

Report Summary

Task 2B : Environmental Site Assessment of CFB Gagetown, NB

Background / Introduction

Jacques Whitford Limited (Jacques Whitford) was contracted by Public Works and Government Services Canada (PWGSC), on behalf of the Department of National Defence (DND), to conduct an Environmental Site Assessment (ESA) in the Range and Training Area (RTA) at Canadian Forces Base Gagetown (CFB Gagetown) in Oromocto, New Brunswick, Canada. The site assessment is part of a commitment made by the Federal Government of Canada to identify and report on the historical use of herbicides applied in the RTA between 1952 and the present. Herbicides were historically used for vegetation control for military training reasons that included reducing fire hazards and allowing clear line of sight on impact zones for artillery training. Other uses included herbicide trials conducted in collaboration with the United States Department of the Army (USDoA) as well as the Canadian Forestry Services (CFS) on specific plots of land within the RTA in 1966 and 1967.

The initial step in the planning of the site assessment was to determine, through document reviews, which specific areas within the RTA received applications of herbicides, as well as what types of herbicide were applied, and in what year. The initial field program was designed to determine the presence/absence of herbicides in environmental media by collecting surface soil, soil core, surface water, sediment, groundwater, and vegetation samples, in areas that had been historically sprayed, as well as from areas that were well away from these spray areas and that had never been sprayed (background locations for comparison). Samples were then sent to accredited laboratories for chemical analyses.

Field and Laboratory Programs

The field sampling program was performed by Jacques Whitford engineers, scientists, and technicians between September 28, 2005 and November 9, 2005. The program included the collection of a total of 1250 samples in the CFB Gagetown RTA. The breakdown of samples collected included 1063 surface soil, 7 soil cores, 30 sediment, 30 surface water, 12 groundwater (from existing potable water wells at the bivouac sites) and 108 vegetation samples. These numbers do not include the additional samples collected and analysed to satisfy quality assurance and quality control requirements for the project.

Samples collected during the field program were submitted to the primary contracted lab, Research Productivity Council Laboratories (RPC) of Fredericton, New Brunswick. Due to the large number of samples for analysis, RPC sub-contracted specific analyses for the soils, sediment and water samples to TESTMARK Laboratories Ltd. (Testmark) of

Garson, Ontario. As well, vegetation samples were sent to Enviro-Test Laboratories (ETL – now ALS Laboratories) of Edmonton, Alberta. Analyses were completed between November 2005 and March 2006.

The samples were analyzed for the following chemicals: paraquat, diquat, dioxins and furans (dioxins), bromacil, diuron, hexazinone, imazapyr, triclopyr, glyphosate, 2,4-D, 2,4,5-T, picloram, dicamba, dinoseb, 2,4,5-TP, 2,4-DP, dalapon, pentachlorophenol, hexachlorobenzene, pentachlorobenzene, tetrachlorobenzene, and arsenic. The selection of laboratory analyses was dependent on the herbicides applied in each area.

Results

Based on the laboratory tests performed, only concentrations of dioxins and arsenic in some of the soil samples exceeded the Canadian soil quality guidelines. The minor exceedance of arsenic in surface soils was detected in Background Area 3 and is presently considered representative of the local geology. The highest concentrations of dioxins in soil were found in the location of the 1967 USDoA test plots. Concentrations slightly above Canadian guidelines of dioxins in soil were also found in the Clones bivouac site, the Murphy bivouac site, the Enniskillen Range, the 1966 US DoA test plots, and four other discrete sites in the RTA. In a proactive precautionary measure, DND has restricted site access to areas where dioxins concentrations were the highest (1967 USDoA Test Plots) as well as where human exposure to surface soils would be the most concentrated (in the bivouacs) until the results of a site specific risk assessment are completed.

Only one sediment sample had a dioxins concentration that slightly exceeded the recommended Canadian sediment quality guideline (collected in Swan Creek Lake). This slight exceedance was not considered to be significant as all sediment sample results from the RTA are comparable to results from samples taken in the background areas.

Chlorinated benzenes were detected in one groundwater sample from the Clones bivouac; however, no Canadian drinking water quality guidelines for these chlorinated benzenes exist to compare results to. Groundwater and surface water samples had concentrations of dioxins less than the Ontario Ministry of the Environment drinking water quality objective, which was used as a comparison due to the absence of a Canadian drinking quality guideline.

Vegetation samples were collected from the areas of the 1966 and 1967 USDoA test plots, the Canadian Forestry Service trials (1966-1967) test plots, and in the three Background areas. Overall, there is no significant difference in vegetation dioxins concentrations in all of these areas. To note; no quality guidelines exist to compare results to. Instead, the results were used as an indication of plant uptake in comparison to background concentrations for future assessment work should that be required.

Only five other chemicals analyzed by the laboratories were found at measurable concentrations in the samples submitted. These are: 2,4,5-T, 2,4-D, dicamba, and

picloram, from one soil sample in the Enniskillen Range, and pentachlorophenol in one sample from Background Area #3. Furthermore, 2,4-D was also reported in two vegetation samples. The measured concentrations of all these chemicals were below their applicable criteria where these exist. The remaining chemicals analyzed were not detected in any of the samples submitted to the laboratory.

Recommendations

To address the concentrations of chemicals found above recommended generic quality guidelines in the RTA at CFB Gagetown, a detailed quantitative risk assessment should be conducted. This risk assessment will provide an understanding of the nature and magnitude of risk and effects of exposure to those concentrations of chemicals on humans and/or ecological receptors. The risk assessment will determine the requirement for the development of site-specific soil, sediment, and water quality guidelines for CFB Gagetown. Thus new criteria (where they do not exist) and/or adjustments to the existing generic quality guidelines can be developed to reflect the unique activities and environmental conditions that exist within the RTA and allow DND to determine if further investigative work is warranted. The risk assessment should also assess the suitability of the groundwater at the Clones bivouac for chlorinated benzene compounds, and the need for further ecological sampling beyond vegetation (i.e., collection and analysis of soil invertebrates, additional discrete soil plant pairs, or small mammals) on land and in sediments.

The areas that are proposed for further sampling include: (1) the 1966 and 1967 USDoA test plots, (2) Clones bivouac, (3) Murphy bivouac, (4) APEC 4 - area immediately west of the Base Administrative boundaries, (5) APEC 6 – Argus impact area/Grenade range, and (6) APEC 13 – Areas 28, 27, 26, & 21 of the RTA. It is also recommended that soil samples originally collected in APEC 7 – Greenfield impact area/TOW range and in APEC 6 – Argus impact area/Grenade range, but not submitted for analysis based on the strategic approach used, be analyzed for dioxins. As recommended above, the results of these analyses should be compared to newly derived site-specific criteria based on the results of the risk assessment.