ASSESSMENT STUDY OF WATER AND WASTEWATER SYSTEMS AND ASSOCIATED WATER MANAGEMENT PRACTICES AT CHEAM BAND

A
REPORT
TO
INDIAN AND NORTHERN AFFAIRS CANADA
BC REGION

NovaTec Consultants Inc.
Environmental Engineers and Scientists

June 2002

File: 1407.09-10

Appendix C

Water Testing Results for Cheam

CITY OF CHILLIWACK

MUNICIPAL DEVELOPMENT DEPARTMENT

8550 YOUNG ROAD

CHILLIWACK, B.C. V2P 8A4

TELEPHONE (604) 793-2906 FAX (604) 793-2285

TRANSMITTAL SHEET

TO: Andrew Karsai	FROM: Ernie Knight
COMPANY: Novatech	DATE:
FAX NUMBER:	TOTAL NO. OF PAGES INCLUDING COVER:
PHONE NUMBER: 604 873-9262	SENDER'S REFERENCE NUMBER:
RE: Water Analysis	YOUR REFERENCE NUMBER:

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:

Andrew,

Attached are the latest chemical analysis results for the City of Chilliwack water supply system. This information would be representative of the water supplied to the three native bands that you are reporting on.

Regards

E. A. Knight, C. Tech.
Senior Development Technician

Janet

ANALYTICAL SERVICES

26-Oct-01

Certificate of Analysis

8577 Commerce Court
Burnaby, B.C.
Canada V5A 4N5
Tel 604 444 4808
Fax 604 444 4511

Reported To :

CITY OF CHILLIWACK Client Code CG

CIVIC SERVICES CENTER
8300 KIERNAN DRIVE
CHILLIWACK, BC V2P 7H7
ATTENTION: MARIE KIMMERLY

Phone : (604) 793-2810
FAX : (604) 793-2285

Project Information :

Project ID : DRINKING WATER PROGRAM PRODUCTION WELLS
Submitted By: PETER O'BYRNE

Requisition Forms :

Form 80898421 logged on 24-Sep-01 completed on 26-Oct-01
Form 80898422 logged on 24-Sep-01 completed on 24-Oct-01
Form 08086909 logged on 27-Sep-01 completed on 3-Oct-01

Remarks :

- All organic data is blank corrected except for PCDD/F, Hi-res MS and CLP volatile analyses
- 'MDL' = Method Detection Limit, '<' = Less than MDL, '—' = Not analyzed
- 'CDWG'= Canadian Drinking Water Guidelines
- Solids results are based on dry weight except Biota Analyses & Special Waste Oil & Grease
- Organic analyses are not corrected for extraction recovery standards except for Isotope Dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)
- All Groundwater samples except BTEX/VOC's or Purgeable Hydrocarbons are decanted and/or filtered prior to analysis unless otherwise mandated by regulatory agency
- This report shall not be reproduced except in full, without the written approval of the laboratory

Methods used by Philip are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', 20th Edition, published by the American Public Health Association, or on US EPA protocols found in the 'Test Methods For Evaluating Solid Waste, Physical/Chemical Method, SW846', 3rd Edition. Other procedures are based on methodologies accepted by the appropriate regulatory agency. Methodology briefs are available by written request.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Liability for any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied.
Your samples will be retained at Philip for a period of 30 days from receipt of data or as per contract.

