GROUNDWATER PESTICIDE CONTAMINATION IN SELECTED AQUIFERS OF THE LOWER FRASER VALLEY

BC RESEARCH

Report

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Groundwater pesticide contamination in selected aquifers of the Lower Fraser Valley.

K-J Liebscher

Project 4-03-471

GROUNDWATER PESTICIDE CONTAMINATION IN SELECTED AQUIFERS OF THE LOWER FRASER VALLEY

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ACKNOWLEDGEMENTS

Thanks are extended to Will Gaherty and Philip Ross of Norecol Environmental Consultants Ltd. for their participation in the collection of the samples and the hydrogeological interpretation.

Gratitude is expressed to Mary Ellen Patton, Department of Earth Sciences, University of Waterloo for the enriched tritium results.

INLAND WATERS PESTICIDE SAMPLING DATABASE

RESULTS

DINOSEB CONCENTRATIONS

LOCATOR NO	DATE	TP-SEC	ADDRESS	DINOSEB
D26	02/20/89	07-24	2438 210ST	0.020 ppb
F03	01/23/89	13-01	W SIDE TOWNLINE RD 300M S OF HUNT	0.020 ppb
D24	02/13/89	13-04	245 BRADNER	0.850 ppb
D41	02/13/89	13-04	28469 BOUNDARY	0.100 ppb
D02	02/13/89	16-05	490 CLEARBROOK	0.090 ppb
D09	01/26/89	16-06	512 TOWNLINE	0.060 ppb

Total number of detected samples = 6

Average Dinoseb Concentration (detected samples) is 0.190 ppb

Total Samples taken = 52.

frequency: $\frac{6}{52} = 0.12$ or 12%

Results submitted to IW by B C Research

1.0 SUMMARY

A total of fifty-one groundwater samples were collected from aquifers in the Lower Fraser Valley, British Columbia. Four of the samples originated from federal piezometers, five from provincial piezometers and forty-two from domestic wells. Each sample was analyzed for a selection of target pesticides. The samples were also analyzed for enriched tritium and nitrate/nitrite. Five samples contained detectable amounts of pesticides such as diazinon, chlordane, dimethoate and endosulfan. Simazine and atrazine were also detected at trace levels in several of the samples. Non-target neutral extractable compounds were also detected in twenty-three samples. Dinoseb was detected in six of the acid extractable samples. Non-target acid extractable compounds were detected in thirty-seven samples. The volatile compound, 1,2-dichloro- propane, was found in 11 sites and in 2 other samples at trace levels. The non-target volatile compound, 1,3-dichloropropene was found in one sample. Glyphosate was not detected in any of the samples. The areas for sampling are ones identified as having surface recharge.

A review of the well logs indicates that the majority of wells are relatively shallow and strategraphic information for those wells indicates that the majority have coarse materials extending from the surface to the screened interval. There was no correlation observed between nitrate/nitrite and pesticide contamination. None of the samples have tritium concentrations indicative of pre-1950's water. The generally high nitrate/nitrite levels supports the contention that the area is vulnerable to surface originated contamination. At least 57% of the wells exceed Canadian drinking water standards for nitrates.

This study has established that pesticide contamination does occur in this area, but there is insufficient data to evaluate the hydrogeologic settings of the examined wells. In order to provide more details on local contaminant hydrogeology further studies are recommended. They would include vertical control, more extensive and aggressive water

level measurement, collection of pump rates and hydraulic response testing. This approach would be used to examine several selected wells which have been identified as being contaminated with pesticides.

2.0 INTRODUCTION

The Inland Waters Directorate of Environment Canada, Pacific and Yukon Region initiated a study to investigate groundwater pesticide contamination in aquifers of federal interest in the Pacific and Yukon region. Information available to Environment Canada showed 39 active pesticide ingredients currently in use in British Columbia. Of the 39 active ingredients, where useage exceeds 5,000 kg, 30 were ranked as "high priority" by Agriculture Canada's pesticide re-evaluation program. Although recent research and monitoring has identified groundwater pesticide contamination in aquifers in the Lower Fraser Valley, information on levels of contamination is scarce and incomplete.

A contract was subsequently let to B.C. Research Corporation for collection and analysis of water samples from piezometers and domestic wells in the Lower Fraser Valley.

3.0 OBJECTIVES

1. To collect groundwater samples from federal piezometers, provincial piezometers and domestic wells.

2. To provide well logs of all the wells and piezometers sampled.

3. To carry out chemical analyses of groundwater samples for target pesticides and enriched tritium.

4. To prepare a final report summarizing and interpreting the data.

4.0 PROCEDURE

4.1 Sampling

B.C. Research prepared all glassware and chemicals for sample collection. All samples were collected by staff from Norecol Environmental Consultants. The sites were chosen in consultation with the scientific authority. For each site, separate samples were collected for neutral and acid extractable pesticides in one gallon pre-cleaned glass bottles. For preservation, acid was added to the acid extractable pesticide bottle at the rate of 0.75 mL of 18 N sulfuric acid per litre. A sub-sample was taken from the neutral extractable bottle for the analysis of 1,2-dichloropropane. A separate sample was taken in a polyethylene bottle for glyphosate.

is this acceptable?

Samples for enriched tritium analysis were collected in 500 mL Nalgene bottles, filled to the brim without rinsing. The samples were shipped to the University of Waterloo for analysis. Sub-samples were taken in 100 mL polyethylene bottles for nitrate/nitrite analysis and forwarded to the scientific authority for analysis.

Samples were collected from fifty-one sources, including forty-two private domestic wells, four federal piezometers and five provincial piezometers. The samples were collected from the locations listed in Table 1. The geographical locations are illustrated in Figure 1. Federal and provincial piezometer installations were sampled using dedicated Waterra pump systems. Samples were collected from private wells using the existing domestic pump/delivery systems. The samples were collected from these systems recognizing that the sample integrity can be affected. Available information on the domestic wells, collected during each sampling visit, was logged on a standard log sheet. Copies of these logs are included as Appendix A.

+ NO_3 + wells

FIGURE 1

LOCATION OF SAMPLE SITES

Legend

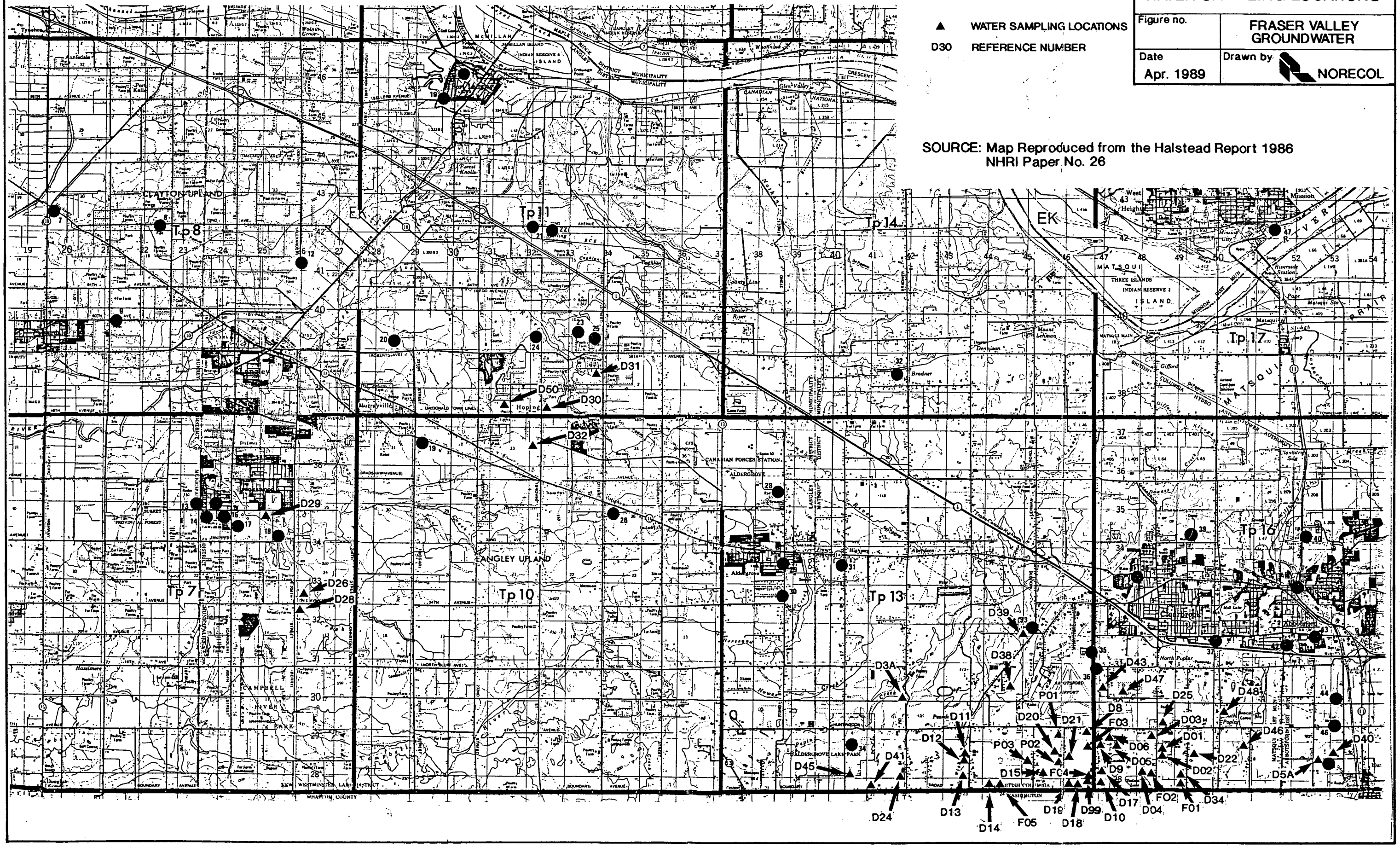
▲ WATER SAMPLING LOCATIONS

D30 REFERENCE NUMBER

WATER SAMPLING LOCATIONS

Figure no.	FRASER VALLEY GROUNDWATER
Date Apr. 1989	Drawn by: NORECOL

SOURCE: Map Reproduced from the Halstead Report 1986
NHRI Paper No. 26



Appendix

TABLE 1

LOCATION OF SAMPLE SITES

	SAMPLE CODE	SITE DESCRIPTION
		FEDERAL PIEZOMETERS:
1	F2	West side of Clearbrook 1100 m south of Huntington.
2	F3	Townline Road - West side. 300 m south of Huntingdon - across street from poultry farm.
3	F4	West side of Townline Rd. 1260 m south of Huntington.
4	F5	East of Ross on "0" Ave. at end of a north-south fenceline and treeline (cedar hedge).
		PROVINCIAL PIEZOMETERS:
5	P1-25	Hamm Rd. 150 m south of intersection of Huntington and Hamm Rd. West side of road. 25 foot depth. Site A.
6	P1-35	Same as P1 - 35 foot depth.
7	P1-50	Same as P1 - 55 foot depth.
8	P2	Hamm Rd. Approximately 1/2 mile south of the above site on west side of road. 25 foot depth. Site C.
9	P3	Mt. Lehman Rd. 1.2 mile south of the intersection of Huntington and Mt. Lehman Rd. West side. 25 foot depth. Site B.
		DOMESTIC WELLS:
10	D1	Well in old pump house at Canada Dept. Agriculture, Research Station. roughly 300 block Clearbrook Rd. - east side.
11	D2	Domestic well 20 m WSW of CDA well.
12	D3	611 Clearbrook Rd.
13	D4	197 Clearbrook Rd.
14	D5	556 Laxton Rd.
15	D6	743 Laxton Rd.
16	D8	Townline and Huntington - Mukhtiar and Sons well.

