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DRDC Suffield Contaminated Sites:

A Compendium of Past and Present Sites

J.J. Fitzgerald
Defence R&D Canada – Suffield

Special Publication
DRDC Suffield SP 2002-107
September 2002

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J.J. Fitzgerald
DRDC Suffield

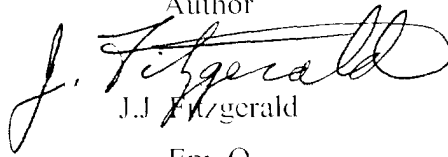
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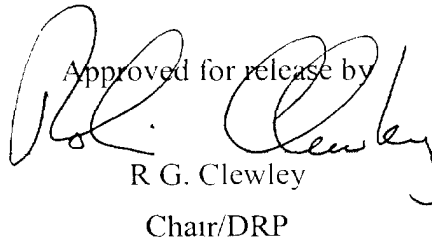
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Abstract

In July of 2002 the Treasury Board of Canada Secretariat, which maintains the Federal Contaminated Sites Inventory database of contaminated sites in Canada released this information to the general public through the internet. In an effort to further clarify what contaminated sites exist at CFB Suffield this report has been compiled. The information presented was gathered by reviewing existing publications held at DRDC Suffield and through discussions with present staff. It is not meant as an in-depth historical record of all past contaminated sites, but rather a review of the present status of known and perceived contaminated sites. This document identifies all of our known contaminated sites, details remediation progress to date and also identifies future planned actions.

Since 1972, DRDC Suffield has embarked on various projects to clean up remnants of our past practices. From 1989 to 1991, under Project SWIFTSURE, the Department spent approximately 18 million dollars removing and destroying chemical agent and ordnance. However, even with this effort there still remained unconfirmed contaminated sites. To assess the problem of unknown site contamination, two separate ecological risk assessments by Golder and Associates, one in 1997 and the other in 2002, have been performed on 17 suspected contaminated sites. Of these, nine have been confirmed as posing an ecological risk.

Plans are now being made to establish remediation procedures for these nine sites. The first step in this process has been taken with the ecological risk assessments. The next phase will be to determine what remediation option should be applied to each site. In 2002, a remediation options analysis study will be carried out, which will provide the necessary recommendations for remediation action.

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Introduction

In July of 2002 the Treasury Board of Canada Secretariat, which maintains the Federal Contaminated Sites Inventory database of contaminated sites in Canada released this information to the general public through the internet. In an effort to further clarify what contaminated sites exist at CFB Suffield this report has been compiled. The information presented was gathered by reviewing existing publications held at DRDC Suffield and through discussions with present staff. It is not meant as an in-depth historical record of all past contaminated sites, but rather a review of the present status of known and perceived contaminated sites. This document identifies all of our known contaminated sites, details remediation progress to date and also identifies future planned actions.

Since 1941 DRDC Suffield (formerly Suffield Experimental Station and Defence Research Establishment Suffield) has used over 80 sites for a variety of activities including chemical warfare testing, explosive testing, flame thrower testing, chemical/hazardous waste disposal and more recently for the training of personnel in countering chemical and biological hazards.

Suffield's remoteness and size (over 2000 sq km) was an ideal setting for development and testing of defensive equipment and procedures. Historically, the Department operated lands within the laws, practices and environmental knowledge that existed at the time. Some of these practices have resulted in the contamination of sites. Growing awareness of this issue over the last decade has prompted the Department to integrate environmental considerations into decision-making at every level of the organization and to undertake several major initiatives to help mitigate environmental impacts.

Since 1972 DRDC Suffield has embarked on various projects to clean up remnants of our past practices. This document identifies all of our known contaminated sites, detail remediation progress to date and also identifies future actions.

Past Remediation

Since 1972 there has been an effort to remediate known contaminated sites by collecting and incinerating agents on the Experimental Proving Ground (EPG) utilizing DRDC Suffield Field Operations Section and Decontamination Group. In 1989, DND authorized an official cleanup, which was named Project SWIFTSURE. From 1989 to 1991, the Department spent approximately 18 million dollars removing and destroying chemical agent and ordnance. However even with this effort there still remained unconfirmed contaminated sites. To assess the problem of unknown site contamination, two separate ecological risk assessments by Golder and Associates, one in 1997 and the other in 2002, costing over 400 thousand dollars have been performed on 17 suspected contaminated sites. Of these, nine have been confirmed as posing an ecological risk.