PHILIP Project Manager: Diana Nguyen

Diana Nguyen

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

Parameter	Unit	MDL	CDWG	Philip ID : 11060852 Client ID : PW75-CFB	11060853 PW64-3	11060854 PW77-2	11060855 PW99-6
PHYSICAL							
Field pH	pH units	1.0	—	6.7	7.1	7.0	8.0
pH	pH units	0.1	6.5-8.5	7.6	7.3	7.2	7.9
Color True	Col.Unit	5	15	< 5	< 5	< 5	< 5
Field Conductivity	uS/cm	0.50	—	121	109	108	124
Specific Conductance	uS/cm	1	—	116	103	107	133
Computed Conductance	uS/cm		—	119	106	115	135
Conductance % Diff.	%		—	2.7	2.5	7.0	1.2
Residue Filterable 1.0u (TDS)	mg/L	10	500	61	55	54	62
Computed TDS	mg/L		—	63	56	60	71
TDS % Diff.	%		—	2.7	1.6	11.2	13.0
Turbidity	NTU	0.10	1.0	< 0.10	0.11	< 0.10	0.51
Hardness Total -T	mg/L		500	52.9	48.2	50.0	61.1
Hardness Total -D	mg/L		—	57.1	51.0	52.4	63.5
Field Temperature	Celsius	0.0	—	12.4	11.9	10.4	10.7
GENERAL INORGANICS							
Alkalinity Phen. 8.3 as CaCO3	mg/L	1	—	< 1	< 1	< 1	< 1
Alkalinity Total as CaCO3	mg/L	1	—	51	44	46	55
Carbonate as CO3=	mg/L		—	< 0.5	< 0.5	< 0.5	< 0.5
Bicarbonate as HCO3-	mg/L		—	62.2	53.6	56.1	67.0
Hydroxide as OH-	mg/L		—	< 0.5	< 0.5	< 0.5	< 0.5
ANIONS							
Chloride Dissolved	mg/L	1.0	< 250	1.4	< 1.0	2.3	1.8
Fluoride Dissolved	mg/L	0.10	1.5	< 0.10	< 0.10	< 0.10	< 0.10
Ion Balance	%		—	1.4	0.2	-1.8	-0.9
Total Anions	meq/L		—	1.23	1.08	1.17	1.38
Total Cations	meq/L		—	1.26	1.09	1.13	1.36
Langelier Index	pH units		—	-0.9	-1.3	-1.3	-0.5
Saturation pH	pH units		—	8.5	8.6	8.5	8.4
NITROGEN							
Ammonia Nitrogen (N)	mg/L	0.005	—	< 0.005	< 0.005	< 0.005	< 0.005
Nitrate Nitrogen Dissolved (N)	mg/L		10.0	0.15	0.22	0.22	0.13
Nitrate+Nitrite (N)	mg/L	0.02	10.0	0.15	0.22	0.22	0.13
Nitrite Nitrogen (N)	mg/L	0.005	1.0	< 0.005	< 0.005	< 0.005	< 0.005
			Matrix :	Water	Water	Water	Water
			Sampled on:	01/09/20 09:35	01/09/20 11:50	01/09/20 11:00	01/09/20 11:25

CONTINUED on page 3

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

Parameter	Unit	MDL	CDWG	Philip ID : 11060852 Client ID : PW75-CFB	11060853 PW64-3	11060854 PW77-2	11060855 PW99-6
SULFATE							
Sulfate	mg/L	1.0	< 500	7.1	7.7	8.0	10.3
METALS TOTAL							
Aluminum	mg/L	0.02	—	< 0.02	< 0.02	< 0.02	< 0.02
Antimony	mg/L	0.05	—	< 0.05	< 0.05	< 0.05	< 0.05
Arsenic	mg/L	0.001	0.025	< 0.001	< 0.001	< 0.001	0.002 (1)
Barium	mg/L	0.001	1.0	0.009 (1)	0.010	0.010	0.011
Beryllium	mg/L	0.0002	—	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Bismuth	mg/L	0.05	—	< 0.05	< 0.05	< 0.05	< 0.05
Boron	mg/L	0.01	5.0	< 0.01 (1)	< 0.01	< 0.01	0.01
Cadmium	mg/L	0.0001	0.005	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Calcium	mg/L	0.05	—	18.5 (1)	17.0 (1)	17.5 (1)	21.6 (1)
Chromium	mg/L	0.005	0.05	< 0.005	< 0.005	< 0.005	< 0.005
Cobalt	mg/L	0.005	—	< 0.005	< 0.005	< 0.005	< 0.005
Copper	mg/L	0.005	1.0	0.055	0.011	< 0.005	< 0.005
Iron	mg/L	0.005	0.3	< 0.005	< 0.005	< 0.005	0.085
Lead	mg/L	0.0005	0.01	< 0.0005	< 0.0005	< 0.0005 (1)	< 0.0005
Magnesium	mg/L	0.05	—	1.63	1.39	1.52	1.75
Manganese	mg/L	0.001	0.05	< 0.001	< 0.001	< 0.001	0.003
Mercury	mg/L	0.00005	0.001	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Molybdenum	mg/L	0.005	—	0.005	< 0.005	< 0.005	0.007
Nickel	mg/L	0.01	—	< 0.01	< 0.01	< 0.01	< 0.01
Phosphorus	mg/L	0.1	—	< 0.1	< 0.1	< 0.1	< 0.1
Potassium	mg/L	1	—	1	1	1	< 1
Selenium	mg/L	0.001	0.01	< 0.001	< 0.001	< 0.001	< 0.001
Silver	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium	mg/L	0.1	200	1.8	1.4	1.5	1.6
Strontium	mg/L	0.001	—	0.065	0.068	0.069	0.073
Sulfur	mg/L	0.1	—	2.1	2.4	2.4 (1)	3.3 (1)
Tellurium	mg/L	0.05	—	< 0.05	< 0.05	< 0.05	< 0.05
Thallium	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Tin	mg/L	0.02	—	< 0.02	< 0.02	< 0.02	< 0.02
Titanium	mg/L	0.003	—	< 0.003	< 0.003	< 0.003	< 0.003
Vanadium	mg/L	0.005	—	< 0.005	< 0.005	< 0.005	< 0.005
Zinc	mg/L	0.005	5.0	< 0.005	< 0.005	0.008 (1)	0.008
Zirconium	mg/L	0.005	—	< 0.005	< 0.005	< 0.005	< 0.005
				Matrix : Water	Water	Water	Water
				Sampled on: 01/09/20 09:35	01/09/20 11:50	01/09/20 11:00	01/09/20 11:25