	SAMPLE CODE	SITE DESCRIPTION
17	✓D9	512 Townline Rd.
18	✓D10	80 Townline Rd.
19	✓D11	435 Ross Rd.
20	✓D12	283 Ross Rd.
21	✓D13	141 Ross Rd.
22	✓D14	29861 "0" Ave. (Boundary Rd.)
23	✓ D15	250 Mt. Lehman Rd.
24	✓D17	246 Townline Rd.
25	✓D18	30951 "0" Ave. (Boundary Rd.)
26	✓D19	50 Hamm Rd.
27	✓ D20	505 Hamm Rd. (same well as 535 Hamm Rd.).
28	✓ D21	520 Hamm Rd.
29	✓D22	356 Columbia.
30	✓D24	245 Bradner Rd.
31	✓D25	870 Clearbrook Rd.
	D26	2438-210th St.
	D28	2208-208th St.
	✓D29	205th St. at 36th Ave. Brookswood Nursery.
	D30	4362-240th St.
	✓D31	4875-248th
	D32	4270-240th St.
32	✓D34	111 Columbia St. No H_2O
33	D38	1344 Hope St.
34	D39	1831 Peardonville - Valleybrook gardens.

	SAMPLE CODE	SITE DESCRIPTION
35	D40	34227 Farmer Rd. (irrigation well).
36	✓D41	28469 Boundary Rd.
37	D43	On airport land adjacent to berry fields - 1625 Townline (?).
38	D45	202 LeFeuvre (280th St.).
39	✓D46	725 Short Rd.
40	D47	31587 Walmsley,.
41	✓D48	1240 Gladwin Rd. on city H_2O
42	D50	23441 48th St.
43	D3A	975 Bradner Rd.
44	✓ D5A	34040 Farmer Rd.
44	✓ D99	69 Townline Rd.

4.2 Analytical

4.2.1 Neutral Extractables

The neutral extractable pesticides were extracted within one day of receipt at B.C. Research. The target compounds and the detection limits are listed in Table 2.

A 3800 mL aliquot of the sample was extracted in the sample bottle twice with 100 mL of a 5:95 mix of acetone:dichloromethane and a third time with 100 mL of dichloromethane. Each extraction was carried out by mixing with a magnetic stirrer for 30 min in the gallon bottle. The raw solvent extract was passed through Na_2SO_4 into a 500 mL evaporating flask. The sample extracts were combined, rotary evaporated and made up to 4 mL in iso-octane.

TABLE 2 - Target Pesticides

Pesticide	Detection Limit (ppb)
Neutral Extractables	
Alachlor	0.1
Atrazine	0.2
Azinphosmethyl	0.2
BHC's	0.004
Captan	0.1
Carbaryl	1.0
Chlorothalonil	0.1
Dazomet	0.1
Diazinon	0.05
Dimethoate	0.05
Endosulfans	0.02
Folpet	0.1
Malathion	0.1
Metolachlor	0.5
Parathion	0.1
Phosmet	0.1
Simazine	0.1
DDT	0.02
DDE	0.01
DDD	0.02
Chlordanes	0.02
Lindane	0.001
Acid Extractables	
Dinoseb	0.02
Glyphosate	5.0
1,2-Dichloropropane	0.1

The concentrated sample extracts were analyzed on a Hewlett Packard 5890 gas liquid chromatograph (GLC) equipped with both electron capture (ECD) and nitrogen phosphorus specific (NPD) detectors. High resolution DB-5 and DB-17 capillary columns were used for the initial analysis.

Confirmation of selected sample extracts was accomplished by GLC-ECD/NPD using an alternative high resolution analytical column and/or by GC/MS/SIM (Selected Ion Monitoring). Results confirmed by these techniques are indicated as superscripts in the results entered in Tables 4-6. Selected extracts were also analyzed by gas chromatography/mass spectrometry/TIC (Total Ion Chromatograph).

4.2.2 Acid Extractables

The acid extractable pesticides were extracted within two days of receipt at B.C. Research. Dinoseb was the only target acid extractable pesticide. The detection limit for this herbicide was 0.02 ppb (Table 2).

A 3800 mL aliquot of the acidified sample was made alkaline with NaOH in the sample bottle, mixed and let stand for 0.5 hours. The sample was then acidified with H_2SO_4 and extracted three times with 100 mL aliquots of dichloromethane using a magnetic stirrer.

Each 100 mL extract was collected through acidified Na_2SO_4, combined in a 500 mL evaporating flask and methylated. The methylated extract was rotary evaporated and transferred to 4 mL of iso-octane.

The extracts were then analyzed on a Hewlett Packard 5890 gas liquid chromatograph equipped with a high resolution DB-5 and/or DB-17 capillary columns and an electron capture detector.

Results were confirmed by analyzing by GLC-EDC using an alternative high resolution analytical column and/or by GC/MS/SIM. The results confirmed by these techniques are indicated as superscripts in the results entered

in Tables 4-6. Selected samples were also analyzed by gas chromatography/mass spectrometry/TIC.

4.2.3 Glyphosate

The samples for glyphosate were stored in a frozen state and were analyzed during one continuous time period. The detection limit for glyphosate was 5 ppb (Table 2).

A 5 mL aliquot of each sample, a range of standards and reagent blank were derivatized, back extracted and analyzed on a high performance liquid chromatograph equipped with a UV/VIS detector and a C-18 (5 µm) reverse phase analytical column.

4.2.4 1,2-Dichloropropane

A sub-sample was taken from the one gallon neutral extractable bottle and extracted with hexane within one day of receipt at B.C. Research. The organic extracts were frozen and analyzed during one continuous time period. The detection limit for this compound was 0.1 ppb (Table 2).

The samples were analyzed on a Hewlett Packard 5988A GC/MS. The mass spectrometer was manually tuned (to give maximum sensitivity in the mass range of interest) and operated in a selected ion mode. The analytical column was a DB-624 (30 m x 0.32 mm ID) capillary column.

4.2.5 Enriched Tritium Analysis

Samples for enriched tritium were collected in separate bottles and analyzed through a sub-contract with the Department of Earth Sciences at the University of Waterloo, care of Ms. Mary Ellen Patton.

4.2.6 Nitrate/Nitrite Analysis

Samples for nitrate/nitrite analysis were collected in separate bottles and analyzed at the Water Quality Branch Laboratory, Environment Canada, Pacific and Yukon Branch.

water guidelines based on 1/2 l/day consumption

Bert Lukey. Jan 14/91.

613-957-1503.
Grace Wood.
Richard Tobin
- no fed/prov #s.

Guidelines for Can Drinking Water

Bert → Max

Peter. → Food ADI

[.025-.75 ppm]

Peter Bennett. As. Chem
Bureau of Chem Haz.
(Ottawa)
613 957 1706

diaz 20 ppb

Prob. OK. (@ .13 ppb)

Chlordane 7

dimethoate 20

Health Adv. US 7 ppb

endosulfan ? [Food 0.1 - 2 ppm. based on need for pest. on crops.]

Food + Stds

Don't pub. (Guidance value 10 ppb.)

Simazine ? 10

Prov. Reg.
BC Legal Limits

Atrazine 60

Ottawa working on Std → Dinoseb ? [Food 0.1 ppm. of all pest not tested.]

Dr. Peter Toft Dir. H+W
Envt Health Direct.

CP's Penta. 60 ppb. Tetra 100 [613-957-3133.]

Ontario. 1, 2 DCP ? [Not rec.]

Ontario working on std. 1, 3 DC Propene [ ] in case of spill.

Exceedances.
Could develop emerg. guidelines

Exceedances.
Guideline could be changed

Richard Tobin
957 3128

Dave worry WQB Ont.

Nastier carcin.
US Health Adv.
2 × 10-5
.2 × 10-6

6 ppb. → US Health Risk Assessment
6 × 10-5 risk of cancer
.6 ppb/1,000,000

} Carcinogen/Mutagen
Draft Doc WHO 1986.
2.5 ppb

Bert Lukey H+W.
6-3003

4.3 Quality Control for Pesticide Analysis

Quality control checks were performed prior to and during the project. All glassware, solvents, reagents and evaporation techniques were checked. Reagent blanks were run with each batch of analyses. Spike and recovery data for the target pesticide compounds are listed in Table 3.

5.0 RESULTS AND DISCUSSION

5.1 Pesticides, Enriched Tritium and Nitrate/Nitrite Results

Delete Tritium

Tables 4, 5 and 6 contain the results for the target pesticides, enriched tritium and nitrate/nitrite. These tables also contain qualitative results under the headings of "Non-Target (Neutral)" and "Non-Target (Acidic)". If non-target compounds were detected in the neutral or acidic extracts by gas liquid chromatography then the positive response was indicated by a "Y" in the table of results. Trace levels (below the specified detection limit) are indicated in the tables as a superscript which defines the mode of detection.

what are trace?

Five samples contained neutral extractable target compounds at or above detection limit. The compounds identified were diazinon (0.30 and 2.0 ppb), chlordane (0.03 ppb), dimethoate (0.05 ppb) and endosulfan (0.13 ppb). Simazine and/or atrazine were also detected at trace levels in six of the sites. Diazinon was also detected at trace levels in three samples. Non-target compounds were detected in twenty-three of the samples extracted under neutral conditions. Selected sample extracts were analyzed by gas chromatography/mass spectrometry/TIC, however no other non-target compounds were identified.

Dinoseb was found in six of the acid extractable samples and at trace concentrations in two other samples. Dinoseb ranged in concentration from 0.02 to 0.85 ppb. Non-target compounds were detected in thirty-seven samples extracted under acidic conditions. Penta- and/or tetrachlorophenol was found in twenty-one samples and the concentrations fell in the range of 0.01 to 0.1 ppb. Selected sample extracts were

TABLE 3 - Spike and Recovery Data

Pesticide	Detection Limit (ppb)	Level of Spike (ppb)	Number of Replicates	Percent Recovery (%)
Alachlor	0.1	1.0	1	99
Atrazine	0.2	1.0	3	88
Azinphosmethyl	0.2	4.0	3	75
BHC, alpha	0.004	0.1	3	106
BHC, beta	0.004	0.1	3	88
BHC, delta	0.004	0.1	3	83
Captan	0.1	1.0	1	92
Carbaryl	1.0	6.4	1	84
Chlorothalonil	0.1	1.0	1	98
Dazomet	0.1	0.5	5	0
Diazinon	0.05	0.5	5	90
Dimethoate	0.05	1.0	1	101
Endosulfan, alpha	0.02	0.1	5	98
Endosulfan, beta	0.02	0.1	5	92
Folpet	0.1	1.0	1	97
Malathion	0.1	0.5	3	85
Metolachlor	0.5	1.0	1	102
Parathion	0.1	0.5	6	85
Phosmet	0.1	1.0	1	110
Simazine	0.1	1.0	3	88
DDT	0.02	0.08	1	100
DDE	0.01	0.04	1	82
DDD	0.02	0.08	1	91
Chlordane, alpha	0.02	0.1	5	93
Chlordane, gamma	0.02	0.1	5	94
Lindane	0.001	0.1	5	92
Dinoseb	0.02	0.6	5	80
Glyphosate	5.	0.010	20	90
1,2-Dichloropropane	0.1	0.5	5	80

analyzed by gas chromatography/mass spectrometry/TIC but no other non-target compounds were identified.

The volatile target compound 1,2-dichloropropane was identified in eleven samples at or above detection limit and in two other sites at trace levels. The concentrations ranged from 0.1 to 4.6 ppb. The non-target compound 1,3-dichloropropene was found at a concentration of 3.5 ppb at site D24.

