

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.*

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, larynx, 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

2025-10-14

Provided by Gary Goode

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

Condition Count	Chloracne	Non-Hodgkin's Lymphoma	Carcinoma of the Lung	Respiratory cancers, including cancers of the lung, larynx, 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			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

Reporting and Analysis Unit - Centralized Operations Division

2025-10-14

Provided by Gary Goode

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

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

Condition Count	Chloracne	Non-Hodgkin's Lymphoma	Carcinoma of the Lung	Respiratory cancers, including cancers of the lung, larynx, trachea and bronchus	Soft tissue sarcoma	CA Prostate	Prostate Cancer	Multiple Myeloma	Leukemias	Chronic Lymphocytic Leukemia (CLL)	Type 2 Diabetes	Parkinson's Syndrome / Disease	Acute or subacute transient peripheral neuropathy	Ischemic Heart Disease	Total
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

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

Condition Count	Chloracne	Non-Hodgkin's Lymphoma	Carcinoma of the Lung	Respiratory cancers, including cancers of the lung, larynx, trachea and bronchus	Soft tissue sarcoma	CA Prostate	Prostate Cancer	Multiple Myeloma	Leukemias	Chronic Lymphocytic Leukemia (CLL)	Type 2 Diabetes	Parkinson's Syndrome / Disease	Acute or subacute transient peripheral neuropathy	Ischemic Heart Disease	Total
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	Chronic Lymphocytic Leukemia (CLL)	27020-2
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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 aurally 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 were 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 it 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 were 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 Hamburger 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 saw 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-leaved 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.

G e n e t i c D a m a g e I n
N e w Z e a l a n d V i e t n a m
W a r
V e t e r a n s

Participants Report

Prepared by Louise Edwards
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ABSTRACT

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.

ACKNOWLEDGEMENTS

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.

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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.

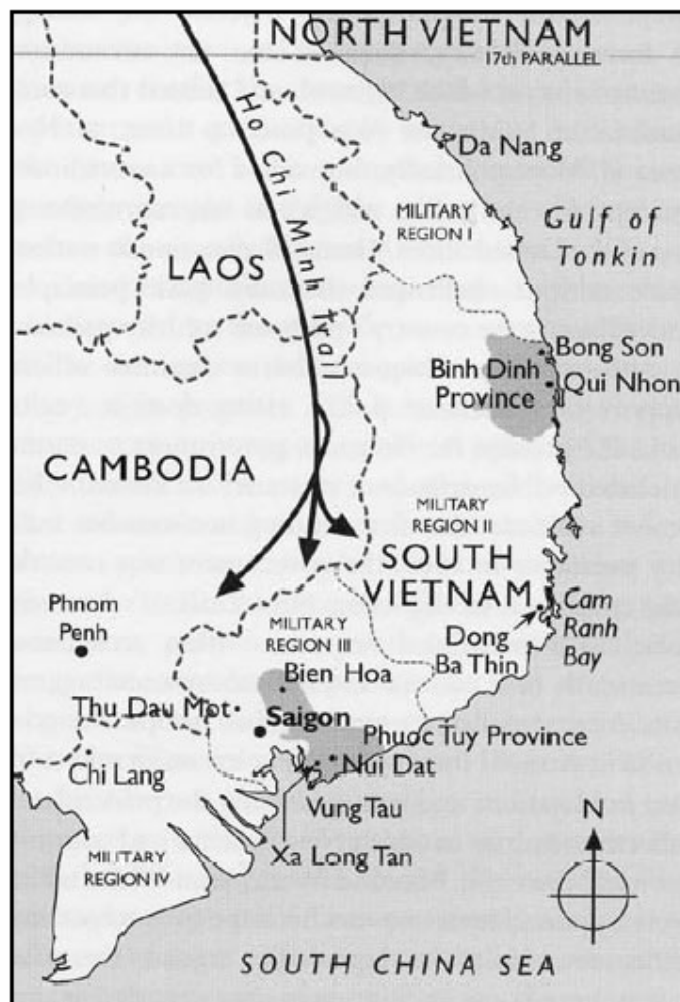


Figure 1.1 South Vietnam 1965-1972

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; Schechter *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. Furthermore, 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 CHAPTER TWO: LITERATURE REVIEW

2.1 Agent Orange and Health Effects

Over the duration of Operation Ranch Hand, 6 major herbicides were aerially sprayed: 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-trichlorophenoxyacetic 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 teratogenicity¹ (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-dichlorophenoxyacetic 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 studies 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 (Industria Chimica 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 tarda² (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 Blue³ and Agent White⁴. 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.