CONTINUED on page 4

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

Parameter	Unit	MDL	CDWG	Philip ID : 11060852 Client ID : PW75-CFB	11060853 PW64-3	11060854 PW77-2	11060855 PW99-6
METALS DISSOLVED							
Aluminum Dissolved	mg/L	0.02	—	< 0.02	< 0.02	< 0.02	< 0.02
Antimony Dissolved	mg/L	0.05	—	< 0.05	< 0.05	< 0.05	< 0.05
Arsenic Dissolved	mg/L	0.001	—	< 0.001	< 0.001	< 0.001	0.002
Barium Dissolved	mg/L	0.001	—	0.010	0.012	0.013	0.011
Beryllium Dissolved	mg/L	0.0002	—	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Bismuth Dissolved	mg/L	0.05	—	< 0.05	< 0.05	< 0.05	< 0.05
Boron Dissolved	mg/L	0.008	—	0.010	< 0.008	< 0.008	< 0.008
Cadmium Dissolved	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Calcium Dissolved	mg/L	0.05	—	19.8	17.9	18.3	22.3
Chromium Dissolved	mg/L	0.005	—	< 0.005	< 0.005	< 0.005	< 0.005
Cobalt Dissolved	mg/L	0.005	—	< 0.005	< 0.005	< 0.005	< 0.005
Copper Dissolved	mg/L	0.005	—	0.049	0.007	< 0.005	< 0.005
Iron Dissolved	mg/L	0.005	—	< 0.005	< 0.005	< 0.005	< 0.005
Lead Dissolved	mg/L	0.001	—	< 0.001	< 0.001	0.001	< 0.001
Magnesium Dissolved	mg/L	0.05	—	1.87	1.52	1.64	1.91
Manganese Dissolved	mg/L	0.001	—	< 0.001	0.007	< 0.001	0.003
Mercury Dissolved	mg/L	0.00005	—	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Molybdenum Dissolved	mg/L	0.005	—	< 0.005	< 0.005	< 0.005	< 0.005
Nickel Dissolved	mg/L	0.008	—	< 0.008	< 0.008	< 0.008	< 0.008
Phosphorus Dissolved	mg/L	0.1	—	< 0.1	< 0.1	< 0.1	< 0.1
Potassium Dissolved	mg/L	1	—	< 1	< 1	< 1	< 1
Selenium Dissolved	mg/L	0.001	—	< 0.001	< 0.001	< 0.001	< 0.001
Silver Dissolved	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Sodium Dissolved	mg/L	0.05	—	2.39	1.51	1.62	1.69
Strontium Dissolved	mg/L	0.001	—	0.074	0.076	0.077	0.080
Sulfur Dissolved	mg/L	0.1	—	2.4	2.5	2.6	3.5
Tellurium Dissolved	mg/L	0.05	—	< 0.05	< 0.05	< 0.05	< 0.05
Thallium Dissolved	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Tin Dissolved	mg/L	0.02	—	< 0.02	< 0.02	< 0.02	< 0.02
Titanium Dissolved	mg/L	0.003	—	< 0.003	< 0.003	< 0.003	< 0.003
Vanadium Dissolved	mg/L	0.005	—	< 0.005	< 0.005	< 0.005	< 0.005
Zinc Dissolved	mg/L	0.005	—	< 0.005	< 0.005	0.008	< 0.005
Zirconium Dissolved	mg/L	0.005	—	< 0.005	< 0.005	< 0.005	< 0.005
CARBAMATES							
Prep.Pesticide Water	date			01/10/17	01/10/17	01/10/17	01/10/17
Aldicarb	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
			Matrix :	Water	Water	Water	Water
			Sampled on:	01/09/20 09:35	01/09/20 11:50	01/09/20 11:00	01/09/20 11:25