Contaminated Sites

The following is a list of known or suspected contaminated sites. The "S" number designation is what is presently used in the ECONET database on the Treasury Board database to identify contaminated sites. The following DRES name is the identifier for the site as it is termed at DRDC Suffield. It should be noted that not all sites have an "S" designation because they are not in the database for one of two reasons. The sites have either been confirmed as clean or the database at the time of writing this document has not been updated.

S4129 DRES 490 Inner Fence

This site is a square area approximately 1 kilometre by 1 kilometre. Within this area there are four large craters that resulted from blast trials during the 1960s. The craters at one point were used to store barrels containing mustard. During Project SWIFTSURE the barrels were removed [1], drained and shredded. Within this area there are two non-vegetated areas. One 20 x 30 metre area was used for lewisite neutralization and the other a 30 x 60 metre area, where mustard drums and inert ordnance was shredded [2]. Presently at the craters there remains a toxic chemical residue formed from the barrels leaking in them, and at the site of shredding, some toxic scrap metal debris and surface soil contamination. Separate from these areas, there are seventeen 45 gallon sized plastic barrels of hydrolysate sludge stored along with 30 packs of low-level radioactive waste [3]. A fourth area of concern was an area where "large quantities of mustard hydrolysate were poured" [4]. This area is generally referred to as the hydrolysate land treatment area. It was noted in the RMC report that after soil testing in this area no mustard was detected. Within the same vicinity there is also concrete debris that exist from "Blast Wall Trials". The concrete is believed to be uncontaminated.

S4131 DRES Low Radioactive Burial Site

Between 1967 and 1972 low radioactive waste was disposed of in two trenches. The site was fenced in August 2001 and clearly posted. The site is operated under the Waste Management Facility Operation License AECB-WFOL-3070-6 and receives annual AECB inspections [5]. To augment these inspections there are some 37 piezometers in the area that have been used for taking groundwater and radioactivity samples to verify if there is any radioactive leaching or contamination. To date the analysis shows the radioactivity to be no higher than the local surrounding area [5]. Suffield contractor report, CR 95-21 states the Atomic Energy Board did not require the area to be fenced as it was posted with cement ground markers on all four corners [6], but due to the recent increase in oil and gas activity DRDC Suffield decided to fence the area to avoid any possibility of the site being disturbed. With the cooperation of the Suffield Industrial Range Control (SIRC), the entire area was fenced in 2001.

S4132 DRES 14 Alpha

This area encompasses an area of 225 ha which was subjected to a range clean up between 1977 and 1979 [7] and was further cleaned during Project SWIFTSURE. After SWIFTSURE, the only observable contamination is a circular area approximately 30m in diameter, which is contaminated with a high concentration of arsenic. The 1995 Environmental Baseline Study [8] identified this site as potentially being a high risk site warranting further investigation. In 1997 an ecological risk assessment was performed on 14 Alpha and identified the arsenic area and a second small area as having anomalies that may still be contaminated with unexploded ordinance [9]. Both areas still require remediation. Further to this in SSP 173, DRES EPG Site Remediation Plan (1998), there was a drum of mustard degradation products and four 45 gallon drums of arsenic and cyanide compounds listed as being on site. Since publication of that report, the drum of mustard has been removed and is stored in a metal hazardous waste storage bin at the 490 Site while awaiting destruction and the four 45 gallon drums of arsenic and cyanide compounds have been neutralized by encapsulation in concrete. These are now buried in the "ash pit" at the Base dump [10].