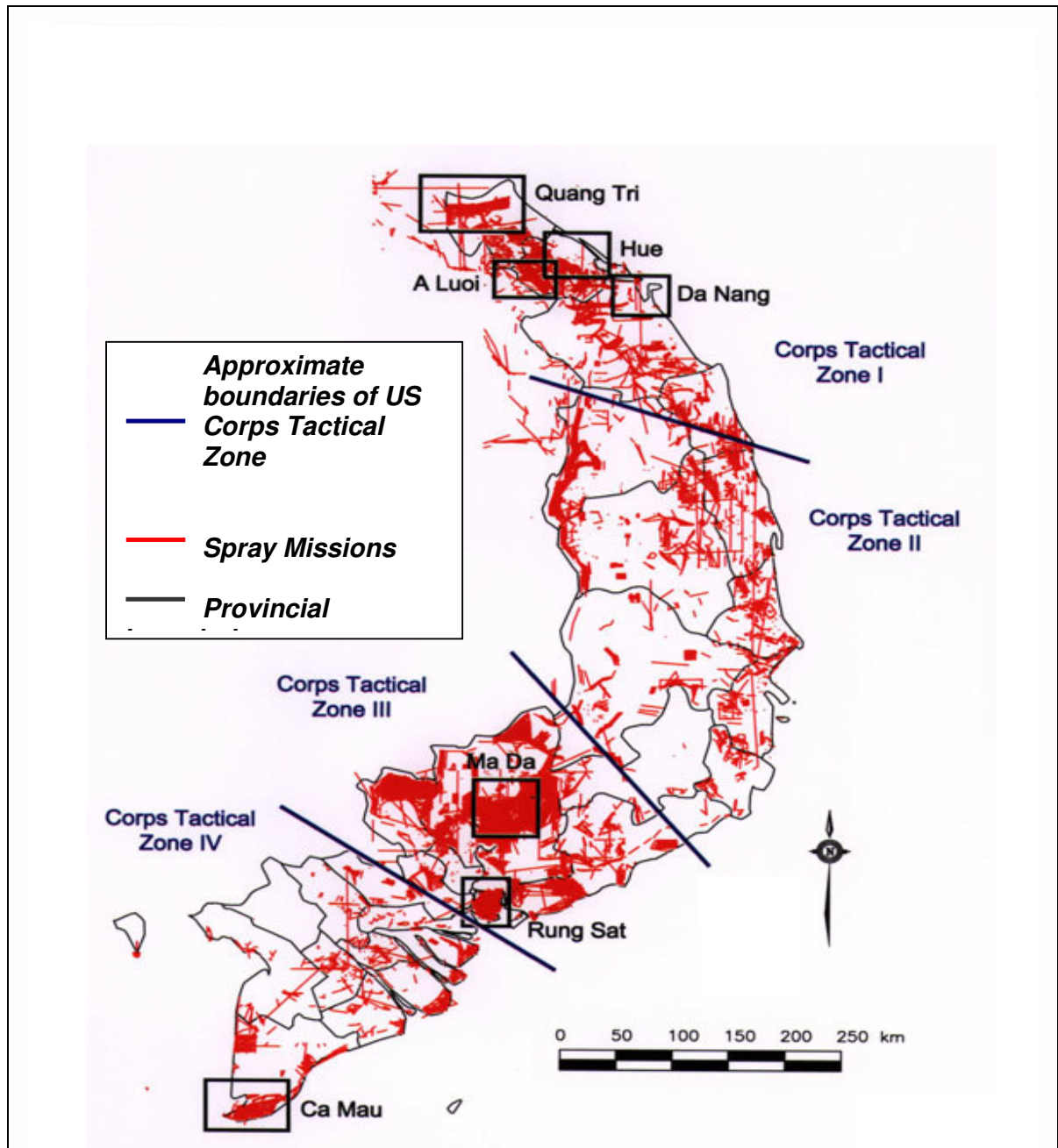


Figure 2.3 Map of Agent Orange Spraying

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 clastogenicity⁵ 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 clastogen 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.

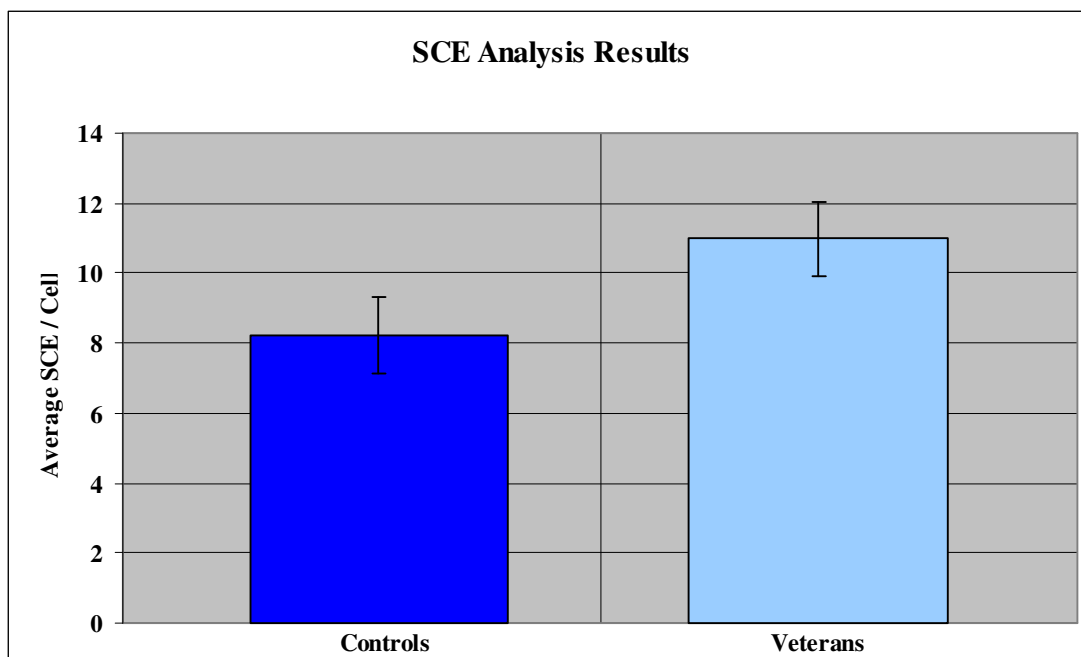


Figure 3.1 SCE Analysis Results

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.

