Carswell/Plant 4

FINAL
BASELINE RISK ASSESSMENT FOR THE FOCUSED FEASIBILITY STUDY

Restoration Advisory Board Executive Summary #36 ● August 8, 2002

INTRODUCTION

The Former Carswell Air Force Base (AFB) is in the process of conducting a Focused Feasibility Study (FFS). The FFS is being conducted through the combined efforts of the Air Force Center for Environmental Excellence (AFCEE), the Air Force Base Conversion Agency (AFBCA), and Aeronautical Systems Center (ASC). The objective of the FFS is to develop and evaluate remedial options that would allow the transfer of Federal land (i.e., surrounding Carswell Golf Course). Currently, this property is controlled by the Base Realignment and Closure (BRAC) program, which transfers land for suitable public use. To support the FFS and the transfer of property, a Baseline Risk Assessment was conducted so that the appropriate remedial action objectives can be established.

BACKGROUND

The Risk Assessment covers the property currently operated by the golf course as depicted in Figure 1. A portion of the property contains groundwater contaminated with trichloroethene (TCE) emanating from upgradient source areas. The risks involved with the TCE plume along with any other contaminants on site were evaluated through a Human Health (HHRA) and Ecological Risk Assessment (ERA).

The following HHRA exposure scenarios were evaluated in the Risk Assessment:

- Residents possibly exposed to groundwater through ingestion, inhalation of volatiles released by tap water, dermal contact, and inhalation of soil gas vapors trapped in basements
- Construction workers possibly exposed to groundwater through dermal contact, inhalation of volatiles in an excavation, and incidental ingestion
- Recreational users possibly exposed to surface water and sediment by incidental ingestion and dermal contact, and to fish by ingestion
- Trespassers possibly exposed to surface water and sediment by incidental ingestion and dermal contact
- Maintenance workers possibly exposed to surface water and sediment by incidental ingestion and dermal contact

HHRAs evaluate two types of threats to human health:

- Non-cancer Hazards (example: irritation of eyes and lungs from inhalation of acetone)
- Carcinogenic Risks (potential for exposure to a carcinogen, such as TCE, to cause cancer)

Some chemicals may pose both non-cancer hazards and also be carcinogens. Non-cancer Hazards are calculated by determining a threshold value for exposure below which there will be no adverse effect. The reference dose is an estimate of this threshold value. The risk assessment estimates a person's intake of a certain chemical and divides that by reference dose to yield hazard quotient. If the hazard quotient is less than 1, then that level of contamination is considered to have no health effects.

Any exposure to a carcinogen can result in a potential for cancer. The potential for a particular carcinogen to induce cancer is estimated by the cancer slope factor. The cancer slope factors are calculated by epidemiologists based on laboratory studies. The risk assessment estimates a person's intake of each chemical and multiplies that by the cancer slope factor to yield a probability that the exposure will result in the development of cancer. The EPA's target risk range is 10^{-6} (one in a million) to 10^{-4} (one in ten thousand). The risk assessment and the feasibility study do not recommend an exact risk number (e.g. 10^{-5}); instead a risk management decision is made by the remedial project managers.

HHRA Results

Based on the calculations from the HHRA, carcinogenic risks are within the EPA target risk range across the