CONTINUED on page 5

ANALYTICAL SERVICES

26-Oct-01

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

				Philip ID :	11060852	11060853	11060854	11060855
				Client ID :	PW75-CFB	PW64-3	PW77-2	PW99-6
Parameter	Unit	MDL	CDWG					
Aldicarb Sulfone	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Aldicarb Sulfoxide	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Bendiocarb	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Carbaryl	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Carbofuran	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
3-Hydroxycarbofuran	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Methiocarb	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Methomyl	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Oxamyl	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Propoxur	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
HYDROCARBONS								
TEH Extraction-Water	date				01/09/24	01/09/26	01/09/26	01/09/26
VH C6-C10	mg/L	0.1	—		< 0.1	< 0.1	< 0.1	—
TEH (C10 - C30)	mg/L	0.1	—		< 0.1	< 0.1	< 0.1	< 0.1
VPHw	mg/L		—		< 0.1	< 0.1	< 0.1	—
POLYCYCLIC AROMATIC HYDROCARBONS								
PAH Extraction-Water	date				01/09/27	01/09/27	01/09/27	01/09/27
Acenaphthene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Acenaphthylene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Acridine	mg/L	0.00005	—		< 0.00005	< 0.00005	< 0.00005	< 0.00005
Anthracene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Benzo(a)anthracene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Benzo(b)fluoranthene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Benzo(k)fluoranthene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Benzo(g,h,i)perylene	mg/L	0.00002	—		< 0.00002	< 0.00002	< 0.00002	< 0.00002
Benzo(a)pyrene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Chrysene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Dibenz(a,h)anthracene	mg/L	0.00002	—		< 0.00002	< 0.00002	< 0.00002	< 0.00002
Fluoranthene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Fluorene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Indeno(1,2,3-c,d)pyrene	mg/L	0.00002	—		< 0.00002	< 0.00002	< 0.00002	< 0.00002
2-Methylnaphthalene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Naphthalene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Phenanthrene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Pyrene	mg/L	0.00001	—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
Total PAH's	mg/L		—		< 0.00005	< 0.00005	< 0.00005	< 0.00005
Total Low MW PAH's	mg/L		—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
				Matrix :	Water	Water	Water	Water
				Sampled on:	01/09/20 09:35	01/09/20 11:50	01/09/20 11:00	01/09/20 11:25

CONTINUED on page 6

ANALYTICAL SERVICES

26-Oct-01

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

				Philip ID :	11060852	11060853	11060854	11060855
				Client ID :	PW75-CFB	PW64-3	PW77-2	PW99-5
Parameter	Unit	MDL	CDWG					
Total High MW PAH's	mg/L		—		< 0.00001	< 0.00001	< 0.00001	< 0.00001
SURROGATE RECOVERY								
d10-Acenaphthene	%	0	---		48	57	84	96
d10-Phenanthrene	%	0	—		63	69	100	111
d12-Chrysene	%	0	—		71	70	97	101
d12-Perylene	%	0	—		67	69	98	103
VOLATILE ORGANICS-MAH								
Benzene	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
Chlorobenzene	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
1,2-Dichlorobenzene	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
1,3-Dichlorobenzene	ug/L	0.3	—		< 0.3	< 0.3	< 0.3	—
1,4-Dichlorobenzene	ug/L	0.4	—		< 0.4	< 0.4	< 0.4	—
Ethylbenzene	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
Styrene	ug/L	0.4	—		< 0.4	< 0.4	< 0.4	—
Toluene	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
Xylenes	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
m,p - Xylene	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
o - Xylene	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
VOLATILE ORGANICS-CHLORINATED ALIPHATIC								
Volat. Wat. Pre-Ser.	date				01/09/25	01/09/25	01/09/25	—
Bromomethane	ug/L	3	—		< 3	< 3	< 3	—
Carbon tetrachloride	ug/L	1	—		< 1	< 1	< 1	—
Chloroethane	ug/L	4	—		< 4	< 4	< 4	—
2-chloroethylvinylether	ug/L	2	—		< 2	< 2	< 2	—
Chloromethane	ug/L	1	—		< 1	< 1	< 1	—
1,1-Dichloroethane	ug/L	0.7	—		< 0.7	< 0.7	< 0.7	—
1,2-Dichloroethane	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
1,1-Dichloroethene	ug/L	0.4	—		< 0.4	< 0.4	< 0.4	—
cis-1,2-Dichloroethene	ug/L	0.4	—		< 0.4	< 0.4	< 0.4	—
trans-1,2-Dichloroethene	ug/L	0.7	—		< 0.7	< 0.7	< 0.7	—
Dichloromethane	ug/L	0.9	—		< 0.9	< 0.9	< 0.9	—
1,2-Dichloropropane	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
cis-1,3-Dichloropropene	ug/L	0.4	—		< 0.4	< 0.4	< 0.4	—
trans-1,3-Dichloropropene	ug/L	0.3	—		< 0.3	< 0.3	< 0.3	—
1,2-Dibromoethane	ug/L	1	—		< 1	< 1	< 1	—
1,1,2,2-Tetrachloroethane	ug/L	0.5	—		< 0.5	< 0.5	< 0.5	—
				Matrix :	Water	Water	Water	Water
				Sampled on:	01/09/20 09:35	01/09/20 11:50	01/09/20 11:00	01/09/20 11:25