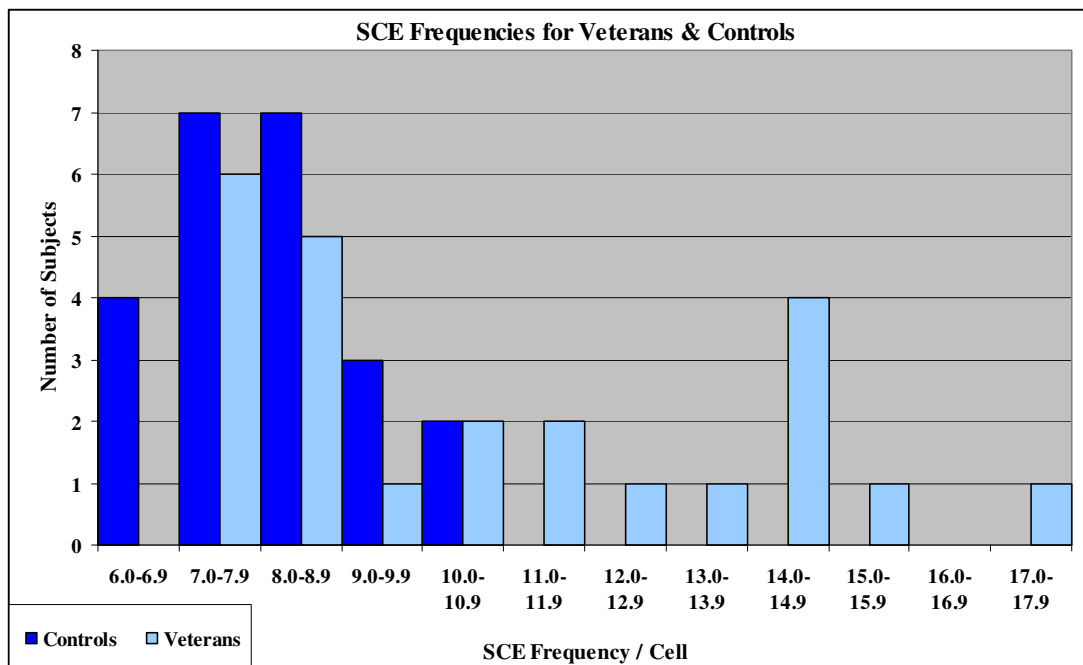


Figure 3.2 Plot of SCE Raw Data

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 <nggoode@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
nggoode@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

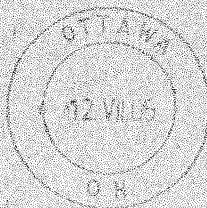
As of March 2024: "Given the comprehensive nature of this report, an additional inquiry is not planned at this time." No inquiry has been called.

National Défense
Defence nationale

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Director
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National Defence Headquarters
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Ottawa, Canada K1A 0K2

Mrs. Gail Radford-Ross
206 - 1233 12 Avenue SW
Calgary, Alberta
T3C 3R6



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	

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

From: Mohanna S@ADM(HR-Mil) DCOS FHP@Ottawa-Hull
Sent: Wednesday, 26 May, 2004 16:32
To:
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)

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
 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 to 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.

7/7/2004

A0090075-1-000001

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

7/7/2004

A0090075-2-000002

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

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).
 His name:

s.19(1)

s.19(1)

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 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,

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
 Prانبuri 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 colleague and friend s.19(1) also spoke of this and was diagnosed 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 recognized 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 immunoglobulins. 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)

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)

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**

MEDIA BRIEFING27 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 REMIND 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

DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON
CLASSIFIÉS

- 2 -

"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

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 15:12 613 945 6823
DIVULGUE EN VERTU DE LA LAI RESEIGNEMENTS NON 613 945 6823 TO 9954519
CLASSIFIES from Colonel R.G. HALL, UNCLASSIFIED WITHOUT ATTACHMENTS

P.01/03

COMBAT TRAINING CENTRE



CENTRE D'ENTRAINEMENT AU COMBAT

Headquarters
Combat Training Centre
Canadian Forces Base Gagetown
Oromocto, New Brunswick
EOG 2PO

13. March 1985

Dear *Don,*

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 personnel.

s.20(1)

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 MP10 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,

Gray

s.19(1)

s.20(1)

UNCLASSIFIED WITHOUT ATTACHMENTS

A0090079-1-000048

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 because 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

20 min. 26 sec

19 min. 57 sec

s.19(1)

s.20(1)