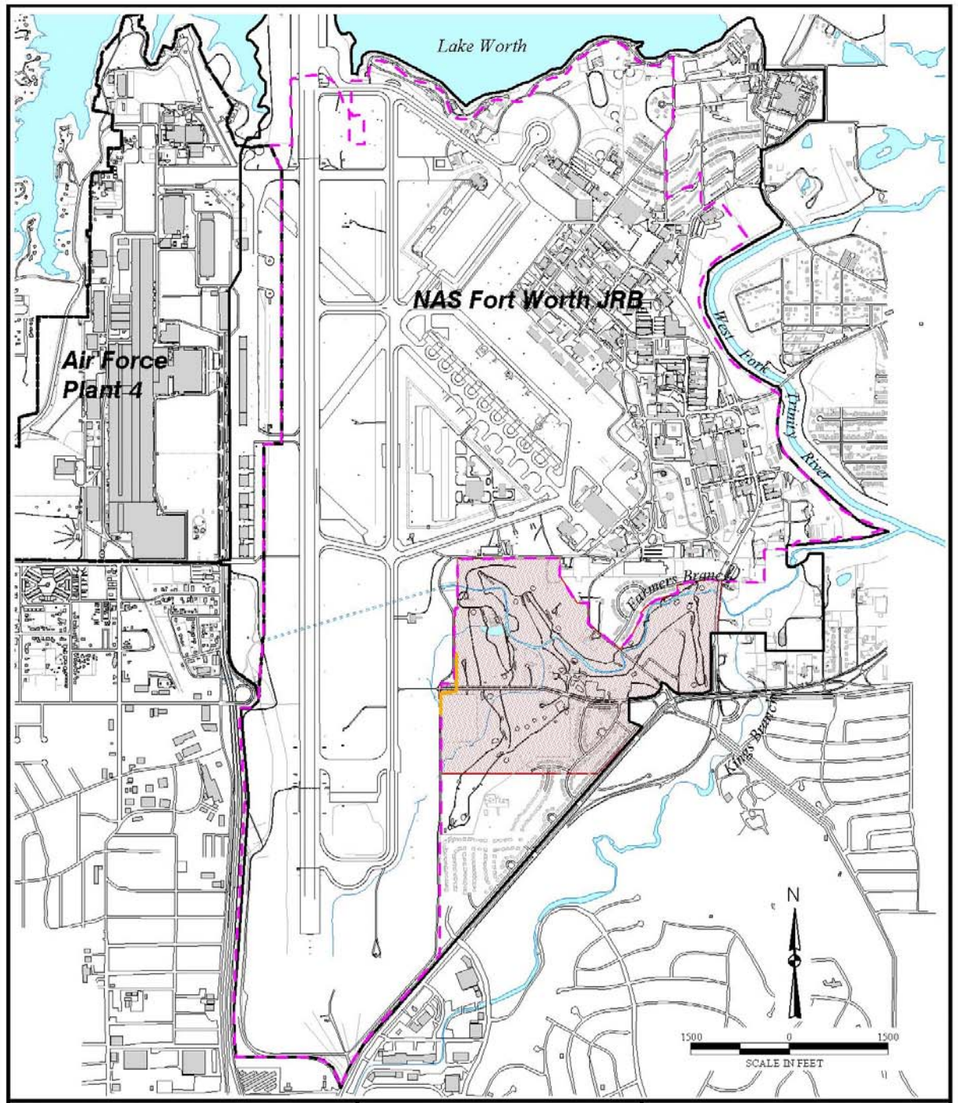
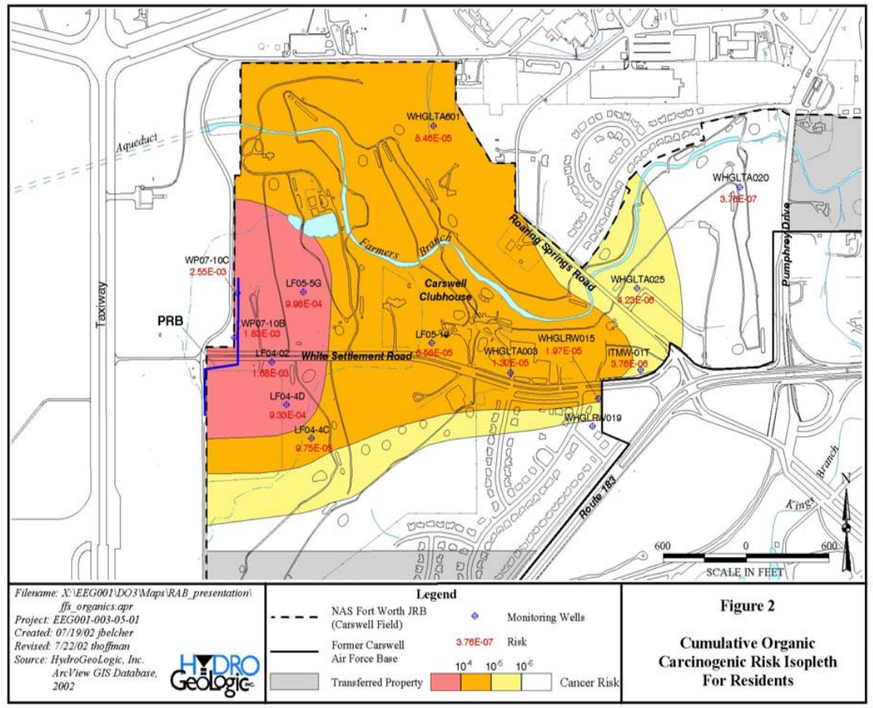


Figure 1
Area Covered by Risk Assessment and Focused Feasibility Study



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Created: 07/19/02 jbelcher
Revised: 7/22/02 thoffman
Source: HydroGeoLogic, Inc. ArcView GIS Database, 2002