5.2 Hydrogeology Evaluation

The assessment of the hydrogeologic setting of the sampling locations is based on:

1) An assessment of published and available reports on local hydrogeologic conditions and through assessment of the topography and surface hydrology.

2) Information from the wells themselves (water levels, well logs, any response or yield information).

3) Data from enriched tritium analysis and interpretation of available chemical data on the wells.

Since the available data are limited, this study is limited with regards to the conclusions which can be drawn about the hydrogeologic systems.

Water levels were collected from few wells because access to the wells was difficult or impossible. Few wells had any geodetic controls, and consequently the well water levels that were measured could not be used to establish gradient directions.

On a large scale, the hydrogeology of the area is well understood. A comprehensive evaluation of the Lower Fraser Valley has been undertaken by E.C. Halstead under the aegis of the National Hydrology Research

Institute. This report is principally oriented to a broad discussion of water supply.

The areas selected for sampling (within Townships 10, 11, 13 and 16, Figure 1) are areas which are identified as having surface recharge. For this reason, they may be vulnerable to contamination from surface application of agricultural chemicals and wastes. The contaminants of most concern from a human health and environmental impact perspective are nutrients and pesticides. Piezometer water levels measured over time by the provincial government in this area indicate pronounced seasonal variation of groundwater levels, information that suggests direct recharge (which might contain pesticides as well as nutrients) is important in this area.

A review of well logs which were obtained (available for thirteen of the domestic wells as well as all of the government wells) suggests that the majority of the wells are relatively shallow, and stratigraphic information from those wells indicates that the majority have coarse materials extending from the surface to the screened interval.

Sites D30 through D32 and D50 are located in the Nikomekl River drainage system in Townships 10 and 11. Logs were located for wells D32 and D50. Both are screened below a clay layer. Information from the homeowners suggests that D30 and D31 are shallow. Neither of these shallow wells had any detectable pesticides, while both deep wells had detectable pesticides. No trend was observed in nitrate/nitrite based on vertical location of screened interval.

Sites D26, D28 and D29 are clustered in a small area in Township 10 and established at varying depths (32, 60 and 150 feet respectively). D26 and D29 both contained pesticides and elevated nitrate/nitrite levels. D28 had no pesticides, and the lowest observed concentration of nitrate/nitrite. No logs were available for these wells. They are identified as being in the Campbell River drainage basin.

The remaining wells are located in Townships 13 and 16. A review of the area topography and hydrology indicates that these wells are in a region

where groundwater will likely flow south across the international boundary. No obvious correlations were observed in the available data, which was not extensive.

The chemical data indicates that nitrate/nitrite is not correlated with pesticide contamination. Several wells containing the lowest nitrate/nitrite levels had detectable levels of a pesticide. In light of the generally low levels of pesticides found, confirmatory sampling would be indicated to ensure that the positive results are indeed representative of water quality in those wells.

Unfortunately, the tritium data from the domestic wells cannot safely be regarded as truly representative of the groundwater conditions since the pump/delivery systems in domestic supply situations cannot be relied upon to maintain reasonable sample integrity since tritium samples are contaminated through contact with the atmosphere. A general review of the tritium data indicates that all of the samples have been in contact with the atmosphere relatively recently. None of the samples have tritium concentrations indicative of pre-1950's water.

Past sampling of groundwaters in these Townships have indicated that nitrogen levels are high. Analytical information collected in this study supports the contention that the groundwater in this area is vulnerable to surface originated contamination. At least 57% of the wells exceed Canadian drinking water standards for nitrates and in all likelihood, if speciation were available for nitrate and nitrite, then the number exceeding drinking water standards might be 90% of the wells, since nitrites may be a major contaminant in some of the wells.

crap

6.0 CONCLUSIONS

This study has established that pesticide contamination does occur in wells in the Lower Fraser Valley, however there is insufficient readily available data to evaluate the hydrogeologic settings of those wells and therefore the hydrogeological interpretation is only general in nature.

In order to provide a more detailed description of the local contaminant hydrogeology, a program including vertical control, more extensive and aggressive water level measurement, collection of pump rates for high capacity wells, and hydraulic response testing to evaluate aquifer characteristics would be necessary. Furthermore, the results of this study suggest the need to understand the etiology of the identified pesticides. One critical question to address is: Do the identified occurrences of pesticides represent local, well-specific phenomena, or are they indicative of more widespread impacts of organic pesticides on groundwater used for domestic water supply? If more sampling is undertaken, sampling protocol design for private wells can incorporate additional measures to preserve sample integrity, even for wells in use for water supply.

In order to conduct the recommended studies, a phased approach may be most suitable. With such an approach, the next step would be to individually assess in detail several selected wells which have been identified as contaminated with pesticides. The program would be directed at establishing the source of the identified pesticide(s) and to determine if contamination in that well is a result of a well specific phenomenon of some kind, or a more general contamination occurrence. If cases of more general contamination were established, the regional groundwater flow could be investigated through physical chemical testing of existing wells in the vicinity, perhaps supplemented by additional wells specific to the program.

Y Yes
N NO
U Unknown.

NO_3 10 mg/L
NO_2 1 "

TABLE 4 - Results for Federal Piezometers

		Pesticide	Detection Limit (ppb)		F-2	F-3	F-4	F-5
				MAC				
Y	0	Alachlor		.4	0.1	-	-	-
U	3	Atrazine		3	0.2	-	-	-
U	0	Azinphosmethyl			0.2	-	-	-
Y	0	BHC's			0.004	-	-	-
U	0	Captan			0.1	-	-	-
N	0	Carbaryl		700	1.0	-	-	-
U-Y	0	Chlorothalonil		2	0.1	-	-	-
U	0	Dazomet			0.1	-	-	-
N	5	Diazinon		.6	0.05	-	-	-
U	1	Dimethoate			0.05	-	-	-
U	1	Endosulfans			0.02	-	-	-
N	0	Folpet			0.1	-	-	-
N	0	Malathion			0.1	-	-	-
Y	0	Metolachlor		EPA 100	0.5	-	-	-
	0	Parathion			0.1	-	-	-
	0	Phosmet			0.1	-	-	-
Y	4	Simazine ✓		4	0.1	-	-	-
	0	DDT			0.02	-	-	-
	0	DDE			0.01	-	-	-
	0	DDD			0.02	-	-	-
Y	1	Chlordanes ✓		.03	0.02	-	-	-
	0	Lindane			0.001	-	-	-
U	8	Dinoseb ✓		7	0.02	0.02	-	-
	0	Glyphosate			5.0	-	-	-
Y	13	1,2-Dichloropropane ✓		.6	0.1	-	4.6[4]	-
		Enriched Tritium (pCi/mL)				9.7	8.3	7.3	7.7
	24	Non-Target, Neutral			N/A	Y	-	-	-
	37	Non-Target, Acidic			N/A	Y	Y	Y	Y
		Nitrate/Nitrite			0.002[6]	10.2	10.3	22.4	18.7

1. Analyzed by GC/MS-TIC.
2. Confirmed on alternate GLC column.
3. Confirmed by GC/MS-SIM.
4. Confirmed by GC/MS-SIM using two (2) ions.
5. Trace level detected - less than detection limit.
6. Nitrate/Nitrite reported as ppm.

- WHO Guidelines
- Rob Adams - Pest Contr. Br. Ref.
- Hwy.

Carcinogenic Toxicity

what are these?

Kidney

tremors, kidneys, reprod., liver, thyroid, mainly

liver

liver, thyroid, fertility, birth defects

25 pest.
7 Carc.
3 Carc. in Ag

TABLE 5 - Results for Provincial Piezometers

Pesticide	Detection Limit (ppb)	P1-25	P1-35	P1-50	P-2	P-3
Alachlor	0.1	-	-	-	-	-
Atrazine	0.2	-[2,5]	-[5]	-	-	-
Azinphosmethyl	0.2	-	-	-	-	-
BHC's	0.004	-	-	-	-	-
Captan	0.1	-	-	-	-	-
Carbaryl	1.0	-	-	-	-	-
Chlorothalonil	0.1	-	-	-	-	-
Dazomet	0.1	-	-	-	-	-
Diazinon	0.05	-	-	-	-	-
Dimethoate	0.05	-	-	-	-	-
Endosulfans	0.02	-	-	-	-	-
Folpet	0.1	-	-	-	-	-
Malathion	0.1	-	-	-	-	-
Metolachlor	0.5	-	-	-	-	-
Parathion	0.1	-	-	-	-	-
Phosmet	0.1	-	-	-	-	-
Simazine	0.1	-[2,5]	-	-	-	-[5]
DDT	0.02	-	-	-	-	-
DDE	0.01	-	-	-	-	-
DDD	0.02	-	-	-	-	-
Chlordanes	0.02	-	-	-	-	-
Lindane	0.001	-	-	-	-	-
Dinoseb	0.02	-	-	-	-	-
Glyphosate	5.0	-	-	-	-	-
1,2-Dichloropropane	0.1	-	-	-	-[5]	0.2
Enriched Tritium (pCi/mL)		8.6	8.5	9.6	9.2	7.8
Non-Target, Neutral	N/A	Y	Y	-	Y	Y
Non-Target, Acidic	N/A	-	Y	-	Y	Y
Nitrate/Nitrite	0.002[6]	6.40	5.40	4.00	17.6	28.7

1. Analyzed by GC/MS-TIC.
2. Confirmed on alternate GLC column.
3. Confirmed by GC/MS-SIM.
4. Confirmed by GC/MS-SIM using two (2) ions.
5. Trace level detected - less than detection limit.
6. Nitrate/Nitrite reported as ppm.

delete pesticide data. Aquifer.

TABLE 6 - Results for Domestic Wells

Pesticide	Detection Limit (ppb)	D-1	D-2	D-3	D-4	D-5	D-6
Alachlor	0.1	-	-	-	-	-	-
Atrazine	0.2	-	-	-	-	-	-
Azinphosmethyl	0.2	-	-	-	-	-	-
BHC's	0.004	-	-	-	-	-	-
Captan	0.1	-	-	-	-	-	-
Carbaryl	1.0	-	-	-	-	-	-
Chlorothalonil	0.1	-	-	-	-	-	-
Dazomet	0.1	-	-	-	-	-	-
Diazinon	0.05	-[5]	-[5]	-	-	-	-
Dimethoate	0.05	-	-	-	-	-	-
Endosulfans	0.02	-	-	-	-	-	-
Folpet	0.1	-	-	-	-	-	-
Malathion	0.1	-	-	-	-	-	-
Metolachlor	0.5	-	-	-	-	-	-
Parathion	0.1	-	-	-	-	-	-
Phosmet	0.1	-	-	-	-	-	-
Simazine	0.1	-	-	-	-[5]	-	-
DDT	0.02	-	-	-	-	-	-
DDE	0.01	-	-	-	-	-	-
DDD	0.02	-	-	-	-	-	-
Chlordanes	0.02	-	-	-	-	-	-
Lindane	0.001	-	-	-	-	-	-
Dinoseb	0.02	-[5]	0.09[2,3]	-	-	-	-
Glyphosate	5.0	-	-	-	-	-	-
1,2-Dichloropropane	0.1	0.6[4]	0.2[4]	-	-	0.5[4]	-
Enriched Tritium (pCi/mL)		11.8	14.0	10.2	8.3	10.9	12.4
Non-Target (Neutral)	N/A	-	-	-	Y	-	Y
Non-Target (Acidic)	N/A	Y	Y[1]	Y	Y[1,3]	Y[1]	-
Nitrate/Nitrite	0.002[6]	13.3	15.1	13.5	6.30	16.2	2.92

1. Analyzed by GC/MS-TIC.
2. Confirmed on alternate GLC column.
3. Confirmed by GC/MS-SIM.
4. Confirmed by GC/MS-SIM using two (2) ions.
5. Trace level detected - less than detection limit.
6. Nitrate/Nitrite reported as ppm.