30 min. 43 sec

** TOTAL PAGE.03 **



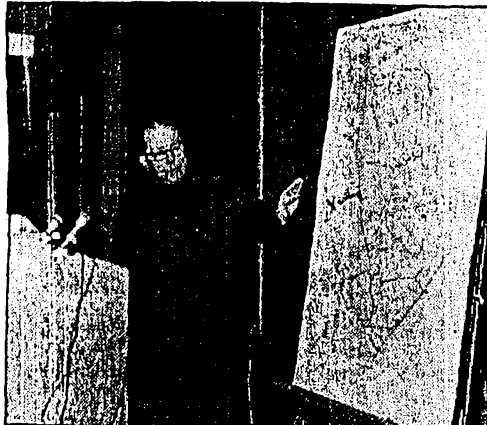
BASE GAGETOWN GAZETTE

Director of Cdn Forces Hqs
National Defence Headquarter
Ottawa, Ontario
K1A 0K2

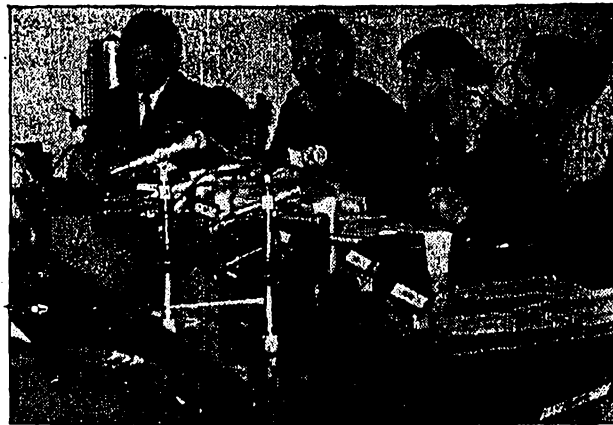


Co

Defoliant Use Sparks Con



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, LCol R. Popp, explains the situation to Brigadier-General G.R. Cheriton, 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 Sargeant (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 to tour 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 Officer LCol 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



Terry Sargeant, MP (NDP Selkirk-Interlake) visit last week. Simon de Jong (NDP Regina East), the Commander's aide.

cent of the training areas 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 herbicide brush 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

Continued P. 2

DIVULGUE EN VERTU DE LA LAI RESEIGNEMENTS NON CLASSIFIES

Director of Cdn Forces History
1 Defence Headquarters
Ottawa

Vol 21 No. 5

Tuesday, 04 Feb. 81



Combat Training Centre

s Controversy



Engineers answers one question. LCol R. Pepper, S03 Ops Capt T. Burnle, Chief of Staff Col W.H. Batt, General Cheriton and SSO Ops LCol R.G. Hurley.



MP (NDP Selkirk-Interlake) is welcomed by the Commander on his L. Simon de Jong (NDP Regina East) is partially hidden behind Capt D. Commander's aide.

training area is military Col Hurley and the base training battle secondary areas. 1000 will be on herbicide control, and Col the training sprayed every six years, it 0-50 million claim it. He rs cleared axes and on the camp ened up in

d P. 2

RCR Band Concert — Valentine Theme —

1430 hrs, 08 Feb 81

Base Theatre

Free Admission

Bring Your Honey

And Come Early!

2 The Gagetown GAZETTE

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 DyCler 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.

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 affidavits 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 250 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 affidavits. When asked if officials from the base had confirmed the existence 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 been cordoned off and placed out of bounds to all military and civilian personnel 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 deter-

mine 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.

Identifying 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.

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."

*TRC/Scandrett
Dartmouth
28/01/84*

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 run-around 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.

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 manoeuvres 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."

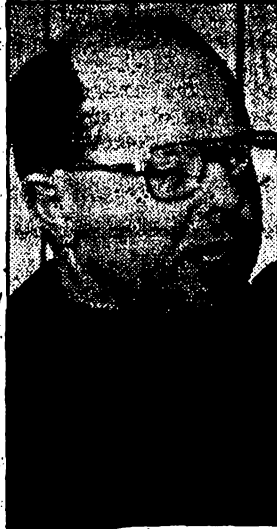
Hurley Claims No Proof Harmful Chemicals Used

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 similar 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,



Col. Ray Hurley

birch, spruce, hemlock and pine.



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 similarities 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)

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 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., 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 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 identified 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 financially 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."



GAZETTE



Wednesday
April 3, 1985
mercredi
3 avril 1985
Vol 25 No 13

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

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 con-

cluded 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 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 car-



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 Traversa, Environment Canada hazardous waste section and George Lindsay, Environment Canada.
(Daily Gleaner Photo by Louella Billings)

ry out a ground water monitoring programme.

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.

DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON CLASSIFIÉS

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/CPD on this, however I am anticipating I will be told to use the ATI process. FHP must have a 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 reports of applicat. no, what used & test results given to Sgt Warren (PMEO) as per Maj Davies' instructions.

s.15(1)

s.16(2)(c)

*W.H.
 Asst Prop 0
 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

DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON
CLASSIFIÉS**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
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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 reports of applicant's, what used + test results given to Sgt Warren (PMEO) as per Maj Davies' instructions.

s.15(1)

s.16(2)(c)

-----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

*W.H.
 Asst Prop 0
 7 May 04.*

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.dsops@nhq

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

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CLASSIFIÉS



National
Défence

Défense
nationale

7795-3 (Comd)

Headquarters
Combat Training Centre
Canadian Forces Base Gagetown
Oromocto, New Brunswick
EOG 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.H.C. Brassard
Lieutenant-Colonel
Acting Commander

Enclosures: 2

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Information

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SSO Tech Svcs
SSO Ops
ESurg

BRIEFING ON THE
CFB GAGETOWN HERBICIDE CONTAINER
DISPOSAL AREAS
TO
MEMBERS OF THE
PROVINCE OF NEW BRUNSWICK CABINET
ON 24 JANUARY, 1985

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

JOINT TO
SITE 4

BY

s.20(1)

s.20(1)

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.

JOINT TO
SITES
5, 6, 7

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

SLIDE 1 ON

ON

INFORMED THE MEDIA AND CND

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

PROTECTION SERVICES AND NATIONAL DEFENCE HEADQUARTERS RESULTED IN A DECISION TO 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 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 TORCON 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).

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.

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

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
CHP 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,

JHP 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.

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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

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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 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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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.

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,
3 PPB ALACHLOR, 127 PPB

FULL SITE EXCAVATION

135 EMPTY CRUSHED DRUMS

398 EMPTY UNCRUSHED DRUMS (331 TORCON 101)

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

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 ORGANIC-HALOGENS, CALCIUM, MAGNESIUM,
SODIUM, POTASSIUM, SULPHATES, CHLORIDES,
ALKALINITY, TOTAL KJEL DANI-NITROGEN

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

DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON
CLASSIFIÉS

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. Gallagher	Minister of Health	
Mrs. Claire Morris	DMin Health	
Dr. Walters	Health	
Mr. Brian Barnes	DMin Environment	
Mr. Dave Besner	Dir Environmental Research	

DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON
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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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- 2 -

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 SPECIES. 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 PERSISTENCE 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 STERILIZATION 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.

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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 SPECIES OF BRUSH PRESENT (SEE ANNEX B) WHICH WAS APPROPRIATE FOR ACRES WHERE THERE WERE 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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- 4 -

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 FROM 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 ORDNANCE;
- 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 FORMED 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 AGREES WITH THE PROGRAM, THAT THE PROVINCIAL AND FEDERAL GOVERNMENT 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.

DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON
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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	230,040	7,575 Ac	TORDON 101	1.6 GAL/Ac	405
		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	222,351	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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DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON
CLASSIFIÉSANNEX 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	<u>550</u>
TOTALS	<u>\$5,418,429</u>	<u>131,033 Ac</u>			6,504

ANNEX C

TO

DATED: JAN 85

1966 COMPOUNDS TESTED BY

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1966 COMPOUNDS TESTED BY DEPT OF FISHERIES AND FORESTRY *

2, 4-D

2, 4, 5-F

TORDON 101

(* - VARIOUS RATES AND MIXTURES OF COMPOUNDS USED)

C-1

ANNEX D

TO

DATED: JAN 85

1967 COMPOUNDS TESTED

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1967 COMPOUNDS TESTED BY DEPT OF FISHERIES AND FORESTRY *

DICAMINE

2, 4, 5-T

2, 4, 5-T

TCA

BENZOIC ACID

PICLORAM

(* - VARIOUS RATES AND MIXTURES OF COMPOUNDS USED)

D-1

DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON
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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, NBD OE, 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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- 2 -

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 CIVILIAN COMMUNITY WAS EVER EFFECTED.

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- 3 -

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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CLASSIFIÉS

- 4 -

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, HOWEVER. 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 FULLY 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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, /95-3 (TECH SVCS)

MINUTES OF A MEETINGBETWEEN ENVIRONMENT CANADA AND DNDON A CHEMICAL WASTE DISPOSAL SITEHELD AT GR 039793 IN THE CFB GAGETOWN TRAINING AREA AT 0830 HOURSAND AT BUILDING H-14 CONFERENCE ROOM AT 0930 HOURS, 18 SEPTEMBER 1984CFB Gagetown
Oromocto, NB

29 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) 3. At the site also were empty drums which were purple with a white
s.20(1) 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 cordoned off and out of bounds to unauthorized personnel.