CONTINUED on page 7

ANALYTICAL SERVICES

26-Oct-01
Page 7 of 25

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

Parameter	Unit	MDL	CDWG	Philip ID : 11060852 Client ID : PW75-CFB	11060853 PW64-3	11060854 PW77-2	11060855 PW99-6
Tetrachloroethene	ug/L	0.5	—	< 0.5	< 0.5	< 0.5	—
1,1,1-Trichloroethane	ug/L	0.7	—	< 0.7	< 0.7	< 0.7	—
1,1,2-Trichloroethane	ug/L	0.5	—	< 0.5	< 0.5	< 0.5	—
Trichloroethene	ug/L	0.6	—	< 0.6	< 0.6	< 0.6	—
Trichlorofluoromethane	ug/L	4	—	< 4	< 4	< 4	—
Vinyl Chloride	ug/L	1	—	< 1	< 1	< 1	—
VOLATILE ORGANICS-TRIHALOMETHANES							
Bromodichloromethane	ug/L	0.5	—	< 0.5	< 0.5	< 0.5	—
Bromoform	ug/L	0.4	—	< 0.4	< 0.4	< 0.4	—
Chloroform	ug/L	0.6	—	< 0.6	< 0.6	< 0.6	—
Dibromochloromethane	ug/L	0.4	—	< 0.4	< 0.4	< 0.4	—
VOC SURROGATE RECOVERY							
Bromofluorobenzene	%	0	—	105	101	102	—
d4-1,2-dichloroethane	%	0	—	96	91	94	—
d8-Toluene	%	0	—	101	102	104	—
			Matrix :	Water	Water	Water	Water
			Sampled on:	01/09/20 09:35	01/09/20 11:50	01/09/20 11:00	01/09/20 11:25

Result comments and/or text results :

(1) Diss > Total, within precision of analytical method.

ANALYTICAL SERVICES

26-Oct-01

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

Parameter	Unit	MDL	CDWG	Philip ID : 11060857 Client ID : PW75-CFB	11060858 PW64-3	11060859 PW77-2	11060860 PW99-6
HERBICIDES							
Prep.Soil Ster.Water	date			01/09/25	01/09/25	01/09/25	01/09/25
Atrazine	mg/L	0.0002	—	< 0.0002	< 0.0002	< 0.0002	< 0.0002
De-ethyl Atrazine	mg/L	0.0003	—	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Butylate	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Cyanazine	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Desmetryn	mg/L	0.0003	—	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Diphenylamine	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Diuron	mg/L	0.002	—	< 0.002	< 0.002	< 0.002	< 0.002
Eptam	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Ethalfluralin	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Hexazinone	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Linuron	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Metalaxyl	mg/L	0.0003	—	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Metribuzin	mg/L	0.0003	—	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Metolachlor	mg/L	0.0002	—	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Pirimicarb	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Profluralin	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Prometryn	mg/L	0.0002	—	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Propazine	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Simazine	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Tebuthiuron	mg/L	0.0002	—	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Terbuthylazine	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Terbutryn	mg/L	0.0002	—	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Triallate	mg/L	0.0003	—	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Triadimefon	mg/L	0.0003	—	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Trifluralin	mg/L	0.0002	—	< 0.0002	< 0.0002	< 0.0002	< 0.0002
ORGANOCHLORINE PESTICIDES							
Alachlor	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Aldrin	mg/L	0.0003	—	< 0.0003	< 0.0003	< 0.0003	< 0.0003
BHC, alpha-	mg/L	0.0003	—	< 0.0003	< 0.0003	< 0.0003	< 0.0003
BHC, beta-	mg/L	0.0003	—	< 0.0003	< 0.0003	< 0.0003	< 0.0003
Captan	mg/L	0.0010	—	< 0.0020	< 0.0020	< 0.0020	< 0.0020
Chlorbenside	mg/L	0.0001	—	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chlordane, alpha-	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chlordane, gamma-	mg/L	0.0005	—	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chlorfenson	mg/L	0.0002	—	< 0.0002	< 0.0002	< 0.0002	< 0.0002
				Matrix : Water	Water	Water	Water
				Sampled on: 01/09/20 09:35	01/09/20 11:50	01/09/20 11:00	01/09/20 11:25