TABLE 6 (cont'd.) - Results for Domestic Wells

Pesticide	Detection Limit (ppb)	D-8	D-9	D-10	D-11	D-12	D-13
Alachlor	0.1	-	-	-	-	-	-
Atrazine	0.2	-	-	-	-	-	-
Azinphosmethyl	0.2	-	-	-	-	-	-
BHC's	0.004	-	-	-	-	-	-
Captan	0.1	-	-	-	-	-	-
Carbaryl	1.0	-	-	-	-	-	-
Chlorothalonil	0.1	-	-	-	-	-	-
Dazomet	0.1	-	-	-	-	-	-
Diazinon	0.05	-	-	-	-	-	-
Dimethoate	0.05	-	-	-	-	-	-
Endosulfans	0.02	-	-	-	-	-	-
Folpet	0.1	-	-	-	-	-	-
Malathion	0.1	-	-	-	-	-	-
Metolachlor	0.5	-	-	-	-	-	-
Parathion	0.1	-	-	-	-	-	-
Phosmet	0.1	-	-	-	-	-	-
Simazine	0.1	-	-	-[5]	-	-	-
DDT	0.02	-	-	-	-	-	-
DDE	0.01	-	-	-	-	-	-
DDD	0.02	-	-	-	-	-	-
Chlordanes	0.02	-	0.03[2]	-	-	-	-
Lindane	0.001	-	-	-	-	-	-
Dinoseb	0.02	-	0.06[3]	-	-	-	-
Glyphosate	5.	-	-	-	-	-	-
1,2-Dichloropropane	0.1	-	0.8[4]	0.1	-	-	-
Enriched Tritium (pCi/mL)		10.4	10.8	6.9	8.3	7.3	10.3
Non-Target (Neutral)	N/A	Y	Y	Y	Y		
Non-Target (Acidic)	N/A	Y	Y[1]	-	Y[3]	Y	-
Nitrate/Nitrite	0.002[6]	3.10	10.8	13.1	12.7	15.4	14.6

1. Analyzed by GC/MS-TIC.
2. Confirmed on alternate GLC column.
3. Confirmed by GC/MS-SIM.
4. Confirmed by GC/MS-SIM using two (2) ions.
5. Trace level detected - less than detection limit.
6. Nitrate/Nitrite reported as ppm.

TABLE 6 (cont'd.) - Results for Domestic Wells

Pesticide	Detection Limit (ppb)	D-14	D-15	D-17	D-18	D-19	D-20
Alachlor	0.1	-	-	-	-	-	-
Atrazine	0.2	-	-	-	-	-	-
Azinphosmethyl	0.2	-	-	-	-	-	-
BHC's	0.004	-	-	-	-	-	-
Captan	0.1	-	-	-	-	-	-
Carbaryl	1.0	-	-	-	-	-	-
Chlorothalonil	0.1	-	-	-	-	-	-
Dazomet	0.1	-	-	-	-	-	-
Diazinon	0.05	-	-	-	-	-	-
Dimethoate	0.05	-	-	-	-	0.05[2]	-
Endosulfans	0.02	-	-	-	-	-	-
Folpet	0.1	-	-	-	-	-	-
Malathion	0.1	-	-	-	-	-	-
Metolachlor	0.5	-	-	-	-	-	-
Parathion	0.1	-	-	-	-	-	-
Phosmet	0.1	-	-	-	-	-	-
Simazine	0.1	-	-	-	-	-	-
DDT	0.02	-	-	-	-	-	-
DDE	0.01	-	-	-	-	-	-
DDD	0.02	-	-	-	-	-	-
Chlordanes	0.02	-	-	-	-	-	-
Lindane	0.001	-	-	-	-	-	-
Dinoseb	0.02	-	-	-	-[5]	-	-
Glyphosate	5.0	-	-	-	-	-	-
1,2-Dichloropropane	0.1	-	0.4[4]	-	-	0.4[4]	-
Enriched Tritium (pCi/mL)		9.0	9.2	7.9	24.3	8.2	10.0
Non-Target (Neutral)	N/A	-	Y	Y	-	Y	-
Non-Target (Acidic)	N/A	Y	-	-	Y	Y	-
Nitrate/Nitrite	0.002[6]	0.390	27.5	34.2	-	41.5	11.5

1. Analyzed by GC/MS-TIC.
2. Confirmed on alternate GLC column.
3. Confirmed by GC/MS-SIM.
4. Confirmed by GC/MS-SIM using two (2) ions.
5. Trace level detected - less than detection limit.
6. Nitrate/Nitrite reported as ppm.

TABLE 6 (cont'd.) - Results for Domestic Wells

Pesticide	Detection Limit (ppb)	D-21	D-22	D-24	D-25	D-26	D-28
Alachlor	0.1	-	-	-	-	-	-
Atrazine	0.2	-	-	-	-	-	-
Azinphosmethyl	0.2	-	-	-	-	-	-
BHC's	0.004	-	-	-	-	-	-
Captan	0.1	-	-	-	-	-	-
Carbaryl	1.0	-	-	-	-	-	-
Chlorothalonil	0.1	-	-	-	-	-	-
Dazomet	0.1	-	-	-	-	-	-
Diazinon	0.05	-	-	-	-	-	-
Dimethoate	0.05	-	-	-	-	-	-
Endosulfans	0.02	-	-	-	-	0.13[2,3]	-
Folpet	0.1	-	-	-	-	-	-
Malathion	0.1	-	-	-	-	-	-
Metolachlor	0.5	-	-	-	-	-	-
Parathion	0.1	-	-	-	-	-	-
Phosmet	0.1	-	-	-	-	-	-
Simazine	0.1	-	-	-	-	-	-
DDT	0.02	-	-	-	-	-	-
DDE	0.01	-	-	-	-	-	-
DDD	0.02	-	-	-	-	-	-
Chlordanes	0.02	-	-	-	-	-	-
Lindane	0.001	-	-	-	-	-	-
Dinoseb	0.02	-	-	0.85[3]	-	0.02	-
Glyphosate	5.0	-	-	-	-	-	-
1,2-Dichloropropane	0.1	-[5]	-	1.3[4]	-	-	-
Enriched Tritium (pCi/mL)		8.7	12.6	8.8	8.1	7.4	7.6
Non-Target (Neutral)	N/A	Y	Y	Y[1]	-	Y[1]	-
Non-Target (Acidic)	N/A	Y	Y	Y[1]	Y	Y	Y
Nitrate/Nitrite	0.002[6]	13.5	16.8	16.5	7.75	37.5	3.25

1. Analyzed by GC/MS-TIC.
2. Confirmed on alternate GLC column.
3. Confirmed by GC/MS-SIM.
4. Confirmed by GC/MS-SIM using two (2) ions.
5. Trace level detected - less than detection limit.
6. Nitrate/Nitrite reported as ppm.

TABLE 6 (cont'd.) - Results for Domestic Wells

Pesticide	Detection Limit (ppb)	D-29	D-30	D-31	D-32	D-34	D-38
Alachlor	0.1	-	-	-	-	-	-
Atrazine	0.2	-	-	-	-	-	-
Azinphosmethyl	0.2	-	-	-	-	-	-
BHC's	0.004	-	-	-	-	-	-
Captan	0.1	-	-	-	-	-	-
Carbaryl	1.0	-	-	-	-	-	-
Chlorothalonil	0.1	-	-	-	-	-	-
Dazomet	0.1	-	-	-	-	-	-
Diazinon	0.05	0.30[2,3]	-	-	-[5]	-	-
Dimethoate	0.05	-	-	-	-	-	-
Endosulfans	0.02	-	-	-	-	-	-
Folpet	0.1	-	-	-	-	-	-
Malathion	0.1	-	-	-	-	-	-
Metolachlor	0.5	-	-	-	-	-	-
Parathion	0.1	-	-	-	-	-	-
Phosmet	0.1	-	-	-	-	-	-
Simazine	0.1	-	-	-	-	-	-
DDT	0.02	-	-	-	-	-	-
DDE	0.01	-	-	-	-	-	-
DDD	0.02	-	-	-	-	-	-
Chlordanes	0.02	-	-	-	-	-	-
Lindane	0.001	-	-	-	-	-	-
Dinoseb	0.02	-	-	-	-	-	-
Glyphosate	5.0	-	-	-	-	-	-
1,2-Dichloropropane	0.1	-	-	-	-	-	-
Enriched Tritium (pCi/mL)		8.3	9.9	7.8	7.5	13.7	8.7
Non-Target (Neutral)	N/A	-[1]	-	Y	Y	-	-
Non-Target (Acidic)	N/A	Y	Y	Y	Y	Y	Y
Nitrate/Nitrite	0.002[6]	8.88	1.58	7.00	0.540	16.0	19.6

1. Analyzed by GC/MS-TIC.
2. Confirmed on alternate GLC column.
3. Confirmed by GC/MS-SIM.
4. Confirmed by GC/MS-SIM using two (2) ions.
5. Trace level detected - less than detection limit.
6. Nitrate/Nitrite reported as ppm.

TABLE 6 (cont'd.) - Results for Domestic Wells

Pesticide	Detection Limit (ppb)	D-39	D-40	D-41	D-43	D-45	D-46
Alachlor	0.1	-	-	-	-	-	-
Atrazine	0.2	-	-	-[5]	-	-	-
Azinphosmethyl	0.2	-	-	-	-	-	-
BHC's	0.004	-	-	-	-	-	-
Captan	0.1	-	-	-	-	-	-
Carbaryl	1.0	-	-	-	-	-	-
Chlorothalonil	0.1	-	-	-	-	-	-
Dazomet	0.1	-	-	-	-	-	-
Diazinon	0.05	-	-	-	2.0[2]	-	-
Dimethoate	0.05	-	-	-	-	-	-
Endosulfans	0.02	-	-	-	-	-	-
Folpet	0.1	-	-	-	-	-	-
Malathion	0.1	-	-	-	-	-	-
Metolachlor	0.5	-	-	-	-	-	-
Parathion	0.1	-	-	-	-	-	-
Phosmet	0.1	-	-	-	-	-	-
Simazine	0.1	-	-	-	-	-	-
DDT	0.02	-	-	-	-	-	-
DDE	0.01	-	-	-	-	-	-
DDD	0.02	-	-	-	-	-	-
Chlordanes	0.02	-	-	-	-	-	-
Lindane	0.001	-	-	-	-	-	-
Dinoseb	0.02	-	-	0.10	-	-	-
Glyphosate	5.0	-	-	-	-	-	-
1,2-Dichloropropane	0.1	-	-	-	-	-	-
Enriched Tritium (pCi/mL)		10.3	22.0	8.8	39.7	16.3	7.7
Non-Target (Neutral)	N/A	-	-	Y	Y[1]	-	-
Non-Target (Acidic)	N/A	-	Y	Y	Y	Y	Y
Nitrate/Nitrite	0.002[6]	13.0	6.42	19.9	0.010	0.205	16.1

1. Analyzed by GC/MS-TIC.
2. Confirmed on alternate GLC column.
3. Confirmed by GC/MS-SIM.
4. Confirmed by GC/MS-SIM using two (2) ions.
5. Trace level detected - less than detection limit.
6. Nitrate/Nitrite reported as ppm.