S4133 DRES Building 12 Site

This site, which existed from the early 1940s, consisted of Building 403 and Building 12, which housed 5 lead-lined rooms, and had 5 concrete lead-lined vats outside [11]. The outside vats were used for the storage of mustard agent. In 1973/74 the mustard in the vats was pumped out and neutralized [12]. In conversations with DRDC Suffield staff it is believed that an unknown quantity of mustard either remained between the lead and concrete or simply leaked into the soil below the vats. These vats with the lead liners were later (1976) collapsed and buried. All that remained after this was Building 12 with its lead lined rooms and Building 403. Building 12 and its 5 lead-lined rooms (which were never used to store mustard) were dismantled in 1996 and sold as scrap. Within the confines of the 5 outside buried vats it is believed that an unknown small quantity of mustard remains. Thioglycol (a mustard breakdown product) has been detected in sampling boreholes that have been drilled around the perimeter of the site. In 2001/2 there was an Ecological Risk Assessment performed by Golder and Associates for this site. Preliminary results indicate that some mustard and mustard breakdown products exist and that as much as 12000 m³ of soil is contaminated [13]. This site also has contaminated lead and reinforced concrete, which will also pose a problem for remediation and as such several different avenues of remediation will be required.

S4134 DRES 25 Pound Gun Tower (Site to be removed from ECONET database)

This site was used in the 1940s and 50s for test firing chemically-filled artillery projectiles into the ground at the base of the tower [14]. In 2001/2002 an ecological risk assessment was performed on this site. It was found that none of the contaminants screened for (pH, organic, inorganics, inorganic carbon, phosphorus and sulphur) exceeded the regulatory screening criteria [15]. Consequently, the site is deemed to be **free of chemical contamination**; no further action is planned.

S4137 DRES 490 Site West Area (Site to be removed from ECONET database)

This area excludes the 490 Inner Fence Area, 604 Layout, 490 Compound (Buildings) and the Flammable Storage Area. It is an area approximately 1.5 kilometres by 3.0 kilometres with a variety of old chemical/nerve agent trial sites [16]. In the fall of 2001 an extensive ecological risk assessment was performed on three of the known trial areas. The preliminary results from this study indicate that contaminants do not exceed the regulatory screening criteria [17] and consequently these areas are deemed **free of contamination**. These results confirm the hypothesis put forward in the DRES EPG Remediation Plan (1998) [18] that “all individual sites are generally considered not hazardous or contaminated as weathering over 30 years has removed chemical residue”, page 155.

S4139 DRES “G” Dump South

The “G” Dump area is approximately a 0.5 km square and “consists of nine trenches used to dispose of surplus chemicals, empty drums, shells and shrapnel, two chemical destruction areas, an area designated as the holes area and an unvegetated, burn area where mustard agent was burned” [19]. According to the 1995 Environmental Baseline Study by Bel MK “mustard and mustard by-products were also destroyed in this area by surface burning in 1962” [20]. A partial cleanup of this site was carried out between 1977 and 1979. The purposes for these trenches and destruction areas were identified as follows in the 1997 Golder Ecological report as follows:

- Trench 1 and 2 were used to dispose of surplus chemicals.
- Trenches 3, 5, 6 and 7 were used to dispose of drums, shells, and shrapnel.
- Trench 4 was used for disposal of chemical waste.
- Trenches 8 and 9 were not used.
- Separate from these trenches there were two areas used for chemical warfare agent destruction and are known as Site A and Site B [21].

During the 1977 to 1979 cleanup it was reported that all the trenches were excavated. However, in discussion with DRDC Suffield staff it was reported that excavation at one trench was halted due to experimental nerve agent aerial “darts” having been found and that with the state of existing technology to continue the cleanup was regarded as too high a risk [22].

S4140 DRES Willis Centre

This is an old site dating back to 1940 and was used until 1990 as a field laboratory, disposal workshop and storage site for chemical warfare agents [23]. There were two toxic buildings, dating back to 1942, on this site and report SSP 173 suggested the best way to remove these

would be by incineration [24]. In 2000, the buildings at this site were demolished and burned. Within the fenced compound there are two toxic residue disposal pits, one having been used for a drain from the laboratory workbench, the other for disposal of waste/residue [25]. Remediation options for this site were given in CR 97-21 but have yet to be implemented. It was proposed that the pits, where toxic waste would have accumulated, be excavated and the contents be removed to a hazardous waste landfill.