CONTINUED on page 9

ANALYTICAL SERVICES

26-Oct-01

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

				Philip ID :	11060857	11060858	11060859	11060860
				Client ID :	PW75-CFB	PW64-3	PW77-2	PW99-6
Parameter	Unit	MDL	CDWG					
Chlorothalonil	mg/L	0.001	—		< 0.005	< 0.005	< 0.005	< 0.005
Chlorpropham	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dacthal (DCPA)	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
DDE, p,p'-	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
DDT, o,p'-	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
DDT, p,p'-	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Diallate(e)	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Diallate(z)	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dichlobenil	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dichloran	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dichlofluanid	mg/L	0.0005	—		< 0.0050	< 0.0050	< 0.0050	< 0.0050
Dicofol	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dieldrin	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Endosulfan I	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Endosulfan II	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Endosulfan Sulphate	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Endrin	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Folpet	mg/L	0.0010	—		< 0.0010	< 0.0010	< 0.0010	< 0.0010
Heptachlor	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Lindane, BHC, gamma-	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Methidathion	mg/L	0.0003	—		< 0.0003	< 0.0003	< 0.0003	< 0.0003
Methoxychlor	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Mirex	mg/L	0.0003	—		< 0.0003	< 0.0003	< 0.0003	< 0.0003
Nitrofen	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Permethrin, cis	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Permethrin, trans	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Pirimiphos-methyl	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Procymidone	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Pronamide	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Quintozene	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Tecnazene	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Tetradifon	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Tolylfluanid	mg/L	0.0005	—		< 0.0025	< 0.0025	< 0.0025	< 0.0025
Vinclozolin	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
SURROGATE RECOVERY								
p,p'-DDE-13C12	%	50	—		119	120	119	118
				Matrix :	Water	Water	Water	Water
				Sampled on:	01/09/20 09:35	01/09/20 11:50	01/09/20 11:00	01/09/20 11:25

CONTINUED on page 10

ANALYTICAL SERVICES

26-Oct-01
Page 10 of 25

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

				Philip ID :	11060857	11060858	11060859	11060860
				Client ID :	PW75-CFB	PW64-3	PW77-2	PW99-6
Parameter	Unit	MDL	CDWG					
ORGANOPHOSPHORUS PESTICIDES								
Prep.Pesticide Water	date				01/09/28	01/09/28	01/09/28	01/09/28
Acephate	mg/L	0.001	—		< 0.001	< 0.001	< 0.001	< 0.001
Aspon	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Azinphos Ethyl	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Azinphos Methyl	mg/L	0.001	—		< 0.001	< 0.001	< 0.001	< 0.001
Bromacil	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Benfluralin	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Bromophos	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Bromophos Ethyl	mg/L	0.0003	—		< 0.0003	< 0.0003	< 0.0003	< 0.0003
Carbophenothion	mg/L	0.0003	—		< 0.0003	< 0.0003	< 0.0003	< 0.0003
Chlorfenvinphos(e)	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chlorfenvinphos(z)	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chlormephos	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Chlorpyrifos	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Chlorpyrifos Methyl	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chlorthiophos	mg/L	0.0003	—		< 0.0003	< 0.0003	< 0.0003	< 0.0003
Cyanophos	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Demeton	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Diazinon	mg/L	0.0003	—		< 0.0003	< 0.0003	< 0.0003	< 0.0003
Dichlofenthion	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dichlorvos	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Dicrotophos	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dimethoate	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dioxathion	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Disulfoton	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
EPN	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Ethion	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Fenchlorphos(Ronnel)	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fenitrothion	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Fensulfothion	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fenthion	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Fonofos	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Iodofenphos	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Isofenphos	mg/L	0.0003	—		< 0.0003	< 0.0003	< 0.0003	< 0.0003
Malaoxon	mg/L	0.0003	—		< 0.0003	< 0.0003	< 0.0003	< 0.0003
Malathion	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Mevinphos-cis	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
				Matrix :	Water	Water	Water	Water
				Sampled on:	01/09/20 09:35	01/09/20 11:50	01/09/20 11:00	01/09/20 11:25