TABLE 6 (cont'd.) - Results for Domestic Wells

	Pesticide	Detection Limit (ppb)	D-47	D-48	D-50	D-3A	D-5A	D-99
1.	Alachlor	0.1	-	-	-	-	-	-
2.	Atrazine	0.2	-	-	-	-	-	-
3	Azinphosmethyl	0.2	-	-	-	-	-	-
4	BHC's	0.004	-	-	-	-	-	-
5	Captan	0.1	-	-	-	-	-	-
6	Carbaryl	1.0	-	-	-	-	-	-
7	Chlorothalonil	0.1	-	-	-	-	-	-
8	Dazomet	0.1	-	-	-	-	-	-
9	Diazinon	0.05	-	-	-	-	-	-
10	Dimethoate	0.05	-	-	-	-	-	-
11	Endosulfans	0.02	-	-	-	-	-	-
12	Folpet	0.1	-	-	-	-	-	-
13	Malathion	0.1	-	-	-	-	-	-
14	Metolachlor	0.5	-	-	-	-	-	-
15	Parathion	0.1	-	-	-	-	-	-
16	Phosmet	0.1	-	-	-	-	-	-
17	Simazine	0.1	-	-	-	-	-	-
18	DDT	0.02	-	-	-	-	-	-
19	DDE	0.01	-	-	-	-	-	-
20	DDD	0.02	-	-	-	-	-	-
21	Chlordanes	0.02	-	-	-	-	-	-
22	Lindane	0.001	-	-	-	-	-	-
23	Dinoseb	0.02	-	-	-	-	-	-
24	Glyphosate	5.0	-	-	-	-	-	-
25	1,2-Dichloropropane	0.1	-	-	0.2[4]	-	-	-
26	Enriched Tritium (pCi/mL)		9.8	7.4	12.6	10.0	9.8	6.8
27	Non-Target (Neutral)	N/A	-	Y	-	-	-	-
28	Non-Target (Acidic)	N/A	-	Y	-	-	-	-
	Nitrate/Nitrite	0.002[6]	14.3	0.050	8.47	5.08	6.75	4.60

1. Analyzed by GC/MS-TIC.
2. Confirmed on alternate GLC column.
3. Confirmed by GC/MS-SIM.
4. Confirmed by GC/MS-SIM using two (2) ions.
5. Trace level detected - less than detection limit.
6. Nitrate/Nitrite reported as ppm.

APPENDIX A

LOGS FOR WELLS AND PIEZOMETERS

GROUNDWATER DATA SHEET

Date: JAN 26/89
Time: 9:30
Site: F02 Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems): North of Judson Lake. (on east side), higher grd - probably drains to lake. Strawberry fields/berry fields nearby
Contact Name: N.A. Phone Number: N.A.

Pump Data (Type, Age, Maintenance History, Lubrication Type): Federal Well Serial Number: ABB EB 3
Well Depth: 16.27m Stick up 0.52
Volume of Pipe: Flushing Time: 13 min / 1 pail
Piping Information (Material, Joint Type, Condition, Defects): PVC 2½" dia.
Water Treatment? N.A.
Water Level: 12.1 m Flow Rate:
Well Depth: 16.27m Stick-up: 0.52

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): N.A.
Contamination Exposure: Yes ____ No ____
If Yes, Explain:
Other Water Quality Data:
Water Quality Comments: No flour. some seds. in flush otherwise clear.

Sampling Data:
Sample Bottles: Time to Collect: 35 min
Sample Description (Turbidity, Color, Odor, Etc.): Clear, odorless

GROUNDWATER DATA SHEET

Date: Jan 23/89
Time: 845
Site: F03 Observer: Ross/Berwanger
Local Description (Topography, Drainage Features, Septic Systems): Roadside, Raspberry fields, flat. Odor of manure
Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): #6 on cap
Serial Number: _____
Well Depth: 9.65m
Volume of Pipe: ~2 gallons Flushing Time: ~2 min
Piping Information (Material, Joint Type, Condition, Defects): Steel case, 2½" PVC core
Water Treatment? _____
Water Level: 4.83 m Flow Rate: _____

9.65
4.83
4.82

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): N/A

Contamination Exposure: Yes ____ No ____
If Yes, Explain: _____
Other Water Quality Data: _____
Water Quality Comments: _____

Sampling Data: _____
Sample Bottles: F03-1 Time to Collect: 15 min
Sample Description (Turbidity, Color, Odor, Etc.): Slightly turbid, slight ammonia odor, light brownish

GROUNDWATER DATA SHEET

Date: Jan 26/89
Time: 10:40
Site: F04 Observer: D. Berwanger.
Local Description (Topography, Drainage Features, Septic Systems): Flat, slight slope to south-east. - gets increasingly more pronounced to SE.
Contact Name: N.A. Phone Number: N.A.

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number: ABB-88-2
Well Depth: 8 m Stick-up 0.52 m
Volume of Pipe: Flushing Time: 8 min / 2 pails
Piping Information (Material, Joint Type, Condition, Defects): PVC 2½"
Water Treatment? N.A.
Water Level: 1.44 m Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): N.A.
Contamination Exposure: Yes ____ No ____
If Yes, Explain:
Other Water Quality Data:
Water Quality Comments: No Odour, clear even flush.

Sampling Data:
Sample Bottles: Time to Collect: 25 min
Sample Description (Turbidity, Color, Odor, Etc.): Clear, odorless

GROUNDWATER DATA SHEET

Date: Jan 23

Time: 9:10 AM Jan 23

Site: F05 Observer: Ross / Bervanger

Local Description (Topography, Drainage Features, Septic Systems):

Strawberry field, large flat field

Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): _____ Serial Number: ABB-88-5 on PVC cap

Well Depth: 4.23 0.5 in above ground

Volume of Pipe: _____ Flushing Time: 2 min

Piping Information (Material, Joint Type, Condition, Defects):

Steel case with 2½" PVC core

Water Treatment? _____

Water Level: 1.42 M Flow Rate: _____

4.23
1.42

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): _____

Contamination Exposure: Yes ____ No ____

If Yes, Explain: _____

Other Water Quality Data: _____

Water Quality Comments: _____

Sampling Data: _____

Sample Bottles: _____ Time to Collect: 9:24

Sample Description (Turbidity, Color, Odor, Etc.): Clear, No Odor

GROUNDWATER DATA SHEET

Date: Feb 6/89
Time: 11:25
Site: P01-25 Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
Berry farm immediately adjacent.

Contact Name: _____ Phone Number: _____
NOTE: 15' depth does not exist.

Pump Data (Type, Age, Maintenance History, Lubrication Type): _____ Serial Number: _____
Well Depth: 8.25m (25ft) Stick-up 0.36
Volume of Pipe: _____ Flushing Time: 1 pail 10 min
Piping Information (Material, Joint Type, Condition, Defects): _____
Water Treatment? _____
Water Level: 3.02 m Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): N.A.

Contamination Exposure: Yes ____ No ____
If Yes, Explain: _____
Other Water Quality Data: _____
Water Quality Comments: _____

Sampling Data: _____
Sample Bottles: _____ Time to Collect: 10 min
Sample Description (Turbidity, Color, Odor, Etc.): clear, colourless odorless

GROUNDWATER DATA SHEET

Date: Feb 6

Time: 10:50

Site: P01-35 Observer: D. Berwanger

Local Description (Topography, Drainage Features, Septic Systems): Berry Farm immediately adjacent.

Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): _____ Serial Number: _____

Well Depth: 11.3 m 35 ft Stick-up 0.36 m

Volume of Pipe: _____ Flushing Time: 1 pail 10 min

Piping Information (Material, Joint Type, Condition, Defects): _____

Water Treatment? _____

Water Level: 3.02 m Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): N.A.

Contamination Exposure: Yes ____ No ____

If Yes, Explain: _____

Other Water Quality Data: _____

Water Quality Comments: _____

Sampling Data: _____

Sample Bottles: _____ Time to Collect: 30 min

Sample Description (Turbidity, Color, Odor, Etc.): clear, colourless pool no odour

GROUNDWATER DATA SHEET

Date: Feb 6/89
Time: 11:55
Site: P01 - 50 A Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
Adjacent to Berg Farm.

Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): _____ Serial Number: _____
Well Depth: 17.57m Stick-up 0.39
Volume of Pipe: _____ Flushing Time: ~ 2 pails ~ 15 min.
Piping Information (Material, Joint Type, Condition, Defects): _____
Water Treatment? _____
Water Level: 3.04 m Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): N.A.

Contamination Exposure: Yes ____ No ____
If Yes, Explain: _____
Other Water Quality Data: _____
Water Quality Comments: _____

Sampling Data: _____
Sample Bottles: _____ Time to Collect: 15 min
Sample Description (Turbidity, Color, Odor, Etc.): Clear, colourless.

GROUNDWATER DATA SHEET

Date: Feb 6/89
Time: 12:55
Site: Po2 Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
By chicken farms, berry farms, Westbay installation
Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): _____ Serial Number: _____
Well Depth: 7.98 m Stick-up 0.28
Volume of Pipe: _____ Flushing Time: 1 pail 10 min ~
Piping Information (Material, Joint Type, Condition, Defects): _____
Water Treatment? _____
Water Level: 3.16 m Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): N.A.
Contamination Exposure: Yes ____ No ____
If Yes, Explain: _____
Other Water Quality Data: _____
Water Quality Comments: _____

Sampling Data: _____
Sample Bottles: _____ Time to Collect: 10 min
Sample Description (Turbidity, Color, Odor, Etc.): clear, colourless odourless

GROUNDWATER DATA SHEET

Date: Feb 6/89
Time: 1:40
Site: P03 Observer: D. Benwanger
Local Description (Topography, Drainage Features, Septic Systems):
Chicken farming nearby.
Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number: _____
Well Depth: 6.39m Stick-up. 0.34
Volume of Pipe: _____ Flushing Time: 8 min Purged turbid
Piping Information (Material, Joint Type, Condition, Defects): _____
Water Treatment? _____
Water Level: 2.87m Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): _____
Contamination Exposure: Yes ____ No ____
If Yes, Explain: _____
Other Water Quality Data: _____
Water Quality Comments: _____

Sampling Data: _____
Sample Bottles: _____ Time to Collect: 10 min
Sample Description (Turbidity, Color, Odor, Etc.): no odour
Turbid purged pail, samples colourless, clear.

GROUNDWATER DATA SHEET

Date: ~~Jan 30/89~~ Feb 13/89

Time: ~~10:00~~ 10:50

Site: D01 Agri. Canada. Res. Station Observer: D. Berwanger

Local Description (Topography, Drainage Features, Septic Systems): Flat, gently sloping to SE

Contact Name: _____ Phone Number: _____

GATE Locked + no one at Station. - Pump House in Compound.

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number: _____

Well Depth: _____

Volume of Pipe: _____ Flushing Time: _____

Piping Information (Material, Joint Type, Condition, Defects): _____

Water Treatment? _____

Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Irrigation

Contamination Exposure: Yes ____ No ____

If Yes, Explain: _____

Other Water Quality Data: _____

Water Quality Comments: _____

Sampling Data: _____

Sample Bottles: _____ Time to Collect: 5 min.

Sample Description (Turbidity, Color, Odor, Etc.): Clear, colourless no odour

GROUNDWATER DATA SHEET

RR 5 Abbotsford Date: ~~10-5~~ Feb 13/89
Time: 11:10
Site: D2 490 Clearbrook Rd. Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
Same as D1

Contact Name: Mr+Mrs. Veer Phone Number: 859-8754
Wants results.