S4141 DRES Gate 4 Dump

This site consists of eight trenches. Five (trenches 1, 2, 3, 6 and 7) of the eight trenches were excavated during a cleanup between 1977-79. Trenches 4 and 5 were still being actively used at that time for the disposal of lab waste. The 1995 environmental baseline study [26] recommended that further assessment of this site was required to determine the extent of soil and groundwater contamination, as well as to ascertain the contents of trenches relative to a hazardous /toxic classification. To this end, an ecological risk assessment was performed in 1996/1997 by Golder and Associates. They stated this site was used for the “disposal of liquid chemical waste, laboratory glass waste, munitions and neutralized neat mustard” [27]. SSP 173, DRES EPG Site Remediation Plan, 1998, reports that trench 3 was never fully excavated and that “the excavation of pit #3 was never completed as the smell of mustard and actual mustard liquid was too intense ...” [28]. Golder and Associates at that time estimated the cost for remediation to be approximately 450K for trenches 1, 4 and 5, with no mention of trench 3, because it was thought to have been cleaned up. This site is presently fenced and warning signs are posted. Further remediation of this site is being planned.

S4154 DRES CRV7 HE Warhead Impact Area

This area is regarded as an “Unexploded Warhead Impact Area”. During 1985, 72 rockets with High Explosive (HE) Warheads and 72 Inert Warheads were test-fired; of these, 46 HE warheads failed to detonate and were never recovered [29]. This site requires sweeping for unexploded warheads and either their removal or destruction.

Sites Yet to be Included in Database

Acid Disposal Area

This area is a 30m x 30m square fenced area used between 1970 to 1988 for the disposal of detoxified lab wastes and etching acids [30]. Two areas, a well and a trench, were identified as areas of potential environmental concern in the 1997 ecological risk assessment [31]. After the analysis of ground water and soil it was recommended that the well be excavated to a 2m depth within a 2m radius of the well then backfilled and seeded with native grass. It was also recommended that the trench, be excavated to 0.5 metre of ground surface and refilled to original grade with compact, native fill, topsoil and seed. This remediation has yet to be performed, as a location for storing of the contaminated soil has not been identified.

Chemical Mixing Dump

This is a 12m x 18m fenced area that was identified in the DRES Environmental Baseline Study [32] as a possible contaminated site because it was used to temporarily store mustard hydrolysate drums during the 1970s range clean-up. During Project SWIFTSURE the drums were removed and destroyed. There remains the possibility of soil contamination resulting from leaking barrels. In 2002 an ecological risk assessment [33] was performed on this site and it has been declared **free from chemical or other contaminants**. It is to be levelled and seeded during 2002.

155mm Gun Tower

This 30m x 30m fenced area was identified in the DRES Environmental Baseline Study [34] as a possible contaminated site because it was used in the 1940s and 50s as a trial site for chemical projectiles and that an ecological risk assessment should be performed to determine whether or not any contamination exist. In 2002 an ecological risk assessment [35] was performed on this site and it has been declared **free from chemical or other contaminants**. This site is presently being utilized for other DRDC Suffield field experiments. No further remediation is planned for or required at this time.

Range and Accuracy Layout

This site has been used to evaluate chemical-filled ordnance, shock tube tests (early 1970s) ANFO tests (early 1960s), as well as for military engineering trials. The Environmental Baseline Study [36] identified the site as possibly being contaminated and recommended an ecological risk assessment be performed. In 2002, an ecological risk assessment [37] was performed on this site and it has been declared **free from chemical or other contaminants**. This site is presently being utilized for other DRDC Suffield field experiments. No further remediation is planned for or required at this time.

Willis Centre Trench

This site is south of the Willis Centre and “was established in the 1940s and may have been used as a toxic disposal trench, or a disposal/burn site” [38]. The Environmental Baseline Study identified this site as a possible contamination site and recommended further assessment. In 2002, an ecological risk assessment [39] was performed, the site was declared **free from chemical or other contaminants**. The trench will be backfilled and levelled in 2002.

Vertical Grid Layout

This is a 700m x 700m square, fenced area that was used for chemical trials between 1950 and 1990. In the Environmental Baseline Study it was assigned a medium risk of environmental impairment [40] based on past usage. Further to this, in the DRES EPG Site Remediation Plan [41] the site was identified as requiring cleanup of various types and amounts of metal, wire etc. This type of cleanup was stated to be primarily labour intensive work. Since publication of both documents, the site was cleaned in 2000 and 2001 of all large metal debris. In 2002, an ecological risk assessment was performed on the site to address the questions and recommendation posed in the Environmental Baseline Study. In this study four main target areas of disturbance and usage were evaluated. The results from this study showed that of the four target areas only one, target area 4, requires additional remediation [42]. This area has been traditionally used as a burn site, and due to the relatively small size of the burn area, the remediation recommended was to excavate the soils within this area to 0.5m depth and test for any residual contamination. If more contamination is found, further excavation will be required.