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- 2 -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	<u>PROPOSED TERMS OF REFERENCE FOR THE INVESTIGATION OF A CHEMICAL DISPOSAL SITE</u> 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	<u>OUTLINE BRIEFING ON CFB GAGETOWN SECONDARY GROWTH CONTROL PROGRAMME</u> 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 seems 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 Gaagetown 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	<u>DISCUSSION OF PROPOSED TERMS OF REFERENCE FOR THE INVESTIGATION OF A CHEMICAL DISPOSAL SITE</u> 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	<u>FORMULATION OF THE PLAN TO MEET THE TERMS OF REFERENCE</u> 12. <u>General</u>. 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 Gaagetown 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. <u>Details of Phase 1.</u> 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. 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); (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; (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; (4) resources to be available at the chemical disposal site at 0800 hours 25 September 1984 are the following: (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 (1/4) 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,	Range Control Officer, OC CE Coy Mr Walter, OC CE Coy SSO Maint, OC CE Coy S02 Tech, Environment Canada OC CE Coy

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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 between 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. 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; (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. <u>Details of Phase 2.</u> 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 contractor to do some or all of the following: (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. normal contracting procedures will be used. Walter will send whatever helpful documents he	S02 Tech OC CE Coy, Mr Travers OC CE Coy Mr Walter

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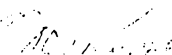
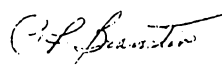
ITEM	DISCUSSION	ACTION BY
	can find to assist with drafting the spec. NDHQ/DCE is to approve the spec before tendering begins; c. funding is to be worked out between FMC and OC CE Company. Mr Travers stated that an operation in Amherst, NS in 1978 involving retrieval of 120 drums of PCBs took seven working 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 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. <u>Details of Phase 3.</u> 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.	SSO Maint, OC CE Coy Maj Rushton
V	<u>MEDIA ATTENTION</u> 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. (Note: On 20 September 1984 Mr Lindsay requested 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	Capt Scandrett
s.15(1)	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 b. Conservation Council of New Brunswick. 19. Capt Scandrett asked for direction regarding release	Capt Scandrett All s.19(1)

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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 <u>open</u> with the public on this matter. 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. <u>Adjournment</u>. 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. Kellys Brigadier-General Commander <u>DISTRIBUTION LIST</u> <table><tr><th><u>Action</u></th><th><u>Information</u></th></tr><tr><td><u>External</u></td><td>C Adm SSO Ops</td></tr><tr><td colspan="2">NDHQ/DCE FMCHQ/SSO MAINT Environment Canada: Mr. G.D. Lindsay District Director Environmental Protection Service</td></tr><tr><td colspan="2">Mr. I.C. Travers Atlantic Region Environmental Protection Service</td></tr><tr><td><u>Internal</u></td><td></td></tr><tr><td colspan="2">SO2 Tech OC CE Coy BP10</td></tr></table> <td>Capt Scandrett</td>	<u>Action</u>	<u>Information</u>	<u>External</u>	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		<u>Internal</u>		SO2 Tech OC CE Coy BP10		Capt Scandrett
<u>Action</u>	<u>Information</u>													
<u>External</u>	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														
<u>Internal</u>														
SO2 Tech OC CE Coy BP10														

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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 CR 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

18 Sep 81

Col. Hurley,

Attached are some of the data sheets that show the correlation between 2,4,5-T and TCDD (as TCDD as in p. 62)

s.15(1)

The greatest concentrations occur in the

n-butyl formulations and Canadian species called for iso-butyl formulations. Therefore it is unlikely that high concentrations of TCDD were present in the chemicals applied by us from 1966-1967. However, the info positively identifies n-butyl ester formulations of 2,4,5-T were employed during the 1966 and 1967 use at Jagatsum. Total, 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 (I think) 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 Ag Canada to ensure that I have left nothing out.

Yours truly

Phil Galt

DIVULGUE EN VERTU DE LA LAI RENSEIGNEMENTS NON CLASSIFIES

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

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 phenoxy herbicides 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

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-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-T₄CDD 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-T₄CDD has not been found in 2,4-D at the detection limit reported by Agriculture Canada (1 µg.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-T₄CDD. 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-BW⁻¹.d⁻¹. By comparison, the highest no-effect level documented for 2,3,7,8-T₄CDD in rats is 0.125 µg.kg-BW⁻¹.d⁻¹ (≈ 16 000 times less than that for 2,7-D₂CDD).

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:

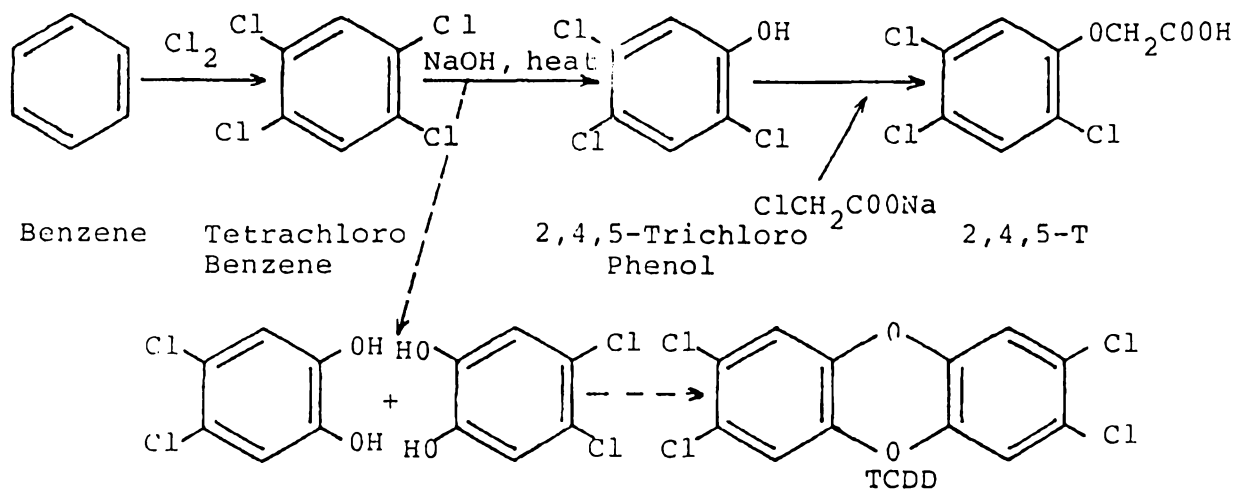


Figure 3. Synthesis of 2,4,5-T from trichlorophenol and possible contamination with 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) during the alkali treatment.

