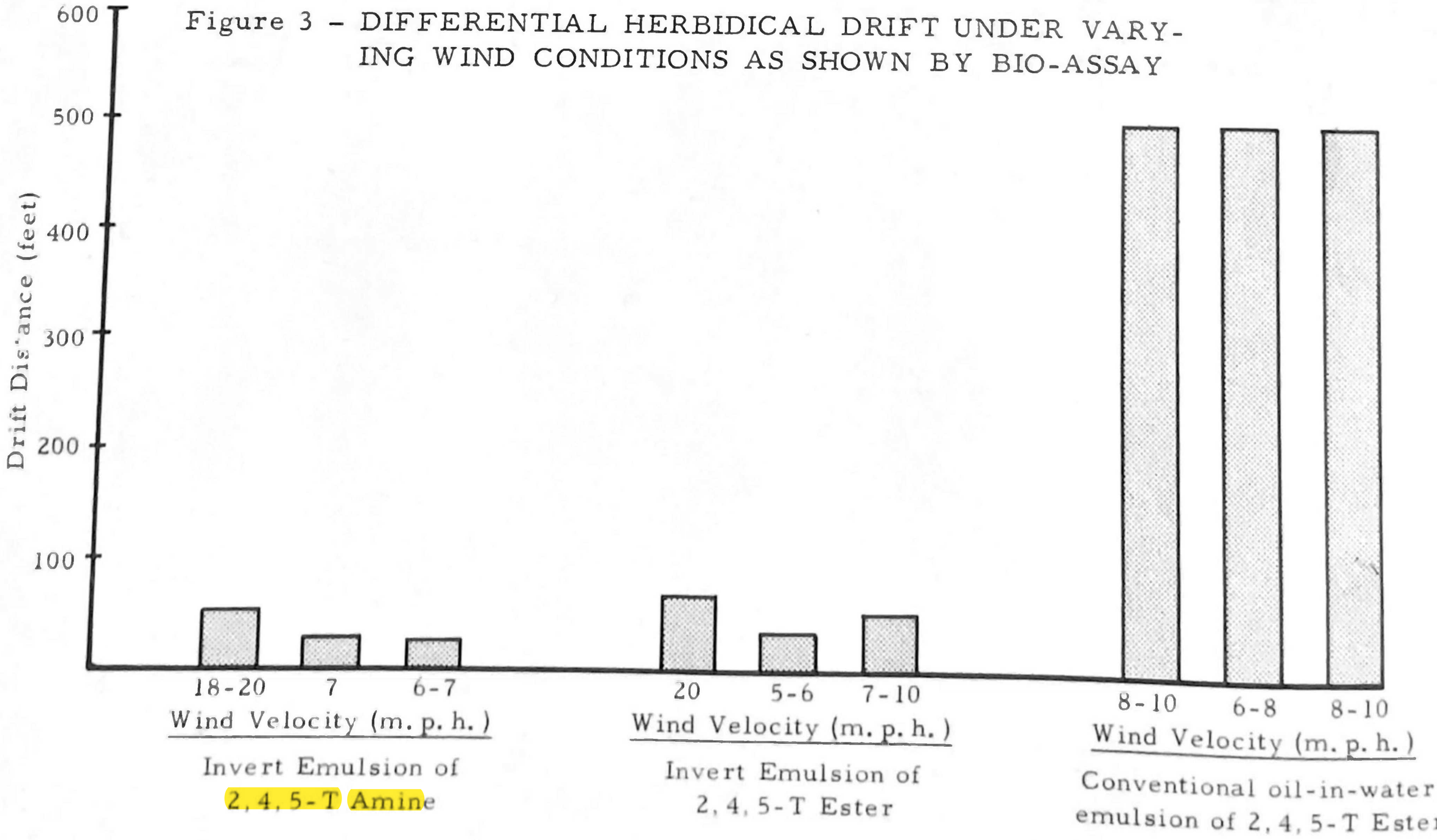
Table I

PERCENTAGE OF DEPOSITED SPRAY
SAMPLED WITHIN 50 AND 100 FEET DOWNWIND

Run Number	Treatment	Wind (m. p. h.)	Percentage of Total Spray Deposited 0-50 ft. downwind	0-100 ft. downwind
Series I-1	Invert Emulsion 2, 4, 5-T Ester	4	99.93	99.96
I-2		4-6	99.95	100.
I-3		7-8	99.97	100.
I-4	Invert Emulsion 2, 4, 5-T Amine	4	99.87	99.90
I-5		9-13	99.82	99.98
I-6		6-7	99.53	99.70
Series II-1*	Invert Emulsion 2, 4, 5-T Amine	18-20	93.28	93.75
II-2		7	98.68	99.69
II-3		6-7	97.07	99.40
II-4	Invert Emulsion 2, 4, 5-T Ester	20	96.83	99.58
II-5		5-6	99.78	99.99
II-6		7-10	99.90	99.99
II-7	Conventional Emulsion 2, 4, 5-T Ester	8-10	79.14	83.52
II-8		6-8	71.95	77.25
II-9		8-10	79.09	86.40

*One nozzle malfunctioned; emulsion incompletely formed.

Figure 3 – DIFFERENTIAL HERBIDICAL DRIFT UNDER VARYING WIND CONDITIONS AS SHOWN BY BIO-ASSAY



Five official claims about CFB Gagetown — and what the government's own records say

Kelly Porter Franklin · evidence to the Maine Gagetown Harmful Chemical Study Commission · 16 October 2026 · All sources are government records in the packet submitted 15 October 2026.

1. "It was seven days of testing, in June 1966 and June 1967."

What the government knew: DND briefing note to the Minister, 27 May 2005: "In 1964, CFB Gagetown sprayed 9,365 acres of brush with a 50-50 mixture of registered 2,4-D and 2,4,5-T products (Agent Orange mixture)."

What Parliament was told four weeks later, 22 June 2005 (Veterans Affairs): spraying took place "over a seven day period in June 1966 and June 1967." That framing was then used to argue against U.S.-style presumptive coverage.

Source: Packet Exhibits A and B (records A0216612, A0156853)

2. "Spraying was confined to remote parts of the base, in little or no wind."