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:
Well Depth:
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects):
Water Treatment?
Water Level: Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):

Contamination Exposure: Yes ____ No ____
If Yes, Explain:
Other Water Quality Data:
Water Quality Comments:

Sampling Data: From garden hose/tap - at well.
Sample Bottles: Time to Collect: 5 min
Sample Description (Turbidity, Color, Odor, Etc.): Clear, colourless
no odour.

GROUNDWATER DATA SHEET

Site: D03 611 Clearbrook Date: Jan 30/89
Time: 10:20
Observer: D. Berwanger.
Local Description (Topography, Drainage Features, Septic Systems): flat, berry farms., sloping gently to SE.
Contact Name: Karen Reimer Phone Number: 854-3952
Wants results

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:
Well Depth: ~102-103'
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects):
Water Treatment? unknown
Water Level: unknown Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic, mixing H_2O with Herbacides.
Contamination Exposure: Yes ____ No ____
If Yes, Explain:
Other Water Quality Data: No change. Lately.
Water Quality Comments:

Sampling Data: Outside garden faucet.
Sample Bottles: Time to Collect: 10 min
Sample Description (Turbidity, Color, Odor, Etc.): no odour, clear, colourless.

GROUNDWATER DATA SHEET

Date: Jan 30/89
Time: 10:40
Site: D04 Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
On shore of Judson Lake, Slopes to Lake, moderately 45°L

Contact Name: Tennant Phone Number: (604) 853-8208
197 Clearbrook Rd.
RR 5 Abbotsford Wants results.

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:
Well Depth: unknown
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects):
Water Treatment? unknown
Water Level: unknown. Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Domestic.

Contamination Exposure: Yes ____ No ____
If Yes, Explain:

Other Water Quality Data: Blue colouring in house/taps.
Water Quality Comments: Worm in bathtub. found recently

Sampling Data: from Tap in House.
Sample Bottles: Time to Collect: 10 min
Sample Description (Turbidity, Color, Odor, Etc.): Clear, colourless
No Odour

GROUNDWATER DATA SHEET

Date: Jan 30/89
Time: 11:00
Site: D05 Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
Flat, gently sloping SE, berry fields, possibly chicken farming
Contact Name: Mr Neetz Phone Number: 859-6887
556 Laxton Rd V2S 1H3 Wants results.

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:
Well Depth:
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects):
Water Treatment? unknown
Water Level: Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Domestic, Don't Drink water, get bottled from town
Contamination Exposure: Yes ____ No ____
If Yes, Explain:
Other Water Quality Data:
Water Quality Comments: Not drinking water because thought it was bad (esp. have small child)

Sampling Data: From tap inside
Sample Bottles: Time to Collect: 10 min
Sample Description (Turbidity, Color, Odor, Etc.): clear, colourless no odour

GROUNDWATER DATA SHEET

NOTE: no one home at 675 Laxton or 709 "

Date: Jan 26/83

Time: 12:30

Site: D6 - 743 Laxton Observer: D. Berwanger

Local Description (Topography, Drainage Features, Septic Systems):
flat, berry fields, some irrigation

Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): Submersable pump Serial Number: _____

Well Depth: _____

Volume of Pipe: _____ Flushing Time: _____

Piping Information (Material, Joint Type, Condition, Defects): _____

Water Treatment? None.

Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Domestic

Contamination Exposure: Yes ____ No ____

If Yes, Explain: _____

Other Water Quality Data: _____

Water Quality Comments: _____

Sampling Data: From Garden tap, nearer to well

Sample Bottles: _____ Time to Collect: _____

Sample Description (Turbidity, Color, Odor, Etc.):
Clear, No odour

GROUNDWATER DATA SHEET

Townships 4 Huntingdon

Date: Jan 26/89
Time: 12:15
Site: DOB
Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
Flat, sloping to South-east.

Contact Name: Mukhtiar + Sons. Phone Number:
Woman didn't speak English very well.

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:
Well Depth:
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects):
Water Treatment?
Water Level: Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Domestic, Plant Use, other?

Contamination Exposure: Yes ____ No ____
If Yes, Explain:
Other Water Quality Data:
Water Quality Comments: No odour + clear/colourless

Sampling Data: from Tap in Garden, bubbling
Sample Bottles: Time to Collect: 5 min
Sample Description (Turbidity, Color, Odor, Etc.):

GROUNDWATER DATA SHEET

512 Townline

Date: Jan 26/89

Time: 11:00

Site: D9 - Mujha Fruit Valley Processors Observer: D. Benvenuget

Local Description (Topography, Drainage Features, Septic Systems): Plant facility, Production well., flat area, asphalt covered. Chicken & Berry farms near by.

Contact Name: Narvail Gill Phone Number: 859-4443, 533-2313 (Toll Free)

Can phone for pump details

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:

Well Depth:

Volume of Pipe: Flushing Time:

Piping Information (Material, Joint Type, Condition, Defects):

~~Water~~ Treatment? ?

Water Level: Flow Rate: Substantial
Feeds whole plant/houses etc.

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):

Contamination Exposure: Yes ____ No ____

If Yes, Explain:

Other Water Quality Data:

Water Quality Comments: No odour, clear, colourless
Bubbled sample from tap

Sampling Data:

Sample Bottles: Time to Collect: 5 min

Sample Description (Turbidity, Color, Odor, Etc.):

GROUNDWATER DATA SHEET

80 Townline

Date: Jan 26/89

Time: 11:30

Site: DiO Observer: D. Berwanger.

Local Description (Topography, Drainage Features, Septic Systems):
More SE. on slope down., South of drainage Slough.

Contact Name: Mr Jasbar Budwal Phone Number: 853-2368
wants us to contact

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:

Well Depth: 30-40 ft.

Volume of Pipe: Flushing Time:

Piping Information (Material, Joint Type, Condition, Defects):

Water Treatment? ~~?~~ ø filter in line.

Water Level: Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Domestic

Contamination Exposure: Yes ____ No ✓

If Yes, Explain:

Other Water Quality Data:

Water Quality Comments: No odour.

Sampling Data:

Sample Bottles: Time to Collect: 5min

Sample Description (Turbidity, Color, Odor, Etc.): No odour.

GROUNDWATER DATA SHEET

Date: Jan 23
Time: 10:20 AM
Site: D11 435 Ross Observer: Ross / Berringer
Local Description (Topography, Drainage Features, Septic Systems):
Aluminum shed. Plywood inside. 40' to berries
Contact Name: Bill Trandi Phone Number: 856 6064

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number: 312009 U85
½ horse impeller electric
Well Depth: 25 ft
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects): Concrete ?
1½" ABS - Well head in shed near sink, open top
Water Treatment? No
Water Level: Never dry Flow Rate: High

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Domestic
Contamination Exposure: Yes ____ No ____
If Yes, Explain:
Other Water Quality Data:
Water Quality Comments: Good Clear.

Sampling Data:
Sample Bottles: D11 Time to Collect:
Sample Description (Turbidity, Color, Odor, Etc.): No odor, clear

GROUNDWATER DATA SHEET

Date: Jan 23
Time: 1005
Site: 012 / 283 Ross Rd Observer: Ross / Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
flat, berry fields. Greenhouse across road.
Contact Name: _____ Phone Number: 856 697 2

Pump Data (Type, Age, Maintenance History, Lubrication Type): In field, near creek. Not Serial Number: _____
Well Depth: 100 ft,
Volume of Pipe: _____ Flushing Time: _____
Piping Information (Material, Joint Type, Condition, Defects): _____
Water Treatment? Not anymore, Not now used
Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic
fertilizer
Contamination Exposure: Yes ____ No ____
If Yes, Explain: _____
Other Water Quality Data: Former well had iron, funny taste
Water Quality Comments: Not great - Changed well.

Sampling Data: From house tap.
Sample Bottles: _____ Time to Collect: 1013
Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

Date: Jan 23
Time: 935
Site: 141 Ross (D13) Observer: Ross
Local Description (Topography, Drainage Features, Septic Systems): Flat land, raspberry fields, corner of bldg outside barn
Contact Name: _____ Phone Number: 856-1243

Pump Data (Type, Age, Maintenance History, Lubrication Type): 15 yrs old, ~~Grundfos~~
Serial Number: _____
Well Depth: 30 ft
Volume of Pipe: _____ Flushing Time: _____
Piping Information (Material, Joint Type, Condition, Defects): Copper Pipe header. PVC
Water Treatment? No
Water Level: ~15 ft depth at lowest in summer Flow Rate: High

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Irrigation water from creek
Poultry? Raspberry bushes. Drinks from well
Cotton Manure fields, regular fert 300 lbs/acre
Contamination Exposure: Yes ✓ No ___
If Yes, Explain: Well near corner of barn, between field & structure
Concrete cap. Spray berries with pesticides (10 ft to bushes)
Other Water Quality Data: Glyphosate, "Goramin", "Dinitro", "Dazmon", Captan
Water Quality Comments: Clear - Good - In summer, iron comes & colors yellow sometimes (heavy irrigation)
"Dinoseb"

Sampling Data: _____
Sample Bottles: D13 Time to Collect: 1-2 min 10 AM
Sample Description (Turbidity, Color, Odor, Etc.): Clear, some bubbles from spout

GROUNDWATER DATA SHEET

Date: Feb 13/89
Time: 12:15
Site: D14 29361 Boundary Rd. Observer: D. Berenger
Local Description (Topography, Drainage Features, Septic Systems):
Flat, berry fields, upgradient chicken farms, drainage ditch by road side.
Contact Name: Parthi Badesha Phone Number: 859-0708

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:
Well Depth: ~ 40'
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects):
had pipe at pump house freeze, not fixed.
Water Treatment? some type of filter at pump
Water Level: Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Domestic.

Contamination Exposure: Yes ____ No ____
If Yes, Explain:

Other Water Quality Data:
Water Quality Comments: Water terrible when filter not working

Sampling Data: from bathtub, lower level of house, by garden tap.
Sample Bottles: Time to Collect: 5 min
Sample Description (Turbidity, Color, Odor, Etc.): slightly greenish tint clear, no odour.

GROUNDWATER DATA SHEET

Site: D 15 250 Mt Lehman Date: Feb 9
Time: 1105
Observer: Ross
Local Description (Topography, Drainage Features, Septic Systems): In house on Chicken farm - Paved over
Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): Impellor 1/2 horse
Serial Number: _____
Well Depth: 30'
Volume of Pipe: _____ Flushing Time: _____
Piping Information (Material, Joint Type, Condition, Defects): ~~Steel~~ PVC
Water Treatment? Filter & Screen
Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Chickens + Domestic
Contamination Exposure: Yes ___ No ___
If Yes, Explain: Pesticide backpack beside well. Sprayer + pump Buckets labelled Germex, Matrun and Telone II beside well
Other Water Quality Data: _____
Water Quality Comments: Good

Sampling Data: _____
Sample Bottles: _____ Time to Collect: _____
Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

Date: Jan 23

Time: 10 40 AM

Site: D17 - 246 Townline Observer: Ross/Berwanger

Local Description (Topography, Drainage Features, Septic Systems):
Behind house. A few chickens - Lake ½ mile back of house
Septic 15m S of well head

Contact Name: Jackie Silva Phone Number: 852 4723
→ Would like to know whats in the water

Pump Data (Type, Age, Maintenance History, Lubrication Type): Concrete cap, steel pipe

Serial Number:

Well Depth: ?

Volume of Pipe: Flushing Time:

Piping Information (Material, Joint Type, Condition, Defects):
Just bought house - No idea

Water Treatment? -

Water Level: Never dry Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic

Contamination Exposure: Yes ____ No ____

If Yes, Explain:

Other Water Quality Data:

Water Quality Comments: Tastes great, clear - Neighbor somewhere says nitrates are high.