Cameron Decontamination Centre

This site was constructed in 1985 and now serves as the main chemical warfare decontamination centre for the EPG and it is also being developed as part of the Counter Terrorism Technology Centre (CTTC). The site can be divided into five main areas: Building 60, Main Compound, Hazardous Material Storage, Lagoon Area and Operation Swiftsure Complex. In the 1995 Baseline Study [43], the site was assigned a medium risk of contamination based on prior use and the fact that toxic chemicals are stored there. This report recommended that an ecological risk assessment should be carried out to determine what, if any, areas are contaminated. In 2002 an Ecological Risk Assessment was performed which found that from the “chemical analyses and bioassays, no additional remedial consideration or options are recommended for the Cameron Decontamination Centre”[44]

Serial 19 Trenches

The Serial 19 Trenches reportedly consist of five trenches [45] that were used for the storage and disposal of munitions. In addition, the dumping of mustard gas into these trenches was reported [46]. Between 1977-78 the removal of the munitions and excavation and treatment of contaminated soil was carried out. DRDC personnel reported that all trenches were located and excavated [47]. In 1990, Royal Military College (RMC) evaluated this remediation by

performing soil analysis on trenches 3, 4 and 5 and determined that “treatment methods employed ... appears to have effectively destroyed the mustard released at these sites” [48]. However in the baseline study [49] it recommends that a further study should be done to confirm this analysis, as trenches 1 and 2 could not be located during the RMC study.

Future Plans

DRDC Suffield is taking a proactive approach to sites that have been contaminated as a result of past practices. To this end, it has taken steps to clean up some areas (as demonstrated by Project SWIFTSURE) and to functionally define where remediation is required, by performing independent ecological risk assessments of suspected contaminated sites. In 2002, an options analysis will be carried out to determine what environmental remediation technologies should be utilized for cleanup of contaminated sites. From this analysis, it is anticipated that a program will be initiated to restore contaminated sites to a natural state

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7. Reference 1, pp. 162 - 166.
8. Reference 3, p. 122.
9. Reference 2, pp. 85 - 90.
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13. Golder and Associates, 2002. Final Report on Ecological Risk Assessment and Development of Remediation Options for Selected Sites on the Experimental Proving Ground (CR 2002-109), Defence Research Establishment Suffield. See pp 4-84 – 4-95.
14. Reference 1, pp. 88 - 91.
15. Reference 14, pp. 4-67 – 4-73.
16. Reference 3, pp. 125 - 127
17. Reference 14, pp 4-44.

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19. Reference 2, pp. 14–15, 63–69
20. Reference 3, pp. 119 to 121.
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23. Reference 1, pp. 199 to 201.
24. Reference 3, pp. 123–125.
25. Reference 2, pp. 14, 59–63.
26. Reference 3, pp. 116–119.
27. Reference 2, pp. 16, 78–85.
28. Reference 1, pp. 24 to 29
29. *Ibid.*, pp. 72–73.
30. Reference 2, pp. 4, 57–59.
31. Reference 1, pp. 20–21
32. Reference 3, pp. 116–119.
33. Reference 14, pp. 4-25 – 4-32.
34. Reference 3, p. 183.
35. Reference 14, pp. 4-52 – 4-58.
36. Reference 3, pp. 167–168
37. Reference 14 pp. 4-45 – 4-52.
38. Reference 3, pp. 198–199.
39. Reference 14 pp. 4-17 – 4-25.
40. Reference 3, pp. 165–166
41. Reference 1, pp. 235–238.

42. Reference 14, pp. 4-17.
43. Reference 3, pp. 173-175.
44. Reference 14, pp. 4-84
45. Reference 3, pp. 117.
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48. Reference 4, pp. 4, 14.
49. Reference 3, pp. 117-118.