CONTINUED on page 11

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

				Philip ID :	11060857	11060858	11060859	11060860
				Client ID :	PW75-CFB	PW64-3	PW77-2	PW99-6
Parameter	Unit	MDL	CDWG					
Methamidophos	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Mevinphos-trans	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Naled	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Omethoate	mg/L	0.001	—		< 0.001	< 0.001	< 0.001	< 0.001
Parathion	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Parathion Methyl	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Phorate	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Phosalone	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Phosmet	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Phosphamidon	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
Pirimiphos Ethyl	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Profenophos	mg/L	0.0005	—		< 0.0005	< 0.0005	< 0.0005	< 0.0005
Pyrazophos	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Quinalphos	mg/L	0.0003	—		< 0.0003	< 0.0003	< 0.0003	< 0.0003
Sulfotep	mg/L	0.0001	—		< 0.0001	< 0.0001	< 0.0001	< 0.0001
Terbufos	mg/L	0.0003	—		< 0.0003	< 0.0003	< 0.0003	< 0.0003
Tetrachlorvinphos	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
MISCELLANEOUS SEMIVOLATILE ORGANICS								
Hexachlorobenzene	mg/L	0.0002	—		< 0.0002	< 0.0002	< 0.0002	< 0.0002
				Matrix :	Water	Water	Water	Water
				Sampled on:	01/09/20 09:35	01/09/20 11:50	01/09/20 11:00	01/09/20 11:25

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

Philip ID : 11062502
Client ID : PW99-6

Parameter	Unit	MDL	CDWG	
HYDROCARBONS				
VH C6-C10	mg/L	0.1	—	< 0.1
VPHw	mg/L		—	< 0.1
VOLATILE ORGANICS-MAH				
Benzene	ug/L	0.5	—	< 0.5
Chlorobenzene	ug/L	0.5	—	< 0.5
1,2-Dichlorobenzene	ug/L	0.5	—	< 0.5
1,3-Dichlorobenzene	ug/L	0.3	---	< 0.3
1,4-Dichlorobenzene	ug/L	0.4	—	< 0.4
Ethylbenzene	ug/L	0.5	—	< 0.5
Styrene	ug/L	0.4	—	< 0.4
Toluene	ug/L	0.5	—	< 0.5
Xylenes	ug/L	0.5	—	< 0.5
m,p - Xylene	ug/L	0.5	—	< 0.5
o - Xylene	ug/L	0.5	—	< 0.5
VOLATILE ORGANICS-CHLORINATED ALIPHATIC				
Volat. Wat. Pre-Scr.	date			01/09/29
Bromomethane	ug/L	3	—	< 3
Carbon tetrachloride	ug/L	1	—	< 1
Chloroethane	ug/L	4	—	< 4
2-chloroethylvinylether	ug/L	2	—	< 2
Chloromethane	ug/L	1	—	< 1
1,1-Dichloroethane	ug/L	0.7	—	< 0.7
1,2-Dichloroethane	ug/L	0.5	—	< 0.5
1,1-Dichloroethene	ug/L	0.4	—	< 0.4
cis-1,2-Dichloroethene	ug/L	0.4	—	< 0.4
trans-1,2-Dichloroethene	ug/L	0.7	—	< 0.7
Dichloromethane	ug/L	0.9	---	< 0.9
1,2-Dichloropropane	ug/L	0.5	—	< 0.5
cis-1,3-Dichloropropene	ug/L	0.4	—	< 0.4
trans-1,3-Dichloropropene	ug/L	0.3	—	< 0.3
1,2-Dibromoethane	ug/L	1	—	< 1
1,1,2,2-Tetrachloroethane	ug/L	0.5	---	< 0.5
Tetrachloroethene	ug/L	0.5	—	< 0.5
1,1,1-Trichloroethane	ug/L	0.7	—	< 0.7
1,1,2-Trichloroethane	ug/L	0.5	—	< 0.5