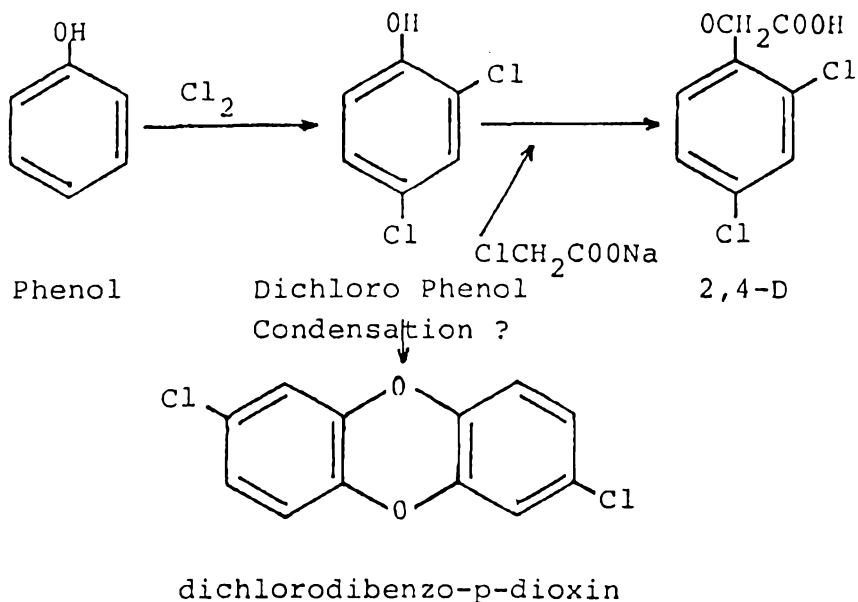


Figure 4. Synthesis of 2,4-D. Alkali treatment is not involved. Condensation reactions could theoretically produce less toxic "dioxins" - e.g., dichlorodibenzo-p-dioxin.

Results of Field Tests to Study Human Exposure to 2,4,5-T Application
 DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON
 CLASSIFIÉS



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 alcohol, 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 Alzheimer Laboratory in Fayetteville. The methods used have been shown to be precise to the 10 parts per billion level. We attempted not only

y T. L. Lavy, University of Arkansas

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.

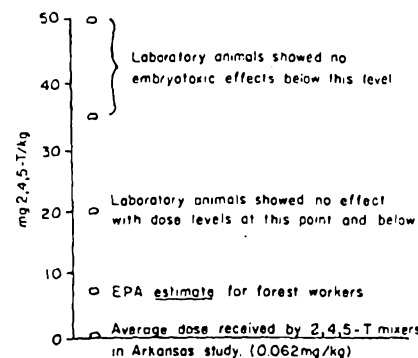


Fig. 1. Comparisons of Arkansas Field test results with 2,4,5-T information from other studies.



Fig. 2. Backpack sprayers preparing to spray.

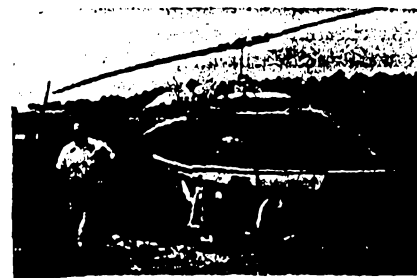


Fig. 3. Helicopter with spray boom.

Page(s) 000106 to/à 000107

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

15(1)

**of the Access to Information Act
de la Loi sur l'accès à l'information**

DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON
CLASSIFIÉS.

MEMORANDUM

COPY

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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

2. Impact extending northwest including sentry posts #3 and #2 2055 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) 166 Ground Spray

1959	Nil	Nil	Nil
.60	1. Area Bounded: N: Camp Argonaut S: Heliport E: Lindsay Brook W: Town Limit Line	504	Aerial Spray/Fixed Using
	2. Area 2	1017	Aerial Spray/Fixed Using

A0090122-2-000109

Admote

2 km to Geary

Nil

Nil

32 oz 2,4,5 T in

1 km to Burton Station

Mix 20% fuel oil

80% water 3.5 gal/acre

32 oz 2,4,5 T in

2 km to Haneytown

Mix 20% fuel oil

80% water 3.5 gal/acre

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
1961	1. Area 6 North of Northing 78	11	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 by Northing 78 S. Northing 78 E. Easting 96 W. Easting 94	104	Aerial Spray/Fixed Using	40 oz 2,4,5 T in mix 20% fuel oil 80% water 4 gal/acre	7 km to Forpeet's Corner
	3. Leffield Impact	111	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