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Annex A

Table A-1. Site Synopsis

SITE	PAST REMEDIATION	STATUS	DOCUMENTATION
S4132 DRES 14 Alpha	1977-1979 General Range Clean Up 1989-1991 Operation SWIFTSURE 2001 Area refenced and signed	Partial Remediation	1995 CR 95-21 Environmental Baseline Study 1997 CR 97-21 Ecological Risk Assessment and Development of Remediation Options 1998 SSP 173 DRES EPG Site Remediation Plan
S4133 DRES Building 12 Site	1970s Decommissioning of Building 12 Compound, 5 of 10 vaults collapsed and buried. 1996 Lead lined vaults/ rooms removed and building demolished	Partial Remediation	2001 DRES Building 12 Compound Mustard Containment Vaults 6 - 10 Geophysical Investigations 2002 CR 2002-109 Ecological Risk Assessment and Development of Remediation Options for Selected Sites on the Experimental Proving Grounds, Defence Research Establishment Suffield
S4134 DRES 25 Pound Gun Tower		No chemical contamination exists Site requires some debris removal	1998 SSP 173 DRES EPG Site Remediation Plan 2002 CR 2002-109 Ecological Risk Assessment and Development of Remediation Options for Selected Sites on the Experimental Proving Grounds, Defence Research Establishment Suffield

Table A-1. Site Synopsis (cont'd)

SITE	PAST REMEDIATION	STATUS	DOCUMENTATION
S4137 DRES 490 Site West Area		No chemical contamination exists Site requires some debris removal	1995 CR 95-21 Environmental Baseline Study 1998 SSP 173 DRES EPG Site Remediation Plan 2002 CR 2002-109 Ecological Risk Assessment and Development of Remediation Options for Selected Sites on the Experimental Proving Grounds, Defence Research Establishment Suffield
S4139 DRES G Dump	1977-1979 General Range Clean Up 1989-1991 Operation SWIFTSURE 2001 Area refenced and signed	Partial Remediation	1995 CR 95-21 Environmental Baseline Study 1997 CR 97-21 Ecological Risk Assessment and Development of Remediation Options 1998 SSP 173 DRES EPG Site Remediation Plan
S4140 DRES Willis Centre	2000 One contaminated lab building and one storage building removed	Partial Remediation	1998 SSP 173 DRES EPG Site Remediation Plan 1995 CR 95-21 Environmental Baseline Study 1997 CR 97-21 Ecological Risk Assessment and Development of Remediation Options

Table A-1. Site Synopsis (cont'd)

SITE	PAST REMEDIATION	STATUS	DOCUMENTATION
S4141 DRES Gate 4 Dump	1977-1979 General Range Clean Up - 7 of 9 trenches excavated and ordnance removed to 490 Area 1989-1991 Operation SWIFTSURE 2001 Area refenced and signed	Partial Remediation	1995 CR 95-21 Environmental Baseline Study 1997 CR 97-21 Ecological Risk Assessment and Development of Remediation Options 1998 SSP 173 DRES EPG Site Remediation Plan
S4154 DRES CRV 7 HE Warhead Impact Area		Remediation required Site to be added to Contaminated Site Database	1995 CR 95-21 Environmental Baseline Study 1998 SSP 173 DRES EPG Site Remediation Plan
Acid Disposal Area		Site to be added to Contaminated Site Database	1995 CR 95-21 Environmental Baseline Study 1997 CR 97-21 Ecological Risk Assessment and Development of Remediation Options 1998 SSP 173 DRES EPG Site Remediation Plan
Chemical Mixing Dump		No chemical contamination exists	1995 CR 95-21 Environmental Baseline Study 1998 SSP 173 DRES EPG Site Remediation Plan 2002 CR 2002-109 Ecological Risk Assessment and Development of Remediation Options for Selected Sites on the Experimental Proving Grounds, Defence Research Establishment Suffield

Table A-1. Site Synopsis (cont'd)

SITE	PAST REMEDIATION	STATUS	DOCUMENTATION
155mm Gun Tower		No chemical contamination exists	1995 CR 95-21 Environmental Baseline Study 2002 CR2002-109 Ecological Risk Assessment and Development of Remediation Options for Selected Sites on the Experimental Proving Grounds, Defence Research Establishment Suffield
Range and Accuracy Layout		No chemical contamination exists	1995 CR 95-21 Environmental Baseline Study 1998 SSP 173 DRES EPG Site Remediation Plan 2002 CR 2002-109 Ecological Risk Assessment and Development of Remediation Options for Selected Sites on the Experimental Proving Grounds, Defence Research Establishment Suffield
Willis Centre Trench		No chemical contamination exists	1995 CR 95-21 Environmental Baseline Study 2002 CR 2002-109 Ecological Risk Assessment and Development of Remediation Options for Selected Sites on the Experimental Proving Grounds, Defence Research Establishment Suffield