DND briefing note, 10 June 2005: a 1964 spraying accident — a weather inversion and strong winds carried 2,4-D/2,4,5-T spray to Upper Gagetown and Sheffield. "The Crown paid approximately $250 000.00" to market gardeners. The spray left the base, and Ottawa paid for it.

Source: Packet Exhibit A (record A0128619)

3. "There is no record of spraying in 1959 or 1962."

The base summary sheet says "no record of a spray program during 1959" — yet the 16 July 1959 contract (Job G5607) provides for "a railroad tank car containing herbicide" at Gagetown.

The base office sent those sheets to the consultants in 2005 as "Draft… the data contained in these sheets are not verified." The 1981 memo behind them says: "a thorough review of this material has not been possible."

Source: Packet Exhibits C and D (A0090122, A0098394, A-2015-01866 pp. 01585–01589)

4. "It was Canadian brush control."

The 1966 program was a U.S. Army Fort Detrick project — "Program for Experimental Herbicidal Sprays, Base Gagetown" — about 110 plots, 14–16 June 1966, including Agent Orange and Agent Blue. DND's own 2005 note: tests done "by DOW Chemical… under the guidance of personnel from… Fort Detrick."

Source: Packet Exhibit F (A0156893); Exhibit A

5. “No one was exposed / no civilians were placed at risk.”

DND’s 2005 notes admit Canadian soldiers served as flagmen under the spray, and that “there are no nominal rolls that date back to the mid 1960s” — so they cannot know who was exposed. The same file records the Crown paying civilians for drift damage (item 2).

Source: Packet Exhibit A

And Maine:

U.S. Embassy cable, 26 March 1975: Canada authorized the 1st Battalion, 152nd Artillery, Maine Army National Guard to train at Camp Gagetown, 15–19 August 1975.

Source: Packet Exhibit E