Sampling Data:

Sample Bottles: Time to Collect:

Sample Description (Turbidity, Color, Odor, Etc.): Clear

GROUNDWATER DATA SHEET

Date: Feb 9

Site: D18 30951 Boundary Time: 1205

Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems):
Right next berry fields

Contact Name: _____ Phone Number: 8590544

Would like results of analysis.

Pump Data (Type, Age, Maintenance History, Lubrication Type): _____ Serial Number: _____

Well Depth: ~50' (Installed by Murphy & Bacon field) ←

Volume of Pipe: _____ Flushing Time: _____

Piping Information (Material, Joint Type, Condition, Defects):
Iron

Water Treatment? not

Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Irrigation & Domestic

Contamination Exposure: Yes ____ No ____

If Yes, Explain: _____

Other Water Quality Data: _____

Water Quality Comments: Sand comes sometimes / Good water
Good all year. Pipes recently froze. Rubber hose

Sampling Data: _____

Sample Bottles: _____ Time to Collect: _____

Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

Date: Feb 9
Time: 10 AM
Site: 50 Harm D19 Observer:
Local Description (Topography, Drainage Features, Septic Systems):
In house
Contact Name: Phone Number:

Pump Data (Type, Age, Maintenance History, Lubrication Type): Impellor 1/2 horse
Serial Number:
Well Depth:
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects):
Water Treatment? Filter at bottom, Screen
Water Level: Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic
Contamination Exposure: Yes ___ No ✓
If Yes, Explain: In Shed + Inner shed
Other Water Quality Data:
Water Quality Comments: No Sand Tastes good

Sampling Data:
Sample Bottles: Time to Collect:
Sample Description (Turbidity, Color, Odor, Etc.):

GROUNDWATER DATA SHEET

Date: Feb 9 / 1989

Time: 9 40

Site: 505 Hamm D20 Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems):
Well house on flat grass near berry field (#5)
Western Fisheries Hatchery Ltd

Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number: _____

Well Depth: About 20'

Volume of Pipe: _____ Flushing Time: _____

Piping Information (Material, Joint Type, Condition, Defects): Copper

Water Treatment? None

Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Chicken hatching & domestic

Contamination Exposure: Yes ___ No ✓

If Yes, Explain: Covered & building

Other Water Quality Data: _____

Water Quality Comments: Fine, no problems

Sampling Data: _____

Sample Bottles: _____ Time to Collect: _____

Sample Description (Turbidity, Color, Odor, Etc.): Clear, no smell
Aerator screen on tap - lots of bubbles

GROUNDWATER DATA SHEET

Date: Feb 9
Time: 1130
Site: DZ1 - 520 Hamm Observer: Ross
Local Description (Topography, Drainage Features, Septic Systems):
Septic > 100m, 1 horse on meadow
Berry fields 10m from well
Contact Name: _____ Phone Number: 8534350
Would like to know analysis

Pump Data (Type, Age, Maintenance History, Lubrication Type): Impeller ½ horse
Serial Number: _____
Well Depth: 42' deep 35' to water
Volume of Pipe: _____ Flushing Time: _____
Piping Information (Material, Joint Type, Condition, Defects): ABS plastic
Water Treatment? Sample before filter cartridge
Water Level: 35' down Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic Pipes recently repaired from freezing.
Contamination Exposure: Yes ____ No ✓
If Yes, Explain: _____
Other Water Quality Data: _____
Water Quality Comments: Good. No change with season
Clear No smell no taste

Sampling Data: _____
Sample Bottles: _____ Time to Collect: _____
Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

356 Columbia

Date: Feb 6/89

Time: 2:30

Site: D22 Observer: D. Berwanger

Local Description (Topography, Drainage Features, Septic Systems): Chicken & Berry farms

Contact Name: Mr. Hrs Brar Phone Number: 859-7792

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:

Well Depth:

Volume of Pipe: Flushing Time:

Piping Information (Material, Joint Type, Condition, Defects):

Water Treatment?

Water Level: Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic.

Contamination Exposure: Yes ____ No ____

If Yes, Explain:

Other Water Quality Data:

Water Quality Comments: Changing to city water. - Columbia has city water line along it.

Sampling Data: Taken from garden tap.

Sample Bottles: Time to Collect: 5 min

Sample Description (Turbidity, Color, Odor, Etc.): clear, colourless no odour

GROUNDWATER DATA SHEET

Date: Feb 13/89
Time: 12:30
Site: D.24 245 Bradner Rd Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
Berry farms, Chicken farms upgradient. + also rise. to morain.
Contact Name: _____ Phone Number: _____
Wanted us to sample 262 Columbia Rd. South of Huntingdon. (brother-in-law)

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number: _____
Well Depth: _____
Volume of Pipe: _____ Flushing Time: _____
Piping Information (Material, Joint Type, Condition, Defects): _____
Water Treatment? _____
Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic
Contamination Exposure: Yes ____ No ____
If Yes, Explain: _____
Other Water Quality Data: _____
Water Quality Comments: Had water tested just recently + trace of nitrate

Sampling Data: from kitchen tap., garden tap runs through house.
Sample Bottles: _____ Time to Collect: 5 min
Sample Description (Turbidity, Color, Odor, Etc.): no colour, odour. clear.

GROUNDWATER DATA SHEET

Date: Feb 13 /09
Time: 10:25
Site: D25 870 Clearbrook Rd. Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
Berry Fields surrounding.

Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): _____ Serial Number: _____
Well Depth: 120'
Volume of Pipe: _____ Flushing Time: _____
Piping Information (Material, Joint Type, Condition, Defects): _____
Water Treatment? None.
Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic.

Contamination Exposure: Yes ____ No ____
If Yes, Explain: _____
Other Water Quality Data: Had bacteria in water
Water Quality Comments: Tested by Health Dept 6 x must bleach water

Sampling Data: From garden tap - some bubbling
Sample Bottles: _____ Time to Collect: 10 min.
Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

Site: D 26 2438-210St Date: Feb 20

Time:

Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems):

Hydroponic greenhouse (English Cucumber)

Contact Name: Phone Number:

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:

Well Depth: 32'

Volume of Pipe: ? Flushing Time:

Piping Information (Material, Joint Type, Condition, Defects):

6" Metal Double screen

Water Treatment? No

Water Level: ? Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):

Hydroponics / Domestic

Contamination Exposure: Yes ____ No ____

If Yes, Explain: No fertilizer / pesticide spills

Other Water Quality Data:

Water Quality Comments: Fine - Tastes Nocolor, no odor
Has iron at first - hardpan layer near bottom of well (Some neighbors taste iron)

Sampling Data:

Sample Bottles: Time to Collect:

Sample Description (Turbidity, Color, Odor, Etc.):

GROUNDWATER DATA SHEET

Site: DZ8 2208-208th Date: Feb 20
Time: 12 15
Observer: Ross
Local Description (Topography, Drainage Features, Septic Systems): Cattle, meadows, Big operation, slopes down to North
Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): 2½ horse impellor
Serial Number: _____
Well Depth: 60'
Volume of Pipe: _____ Flushing Time: 3½ Min
Piping Information (Material, Joint Type, Condition, Defects): 2" Steel
Water Treatment? No
Water Level: "Deep" Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): livestock, Domestic, Dairy
Contamination Exposure: Yes ___ No ___
If Yes, Explain: No fertilizer (Spread manure — filter at barn — iron taste)
Other Water Quality Data: _____
Water Quality Comments: Tastes Good No change ☼ season No sand no metal

Sampling Data: _____
Sample Bottles: _____ Time to Collect: _____
Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

205th St @ 36 Ave

Date: Feb 20

Time: 12:45

Site: D29 Brookswood Nursery Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems):

Nursery - big, open - apply fertilizers pesticides on open

Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number: _____

Well Depth: 150

Volume of Pipe: ? Flushing Time: 3 min

Piping Information (Material, Joint Type, Condition, Defects):

Iron / Steel

Water Treatment? No

Water Level: ✓ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):

Domestic / livestock

Contamination Exposure: Yes ____ No ____

If Yes, Explain: Manure, pesticides on plants

Other Water Quality Data: Septic field nearby

Water Quality Comments: Tastes good all season

Cold No sand, color, smell etc

Sampling Data:

Sample Bottles: _____ Time to Collect: _____

Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

Date: Feb 20

Time: 10 20

Site: ~~D~~ 30 - 4362-240th Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems): Field to north, other houses to south - Land is fallow

Contact Name: Twiss Phone Number: 5307318

Want Results

Pump Data (Type, Age, Maintenance History, Lubrication Type): —

Serial Number:

Well Depth: 20'

Volume of Pipe: Flushing Time:

Piping Information (Material, Joint Type, Condition, Defects):

Water Treatment? —

Water Level: 10' Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic

Contamination Exposure: Yes ____ No ✓

If Yes, Explain:

Other Water Quality Data:

Water Quality Comments: Tastes good No smell Goes dry in summer

Sampling Data:

Sample Bottles: Time to Collect:

Sample Description (Turbidity, Color, Odor, Etc.):

GROUNDWATER DATA SHEET

(All deeps have filters - Resin exchange)

Date: Feb 20

Time: 11 25

Site: D31 4875-248th Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems): Small lots & houses,

Contact Name: Wants Results Phone Number:

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:

Well Depth: 15

Volume of Pipe: Flushing Time:

Piping Information (Material, Joint Type, Condition, Defects):

Water Treatment? No

Water Level: ~ Surface Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic Mostly domestic in area, berries 2-3 miles north.

Contamination Exposure: Yes ___ No ✓

If Yes, Explain: No fertilizers or anything near well.

Other Water Quality Data:

Water Quality Comments: No shortage - Tastes fine Used to bleach well (years ago).

Sampling Data:

Sample Bottles: Time to Collect:

Sample Description (Turbidity, Color, Odor, Etc.):

GROUNDWATER DATA SHEET

Site: 32 4270 - 240th
Date: Feb 20
Time: 950 AM
Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems): Flat, meadow

Contact Name: ______ Phone Number: ______
— Wants to get Results —

Pump Data (Type, Age, Maintenance History, Lubrication Type): 1 horse
Serial Number: ______
Well Depth: ~100' ~~not sure~~...
Volume of Pipe: ______ Flushing Time: ______
Piping Information (Material, Joint Type, Condition, Defects): 3' PVC

Water Treatment? No
Water Level: ______ Flow Rate: ______

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Greenhouse, Flowers, Roses, potted plants & Drinking

Contamination Exposure: Yes ____ No ____
If Yes, Explain: ______

Other Water Quality Data: Reservoir tanks ("Everglaze epoxy lined")
Water Quality Comments: Tastes good, no problems

Sampling Data: ______
Sample Bottles: ______ Time to Collect: ______
Sample Description (Turbidity, Color, Odor, Etc.): ______

GROUNDWATER DATA SHEET

Date: Feb 23
Time: 1230
Site: D34 111 Columbia Observer: Ross
Local Description (Topography, Drainage Features, Septic Systems):
Chicken barn near border big operation
√- messy
Contact Name: Rod Reed Phone Number: 0
Wants results

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:
Well Depth: 150'
Volume of Pipe: ? Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects): PVC
No screens
Water Treatment? No
Water Level: ? Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Chickens & Domestic
Contamination Exposure: Yes ___ No ___
If Yes, Explain: Well on storage shed – general mess
manure piles
Other Water Quality Data:
Water Quality Comments: Good No Sediment

Sampling Data:
Sample Bottles: Time to Collect:
Sample Description (Turbidity, Color, Odor, Etc.):

GROUNDWATER DATA SHEET

Date: Feb 23
Time: 12 30
Site: D 38 1344 Hope Observer: Ross
Local Description (Topography, Drainage Features, Septic Systems):
Berry fields near well, Beside house
Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): ½ horse
Serial Number: _____
Well Depth: (Very Deep)
Volume of Pipe: _____ Flushing Time: 5 min
Piping Information (Material, Joint Type, Condition, Defects):
Steel
Water Treatment? Screen
Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Irrigation + Domestic
Contamination Exposure: Yes ____ No ____
If Yes, Explain:
Adjacent to berry fields
Other Water Quality Data: 0
Water Quality Comments: Tastes good no color no smell

Sampling Data: _____
Sample Bottles: _____ Time to Collect: 2 min
Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

Valley brook gardens

Date: feb 23

Time: 1 15

Site: D 39 — 1831 Peardonville Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems): septic field 150' 25' to raspberries

Nursery - fertilizer

Contact Name: John Schroeder Phone Number: 859 1177

waits results

Pump Data (Type, Age, Maintenance History, Lubrication Type): impeller ½ horse

Serial Number:

Well Depth: 241'

Volume of Pipe: Flushing Time:

Piping Information (Material, Joint Type, Condition, Defects): PVC

Water Treatment? No —

Water Level: ?

Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic - Irrigation

Contamination Exposure: Yes ____ No ____

If Yes, Explain: Nursery, berries,

Other Water Quality Data: Surface creek beside well

Water Quality Comments: Not great for in house, OK at trailer (Other guy says its Good)

Sampling Data:

Sample Bottles: Time to Collect: 5 min

Sample Description (Turbidity, Color, Odor, Etc.):

GROUNDWATER DATA SHEET

Date: Feb 23

Time:

Site: D40 Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems):
Electric Shop 10m from well head — Septic on property

Contact Name: _____ Phone Number: 850 3828

Wants results — hyper allergic child ✱ died @ Xmas

Pump Data (Type, Age, Maintenance History, Lubrication Type): ?

Serial Number: _____

Well Depth: ?

Volume of Pipe: ? Flushing Time: 3 min

Piping Information (Material, Joint Type, Condition, Defects):
1" Copper

Water Treatment? no

Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic

Contamination Exposure: Yes ✓ No ____

If Yes, Explain: On driveway edge, berries to north

Other Water Quality Data: _____

Water Quality Comments: Tastes bad, especially after rains
Sediment

Sampling Data: _____

Sample Bottles: _____ Time to Collect: 2 min

Sample Description (Turbidity, Color, Odor, Etc.):
Clear, No smell

GROUNDWATER DATA SHEET

Date: Feb 13/89
Time: 12:55
Site: D41 28469 Boundary Observer: D. Berwanger
Local Description (Topography, Drainage Features, Septic Systems):
Upgradient, chicken farms, flat; rises upgradient to glacial moraine.
Contact Name: Hambly Phone Number: 856-6279
Wants results 856 8171

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:
Well Depth:
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects):
Water Treatment? no filter
Water Level: Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Domestic + Mink farm.
Contamination Exposure: Yes ____ No ____
If Yes, Explain:
Other Water Quality Data:
Water Quality Comments: Had water tested earlier in summer had sulfur smell, nothing in it at that time.

Sampling Data: from kitchen sink, taps outside frozen or turned off
Sample Bottles: Time to Collect: 5 min
Sample Description (Turbidity, Color, Odor, Etc.): Clear, colourless no odour.

GROUNDWATER DATA SHEET

Date: Feb 27
Time: 1150 AM
Site: D43 on Airport land adjacent to Berry fields Observer: Ross
Local Description (Topography, Drainage Features, Septic Systems): Furniture / woodworking shop to South. Barrels on land
Contact Name: — Phone Number: —

Pump Data (Type, Age, Maintenance History, Lubrication Type): V. Powerful
Serial Number:
Well Depth: — ?
Volume of Pipe: Flushing Time: 6-8 min
Piping Information (Material, Joint Type, Condition, Defects): 6" steel header
Water Treatment? Sediment & rust while flushing
Water Level: Flow Rate: V. FAST !

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Irrigation well
Contamination Exposure: Yes ___ No ___
If Yes, Explain: Construction, chemical storage nearby
Other Water Quality Data: —
Water Quality Comments: —

Sampling Data:
Sample Bottles: Time to Collect: 2 min.
Sample Description (Turbidity, Color, Odor, Etc.): A lot of rust initially, Red butyl hose

GROUNDWATER DATA SHEET

Site: D 45 - 202 Lefeuvre (280th) Date: Feb 27
Time: 12 30
Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems): field - no crops, driveway

Contact Name: ______ Phone Number: ______

Pump Data (Type, Age, Maintenance History, Lubrication Type): - ?
Serial Number: ______
Well Depth: ______
Volume of Pipe: ______ Flushing Time: 3 min
Piping Information (Material, Joint Type, Condition, Defects): - ABS
Water Treatment? - No
Water Level: ______ Flow Rate: ______

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic

Contamination Exposure: Yes ____ No ____
If Yes, Explain: Side of driveway - 15 m to fuel storage

Other Water Quality Data: ______
Water Quality Comments: Sometimes terrible - H_2S smell
clear, bad last summer, better in winter

Sampling Data: ______
Sample Bottles: ______ Time to Collect: ______
Sample Description (Turbidity, Color, Odor, Etc.): ______

GROUNDWATER DATA SHEET

Date: Feb 23
Time: 11 40
Site: D 46 - 725 Short Rd Observer: Ross
Local Description (Topography, Drainage Features, Septic Systems):
Meadow, farm - no berries near well
Contact Name: Vander Horst Phone Number:
Results wanted

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:
Well Depth: 80 - 90'
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects): Steel
Screen downhole
Water Treatment?
Water Level: 40' Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic
Animals
Contamination Exposure: Yes ____ No ✓
If Yes, Explain:
Other Water Quality Data:
Water Quality Comments: Very good

Sampling Data:
Sample Bottles: Time to Collect:
Sample Description (Turbidity, Color, Odor, Etc.):

GROUNDWATER DATA SHEET

Date: Feb 27
Time: 1120
Site: D47 - 31587 Walmsley Observer: Ross
Local Description (Topography, Drainage Features, Septic Systems): Berries across road, cement/gravel on North
Contact Name: _____ Phone Number: _____

Pump Data (Type, Age, Maintenance History, Lubrication Type): Double jet
Serial Number: _____
Well Depth: 60'
Volume of Pipe: _____ Flushing Time: 6 min
Piping Information (Material, Joint Type, Condition, Defects): ~~PVC~~ ABS
Water Treatment? No
Water Level: 35 - 40' Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): Domestic
Contamination Exposure: Yes ___ No ___
If Yes, Explain: Chemicals stored in pump house
Other Water Quality Data: _____
Water Quality Comments: Good No sediment, color
(2 rats drowned in well ~~2~~ 8 months ago)

Sampling Data: _____
Sample Bottles: _____ Time to Collect: 2 min
Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

Date: Feb 27
Time: 11 AM
Site: D 48 1240 Gladwin Observer: Ross
Local Description (Topography, Drainage Features, Septic Systems):
Fields, no ferries
* Maybe City Water - Kid not sure
Contact Name: _____ Phone Number: 853 3583

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number: _____
Well Depth: — 40-60' - Concrete.
Volume of Pipe: _____ Flushing Time: 4 min
Piping Information (Material, Joint Type, Condition, Defects): _____
Water Treatment? No
Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): DOMESTIC
Contamination Exposure: Yes ____ No ____
If Yes, Explain: Growers of veg ies - 50 M North
Other Water Quality Data: _____
Water Quality Comments: Good, no shortage

Sampling Data: _____
Sample Bottles: _____ Time to Collect: _____
Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

Site: D 50 23441 - 48th Date: Feb 27
Time: 240
Observer: Rosa
Local Description (Topography, Drainage Features, Septic Systems):
Nursery
Contact Name: Willy Klippert Phone Number: 534 2775
Wants Results.

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:
Well Depth: 120'
Volume of Pipe: Flushing Time:
Piping Information (Material, Joint Type, Condition, Defects):
6" Steel Screened on bottom
Water Treatment? No
Water Level: Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Domestic

Contamination Exposure: Yes ___ No ___
If Yes, Explain: No Fertilizer near well, Has had V- high NO_3

Other Water Quality Data:
Water Quality Comments: Good, no change, no smell
Toilet has brownish stain where water enters

Sampling Data:
Sample Bottles: Time to Collect:
Sample Description (Turbidity, Color, Odor, Etc.):

GROUNDWATER DATA SHEET

Date: Feb 27

Time: 3:30

Site: D3A 975 Bradner Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems):
Berms, gravel pit

Contact Name: _____ Phone Number: _____

Wants results

Pump Data (Type, Age, Maintenance History, Lubrication Type): Unknown

Serial Number: _____

Well Depth: Unknown

Volume of Pipe: _____ Flushing Time: 3 min

Piping Information (Material, Joint Type, Condition, Defects):
ABS

Water Treatment? No

Water Level: _____ Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):
Domestic

Contamination Exposure: Yes ____ No ____

If Yes, Explain:
Fertilizer, Pesticides sprayed near well

Other Water Quality Data: _____

Water Quality Comments: Tastes good no color, smell

Sampling Data: _____

Sample Bottles: _____ Time to Collect: _____

Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

Site: D5A 34040 farmer Date: Feb 23

Time: 11^23.

Observer: Ross

Local Description (Topography, Drainage Features, Septic Systems): Meadow, ploughed

Contact Name: _____ Phone Number: 859 3327

Pump Data (Type, Age, Maintenance History, Lubrication Type): _____ Serial Number: _____

Well Depth: 60'

Volume of Pipe: _____ Flushing Time: 4/min

Piping Information (Material, Joint Type, Condition, Defects): Steel & ABS

Water Treatment? No

Water Level: 40' Flow Rate: _____

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)): ~~Domestic~~ Greenhouse & Dairy Chrysanthemums

Contamination Exposure: Yes ____ No ✓

If Yes, Explain: No fertilizer, pesticides only in greenhouse

Other Water Quality Data: _____

Water Quality Comments: Tastes OK but releases iron & bleach turns color & chlorine.

Sampling Data: _____

Sample Bottles: _____ Time to Collect: _____

Sample Description (Turbidity, Color, Odor, Etc.): _____

GROUNDWATER DATA SHEET

~~D17~~ D99

Date: Feb 9

Time: 1200

Site: 69 Townline Rd Observer: ~~Ross~~

Local Description (Topography, Drainage Features, Septic Systems): Pasture, Meadow

Contact Name: Raj Phone Number: 852 3691

Pump Data (Type, Age, Maintenance History, Lubrication Type): Serial Number:

Well Depth: ~

Volume of Pipe: Flushing Time: 3 Min

Piping Information (Material, Joint Type, Condition, Defects):

Water Treatment? ~

Water Level: Flow Rate:

Type of Use (Livestock, Domestic, Irrigation, Other (Specify)):

Contamination Exposure: Yes ___ No ___

If Yes, Explain: Not much cultivation, Wellhead in meadow Fenced, No fertilizer

Other Water Quality Data:

Water Quality Comments: Tastes Good No sand No color

Sampling Data:

Sample Bottles: Time to Collect:

Sample Description (Turbidity, Color, Odor, Etc.):

① Fred

@ Collapse table

@ "Y"'s ~~what Quant + Qual.~~ can you get any more out of it.

© Statement of 1,2 dichl. + @ NO_3 - max. allow. levels.

② H + W

③ Province