Table A-1. Site Synopsis (cont'd)

SITE	PAST REMEDIATION	STATUS	DOCUMENTATION
Vertical Grid Layout	1977-1979 General Range Clean Up 1989-1991 Project SWIFTSURE 2000 Removal of metal debris	Minor remediation required	1995 CR 95-21 Environmental Baseline Study 1998 SSP 173 DRES EPG Site Remediation Plan 2002 CR 2002-109 Ecological Risk Assessment and Development of Remediation Options for Selected Sites on the Experimental Proving Grounds, Defence Research Establishment Suffield
Cameron Decontamination Centre	1989-1991 Project SWIFTSURE	No further remediation required	1995 CR 95-21 Environmental Baseline Study 2002 CR 2002-109 Ecological Risk Assessment and Development of Remediation Options for Selected Sites on the Experimental Proving Grounds, Defence Research Establishment Suffield
Serial 19 Trenches	1977-1979 General Range Clean Up	No further remediation required	1990 Summary Overview of Soil and Groundwater Investigations at DRES 1991 DRES September 1990 Field Report 1995 CR 95-21 Environmental Baseline Study

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List of symbols/abbreviations/acronyms/initialisms

DND	Department of National Defence
HE	High Explosive
DRDC	Defence Research and Development Canada
DRES	Defence Research Establishment Suffield
CTTC	Counter Terrorism Training Centre
RMC	Royal Military College
CR	Contractor Report
SSP	Suffield Special Publication

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DOCUMENT CONTROL DATA		
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1 ORIGINATOR (the name and address of the organization preparing the document Organizations for who the document was prepared, e.g. Establishment sponsoring a contractor's report, or tasking agency, are entered in Section 8) Defence R&D Canada – Suffield	2 SECURITY CLASSIFICATION (overall security classification of the document, including special warning terms if applicable) Unclassified	
3 TITLE (the complete document title as indicated on the title page Its classification should be indicated by the appropriate abbreviation (S, C or U) in parentheses after the title) Suffield Contaminated Sites: A Compendium of Past and Present Sites		
4 AUTHORS (Last name, first name, middle initial If military, show rank, e.g. Doe, Maj John E) Fitzgerald J J		
5 DATE OF PUBLICATION (month and year of publication of document) September 2002	6a NO OF PAGES (total containing information, include Annexes, Appendices, etc) 19	6b NO OF REFS (total cited in document) 49
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13 ABSTRACT

In July of 2002 the Treasury Board of Canada Secretariat, which maintains the Federal Contaminated Sites Inventory database of contaminated sites in Canada released this information to the general public through the internet. In an effort to further clarify what contaminated sites exist at CFB Suffield this report has been compiled. The information presented was gathered by reviewing existing publications held at DRDC Suffield and through discussions with present staff. It is not meant as an in-depth historical record of all past contaminated sites, but rather a review of the present status of known and perceived contaminated sites. This document identifies all of our known contaminated sites, details remediation progress to date and also identifies future planned actions.

Since 1972, DRDC Suffield has embarked on various projects to clean up remnants of our past practices. From 1989 to 1991, under Project SWIFTSURE, the Department spent approximately 18 million dollars removing and destroying chemical agent and ordnance. However, even with this effort there still remained unconfirmed contaminated sites. To assess the problem of unknown site contamination, two separate ecological risk assessments by Golder and Associates, one in 1997 and the other in 2002, have been performed on 17 suspected contaminated sites. Of these, nine have been confirmed as posing an ecological risk.

Plans are now being made to establish remediation procedures for these nine sites. The first step in this process has been taken with the ecological risk assessments. The next phase will be to determine what remediation option should be applied to each site. In 2002, a remediation options analysis study will be carried out, which will provide the necessary recommendations for remediation action.

14 KEYWORDS, DESCRIPTORS or IDENTIFIERS

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