Matrix : Water
Sampled on: 01/09/27 08:05

CONTINUED on page 13

ANALYTICAL SERVICES

26-Oct-01

ANALYTICAL REPORT

Client : CITY OF CHILLIWACK
Project : DRINKING WATER PROGRAM PRODUCTION WELLS

Philip ID : 11062502
Client ID : PW99-6

Parameter	Unit	MDL	CDWG	
Trichloroethene	ug/L	0.6	—	< 0.6
Trichlorofluoromethane	ug/L	4	—	< 4
Vinyl Chloride	ug/L	1	—	< 1
VOLATILE ORGANICS-TRIHALOMETHANES				
Bromodichloromethane	ug/L	0.5	—	< 0.5
Bromoform	ug/L	0.4	—	< 0.4
Chloroform	ug/L	0.6	—	< 0.6
Dibromochloromethane	ug/L	0.4	—	< 0.4
VOC SURROGATE RECOVERY				
Bromofluorobenzene	%	0	—	97
d4-1,2-dichloroethane	%	0	—	100
d8-Toluene	%	0	—	99

Matrix : Water
Sampled on: 01/09/27 08:05

Page(s) 004467 to\à 004474

Is(are) under consultation

RESULTS OF ANALYSIS - Water

File No. J4706

			s.19(1)	CHEAM B.O.	CHEAM Well #1	CHEAM Well #2
				98 05 04	98 05 04	98 05 04
Physical Tests						
Colour		(CU)		<5	<5	<5
Conductivity		(umhos/cm)		112	303	472
Total Dissolved Solids				66	165	279
Hardness		CaCO3		51.6	154	245
pH				7.30	7.85	7.86
Turbidity		(NTU)		0.1	0.5	<0.1
Dissolved Anions						
Alkalinity-Total			CaCO3	47	159	252
Chloride	Cl			1.0	1.5	5.6
Fluoride	F			<0.02	0.04	0.03
Sulphate	SO4			7	7	7
Nutrients						
Nitrate Nitrogen			N	0.267	0.770	0.916
Nitrite Nitrogen			N	0.002	0.001	<0.001
Total Metals						
Aluminum	T-Al			<0.2	<0.2	<0.2
Arsenic	T-As			<0.0001	0.0017	0.0008
Barium	T-Ba			0.02	0.03	0.03
Boron	T-B			<0.1	<0.1	<0.1
Cadmium	T-Cd			<0.0002	<0.0002	<0.0002
Calcium	T-Ca			18.1	47.7	81.6
Chromium	T-Cr			<0.01	<0.01	<0.01
Copper	T-Cu			<0.01	<0.01	<0.01
Iron	T-Fe			<0.03	0.08	<0.03
Lead	T-Pb			<0.001	<0.001	<0.001
Magnesium	T-Mg			1.5	8.5	9.9
Manganese	T-Mn			<0.005	<0.005	<0.005
Mercury	T-Hg			<0.00005	<0.00005	<0.00005
Potassium	T-K			<2	<2	<2
Selenium	T-Se			0.0005	0.0012	0.0007
Sodium	T-Na			<2	3	4
Zinc	T-Zn			<0.005	0.014	<0.005

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
< = Less than the detection limit indicated.

RESULTS OF ANALYSIS - Water

File No. J6337

	s.19(1)	PW Cheam
		98 06 23 16:30

Physical Tests			
Colour	(CU)		<5
Conductivity	(umhos/cm)		273
Total Dissolved Solids			175
Hardness	CaCO3		141
pH			7.51
Turbidity	(NTU)		3.0
Dissolved Anions			
Alkalinity-Total		CaCO3	129
Chloride	Cl		3.3
Fluoride	F		0.10
Sulphate	SO4		5
Nutrients			
Nitrate Nitrogen		N	1.51
Nitrite Nitrogen		N	0.010
Total Metals			
Aluminum	T-Al		<0.2
Arsenic	T-As		<0.0001
Barium	T-Ba		0.02
Boron	T-B		<0.1
Cadmium	T-Cd		<0.0002
Calcium	T-Ca		32.8
Chromium	T-Cr		<0.01
Copper	T-Cu		0.05
Iron	T-Fe		0.30
Lead	T-Pb		<0.001
Magnesium	T-Mg		14.4
Manganese	T-Mn		0.357
Mercury	T-Hg		<0.00005
Potassium	T-K		<2
Selenium	T-Se		<0.001
Sodium	T-Na		2
Uranium	T-U		0.00005
Zinc	T-Zn		0.028

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
< = Less than the detection limit indicated.

Page(s) 004477 to\à 004508

Is(are) under consultation