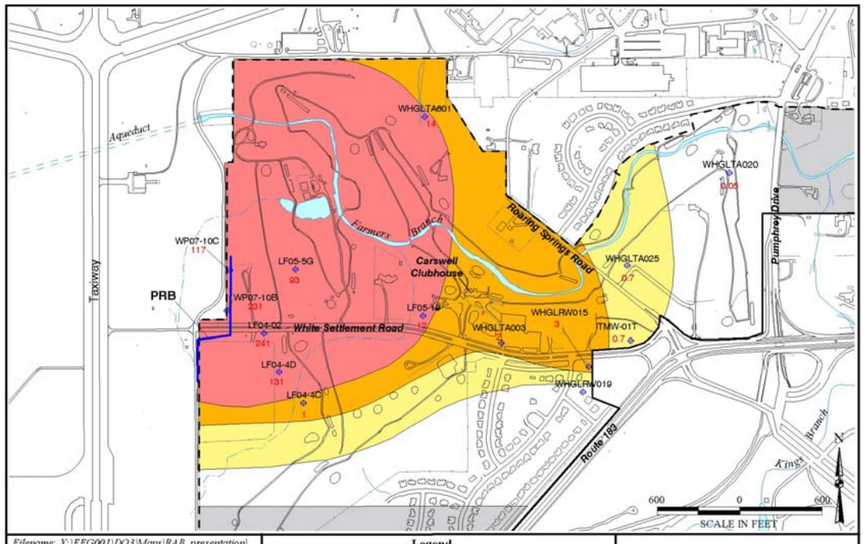
HYDRO GeoLogic

Legend

NAS Fort Worth JRB (Carswell Field)
Former Carswell Air Force Base
Transferred Property
Monitoring Wells
3.76E-07 Risk
10^{-4} 10^{-5} 10^{-6} Cancer Risk

Figure 2

Cumulative Organic Carcinogenic Risk Isopleth For Residents



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Legend

NAS Fort Worth JRB (Carswell Field)
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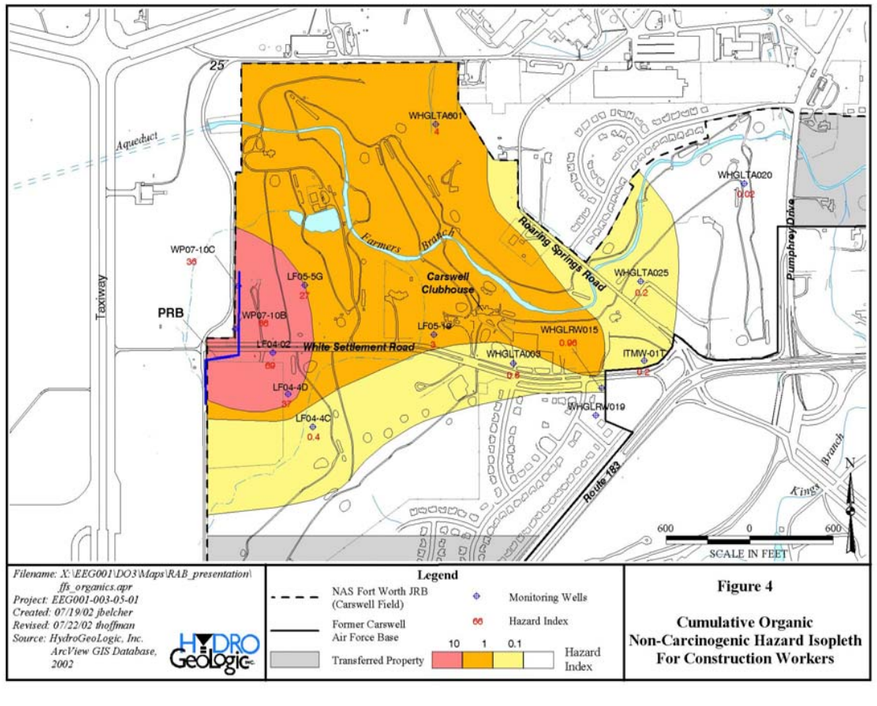
Monitoring Wells
93 Hazard Index
10 1 0.1 Hazard Index