<u>YEAR</u>	<u>AREA</u>	<u>ACREAGE</u>	<u>APPLICATION METHOD</u>
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	1281	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	1401	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

A00901

<u>CHEMICAL</u>	<u>NEAREST COMMUNITY</u>
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	6 km to Mill Road
40 oz 2,4.0 40 oz 2,4.5 T in gal oil. 5 gal/acre	1 km to Burdon Station
40 oz 2,4.0 40 oz 2,4.5 T in	Adjacent to Hurton Station

<u>YEAR</u>	<u>AREA</u>	<u>ACREAGE</u>	<u>APPLICATION METHOD</u>	<u>CHEMICAL</u>	<u>NEAREST COMMUNITY</u>
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 2539	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 5	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	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	1281	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	6 km to Mill Pond

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 10,833 (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 Pocket Learning Range	238	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	7 km to Haneytown
	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	584	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 37 Area 17 south of Northing 78	2000	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

<u>YEAR</u>	<u>AREA</u>	<u>ACREAGE</u>	<u>APPLICATION METHOD</u>	<u>CHEMICAL</u>	<u>NEAREST COMMUNITY</u>
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 Villa
	4. Proposed Sniper Range (SP 12)	165	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, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000	3215	Aerial Spray Helicopter	1.6 gals Torden 101 in 8.4 gals water 10 gals/acre	Various distances ranging from 1 to 10 km to Petersville

A0090122-7-000114

<u>YEAR</u>	<u>AREA</u>	<u>ACREAGE</u>	<u>APPLICATION METHOD</u>	<u>CHEMICAL</u>	<u>NEAREST COMMUNITY</u>
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	1217	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	6 km to Burton Station
	3. In Area 6, 1 km North of SP 10 centered on airstrip No. 1	271	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	1 km to Law's Creek
	4. In Area 7, centered on airstrip No. 2	191	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	170	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	1 km to Mill Road
	6. Area 17	6	Aerial Spray Helicopter	1.6 gal Torden 101 in 8.4 gals water 10 gals/acre	1 km to Pleasant Valley

A0090122-8-000115

<u>YEAR</u>	<u>AREA</u>	<u>ACREAGE</u>	<u>APPLICATION METHOD</u>	<u>CHEMICAL</u>	<u>NEAREST COMMUNITY</u>
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.	3355	Aerial Spray Helicopter	T-101 1.6 gals to 8.4 gals water; 10 gals/acre	14 km to Hampstead
	3. Hersey Impact	1149	Aerial Spray Helicopter	Torden 10K pellet 30 lb/acre	4 km to Upper Gagetown

<u>YEAR</u>	<u>AREA</u>	<u>ACREAGE</u>	<u>APPLICATION METHOD</u>	<u>CHEMICAL</u>	<u>NEAREST COMMUNITY</u>
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	4463	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

INFORMATION CHART

BRUSH CONTROL

VARIOUS TRAINING AREAS

C. F. B. GAGETOWN N.B.

I G N A T I O N of A R E A S		Acreage (net)	Year of application.										Remarks	
			1970	1971	1972	1973	1974	1975	1976	1977	1978	1979		1980
			Method of application.											
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'	'H/P'						
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. 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.

A0090122-11-0041

TOTAL VALUE OF CONTRACTS:		Summary 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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							</

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.

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.											Remarks
		1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	
		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'	-	-	-			
Light Mortar Range	855	-	-	'H'	-	-	-	-	Pellets	-		PELLETS - Acres changed 8/12/77	
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	3,009	-	-	'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 areas	
" " " " " " " " 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 Treatment. 'M' = Mechanical Clearing. 'S' = Sterilization.

RELEASED UNDER AIA INFORMATION ACT
 DIVULGUE EN VERTU DE LA LOI
 CLASSIFIED
 INFORMATION NON CLASSIFIEE

A0090122-13-00
 0320

S U M M A R Y

S H E E T

	Y e a r o f a p p l i c a t i o n .																					
	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														
T o t a l	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				
AV' AGE COST PER ACRE:																						
Air Spray	21	32		26 55		29 64		29 54		28 58		27 25		28 75		30 03		29 65				
Ground Spray				* 19 05		# 12 11				** 12 12					*** 37 00							
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-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 Granular Spray with T-10K PELLETS

** = Cost per acre of Helicopter Spray (Application: One (1) Imperial gallon 2,4-D; 2 gals Oil; (7 gals Water; per acre.

A0090122-14-000121

S-15(1)

DIVULGUÉ EN VERTU DE LA LAI RENSEIGNEMENTS NON
CLASSIFIÉS

IN REPLY PLEASE QUOTE

17605-G2 TD 6164 (DCDEB)

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
(R. Hall)/dk
DCDEB 3-3-3
20718

1160
8/7
Distribution
PLEASE ADDRESS REPLY TO
Chief of the Defence Staff
Canadian Forces Headquarters
Ottawa 4, Ontario.
Attention: Mr. A. L. Pierce, DCDEB.

Page(s) 000123 to/à 000129

**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**

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

*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.