Figure 3

Cumulative Organic Non-Carcinogenic Hazard Isopleth For Residents



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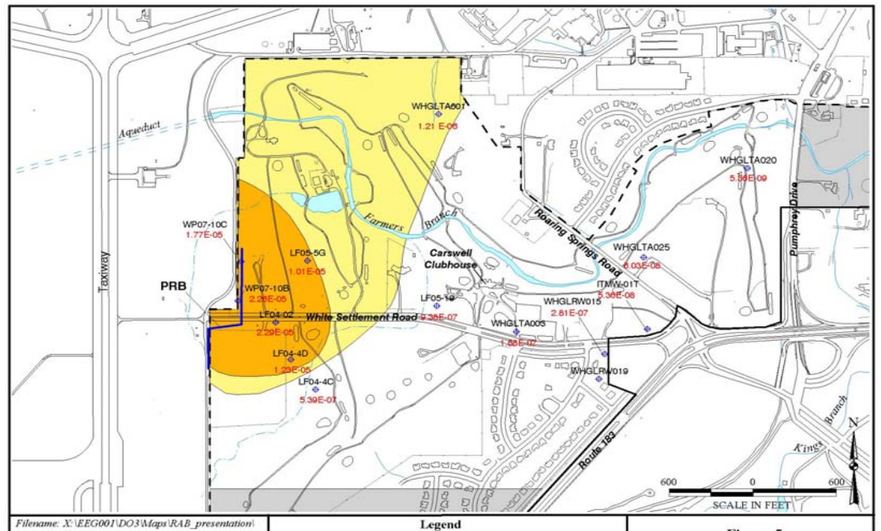
10 1 0.1 Hazard Index

Figure 4

Cumulative Organic Non-Carcinogenic Hazard Isopleth For Construction Workers



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Monitoring Wells
3.76E-07 Risk
10^{-4} 10^{-5} 10^{-6} Cancer Risk

Figure 5

Cumulative Organic Carcinogenic Risk Isopleth For Construction Workers

BRAC property. Cumulative carcinogenic risks and non-cancer hazards are below the target values (no unacceptable health threats) for the Trespasser, the Maintenance Worker, and the Recreational User.

Carcinogenic risks associated with use of the groundwater were calculated based on an age-adjusted resident. For this receptor, it is assumed that the individual spends 6 years as a child and 24 years as an adult on the site. Cumulative carcinogenic risks in the current residential area within the EPA target risk range. Cumulative carcinogenic risks in the vicinity of SWMU 22 (Landfill 4) and the golf course maintenance shed exceed EPA target risk range as depicted in Figure 2.

Non-cancer hazards associated with use of the groundwater were calculated for a child resident. Non-cancer hazards exceed the target value in the northwest section of the property as depicted in Figure 3. Dominant contributors were TCE and *cis*-1,2-DCE. Chloroform and VC also contributed. Other contaminants contributed negligibly.

Carcinogenic risks were evaluated for age-adjusted resident. Taking into account the barrier effect of the foundations found on houses, risks from inhalation of soil vapors are below EPA target risk range.

Excluding the foundation barrier effect, risks are within or below the EPA target risk range except for one small area located immediately downgradient of the Permeable Reactive Barrier (PRB) (which should decrease the concentrations to acceptable levels).

Implications for Residents:

- Do not use the shallow groundwater as a source of potable water (the residents currently receive water from public supplies).
- Intrusion of soil gas into basements does not appear to be a problem because existing residences are in an area of low soil gas concentrations and most buildings in the area do not have basements
- Plume concentrations, and hence the soil gas concentrations, should reduce over time due to the PRB. Non-cancer hazards in the northwestern section of the BRAC property exceed the target value of 1.0 for the Construction Worker as depicted in Figure 4. The majority of these hazards are due to TCE. Vinyl chloride (VC) and *cis*-1,2-dichloroethene (*c*is 1,2-DCE) also contribute. The carcinogenic risks are within the 10^{-5} range or lower as depicted in Figure 5.

Assumptions/Implications for the Construction Workers:

- Assumed that excavation intersects the groundwater table. In this part of the property, groundwater levels range from more than 20 feet to 30 feet below ground surface. Ensuring that any excavation does not intersect the groundwater table will substantially non-cancer hazard.
- Assumed zero reduction in TCE, *c*is 1,2-DCE and VC concentrations by the PRB. The PRB will reduce the TCE concentrations and therefore the non-cancer hazards associated with TCE. The first round of PRB sampling results are pending.
- Assumed the construction worker present in the excavation for 8 hours per day, each working day of a single year. Reducing hours in the excavation will reduce non-cancer hazard.

Ecological Risk Assessment Results

All cancer risks and non-cancer hazards are below EPA limits for surface water and sediment. No significant risks to aquatic or sediment-associated receptor populations or to wildlife that may prey on these populations were determined to exist.

For More Information:

If you would like more information, please see our website at http://www.afcee.brooks.af.mil/er/carswell/nasfw/ or contact George Walters, the Aeronautical Systems Center, Wright-Patterson Air Force Base, OH, at 1-800-982-7248 Ext, 416 or via e-mail at George.Walters@wpafb.af.mil.