Province of British Columbia

Ministry of Environment [redacted]

MEMORANDUM

2569 Kenworth Road, Nanaimo, British Columbia V9T 4P7 / Telephone: (604) 758-3951

DMT - p.2

EJS - p.2

To: J.O. Finnie, P. Eng.
Head
Municipal Section

Date: April 30, 1990

File: PR-1839 - Sampling

Re: Environmental Monitoring Program for Twa/CRD Landfill

On January 9, 1990 receiving environment samples were taken as outlined in "Environmental Monitoring Program for Twa/CRD - Saltspring Island". The results have been tabulated (Tables 1 and 2 attached).

It appears that surface water exiting the landfill site (sampling site B) is contaminated: exhibiting elevated levels of sulphate, aluminum, calcium, iron magnesium, lead, zinc, total phosphorus and chloride as well as increased hardness and conductivity levels. These levels are all elevated when compared to background levels (sampling site A). Downstream sites are slightly elevated over background for a number of parameters; however, it appears that contamination occurring at site B is not significantly degrading downstream water quality.

Similarly, groundwater at the landfill site (sampling site 2) appears to be slightly contaminated: exhibiting elevated levels of sulphate, calcium, magnesium, lead, zinc, and chloride as well as increased hardness and conductivity levels. These levels are all elevated when compared to background levels (sampling site 1). It is noted that the background site exhibits a high nitrate level not found elsewhere. Water quality at downgradient sites is consistent with background levels and, to date, does not appear to be adversely influenced by activities at the landfill.

While the elevated levels found at sampling sites B and 2 are borderline with regard to aquatic life criteria, drinking water quality criteria are not exceeded expect for iron and manganese at sampling site B.

Note that sampling site 2 was the Twa residence tap water. The source could either have been a relatively shallow dug well or the 50 m deep drilled well. Both of these wells are located on the landfill property. During the next sampling the actual source of this sample should be determined.

. . . . 2

I recommend that we continue with the monitoring program. The next sample date should be tentatively scheduled for first flush conditions in the fall of 1990. While analysis for organics has not been considered to date, I recommend that it be implemented, particularly for sampling sites B and 2.

C.J. Jenkins, P. Eng.
Waste Management Officer
Municipal Section

CJJ/lq
TWAEMP.MEM

Attachment

CJJ: Agree with your recommendations above. Please arrange for fall sampling and add organics to parameters. I would suggest 2-3 more samplings, then a review of results to see if any impacts are evident.

Jam

DMT: • Arrange with John D. to conduct sampling program (see file - sampling) in say late October. i.e. after the rains begin.

• Add the following parameters for lab analysis:

① VFA - volatile fatty acids
② BTX - benzene, toluene, xylene
③ Total pesticides - pest. scan

Environmental Monitoring Program

Twa/CRD Landfill - Saltspring Island

Table 1 - Surface Water Monitoring Results - Sampled January 9, 1990

Parameter	Sampling Sites A	B	C	D	E
pH	7.2	7.4	6.6	7.1	7.3
Conductivity	89	515	235	116	126
Hardness	31.1	202	84.5	41.3	45.1
BOD_5	<10	<10	<10	<10	<10
COD	23	20	<10	16	16
Sulphate	8.1	96.3	20.8	13.9	12.3
Aluminum	0.24	1.54	0.1	0.29	<.10
Barium	<0.01	0.04	0.02	<0.01	<0.01
Calcium	8.43	59.4	23.3	11.6	12.8
Cadmium	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Cobalt	<0.1	<0.1	<0.1	<0.1	<0.1
Chromium	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	0.31	2.02	0.09	0.48	0.16
Magnesium	2.44	13	6.4	3	3.19
Manganese	0.01	0.09	<0.01	0.04	0.03
Molybdenum	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel	<0.05	<0.05	<0.05	<0.05	<0.05
Lead	0.002	0.003	<0.001	<0.001	<0.001
Vanadium	0.02	0.06	0.03	0.04	0.04
Zinc	<0.005	0.03	<0.005	<0.005	0.007
Ammonium (as N)	0.03	0.025	0.011	0.036	0.031
Nitrate + Nitrite (as N)	1.5	1.07	2.1	1.39	0.33
Nitrate (as N)	1.49	1.04	2.1	1.38	0.33
Nitrite (as N)	0.01	0.032	<0.005	0.012	<0.005
Total Phosphorus	0.019	0.116	0.017	0.025	0.018
Chloride	7.6	48.3	14.6	9.3	11.4

NOTES:

Location A - Blackburn Creek north west of the Blackburn Road west of the landfill. This site is considered to be upstream of the landfill.
Location B - Drainage ditch flowing under Blackburn Road near landfill gate.
Location C - Irrigation pond on Saltspring Centre property.
Location D - Blackburn Lake outflow downstream side of road culvert.
Location E - Cusheon Lake water supply intake.

all values in mg/L except pH (unitless) and specific conductance (uS/cm)

Environmental Monitoring Program

Twa/CRD Landfill - Saltspring Island

Table 2 - Groundwater Monitoring Results - Sampled January 9, 1990

Parameter	Sampling Sites 1	2	3	4
pH	6.5	6.6	7.7	7.7
Conductivity	150	545	370	200
Hardness	56.8	228	141	22.2
BOD_5	<10	<10	<10	<10
COD	48	<10	<10	<10
Sulphate	11.7	127	31.2	9.1
Aluminum	0.17	<0.10	<0.10	4.08
Barium	<0.01	0.03	0.13	0.04
Calcium	14.5	68.8	49.1	7.17
Cadmium	<0.0005	<0.0005	<0.0005	<0.0005
Cobalt	<0.1	<0.1	<0.1	<0.1
Chromium	<0.005	<0.005	<0.005	<0.005
Copper	0.03	0.07	<0.01	0.01
Iron	0.28	0.09	0.02	4.38
Magnesium	5.00	13.7	4.36	1.04
Manganese	0.03	0.05	0.09	0.07
Molybdenum	<0.01	<0.01	<0.01	<0.01
Nickel	<0.05	<0.05	<0.05	<0.05
Lead	0.003	0.004	<0.001	0.002
Vanadium	0.03	0.06	0.03	0.03
Zinc	0.007	0.017	<0.005	0.04
Ammonium (as N)	0.217	0.006	0.15	0.023
Nitrate + Nitrite (as N)	3.65	0.62	0.02	0.55
Nitrate (as N)	3.62	0.62	<0.02	0.50
Nitrite (as N)	0.035	<0.005	<0.005	0.053
Total Phosphorus	0.038	0.006	0.021	0.155
Chloride	7.9	37.2	22.7	7.7

NOTES:

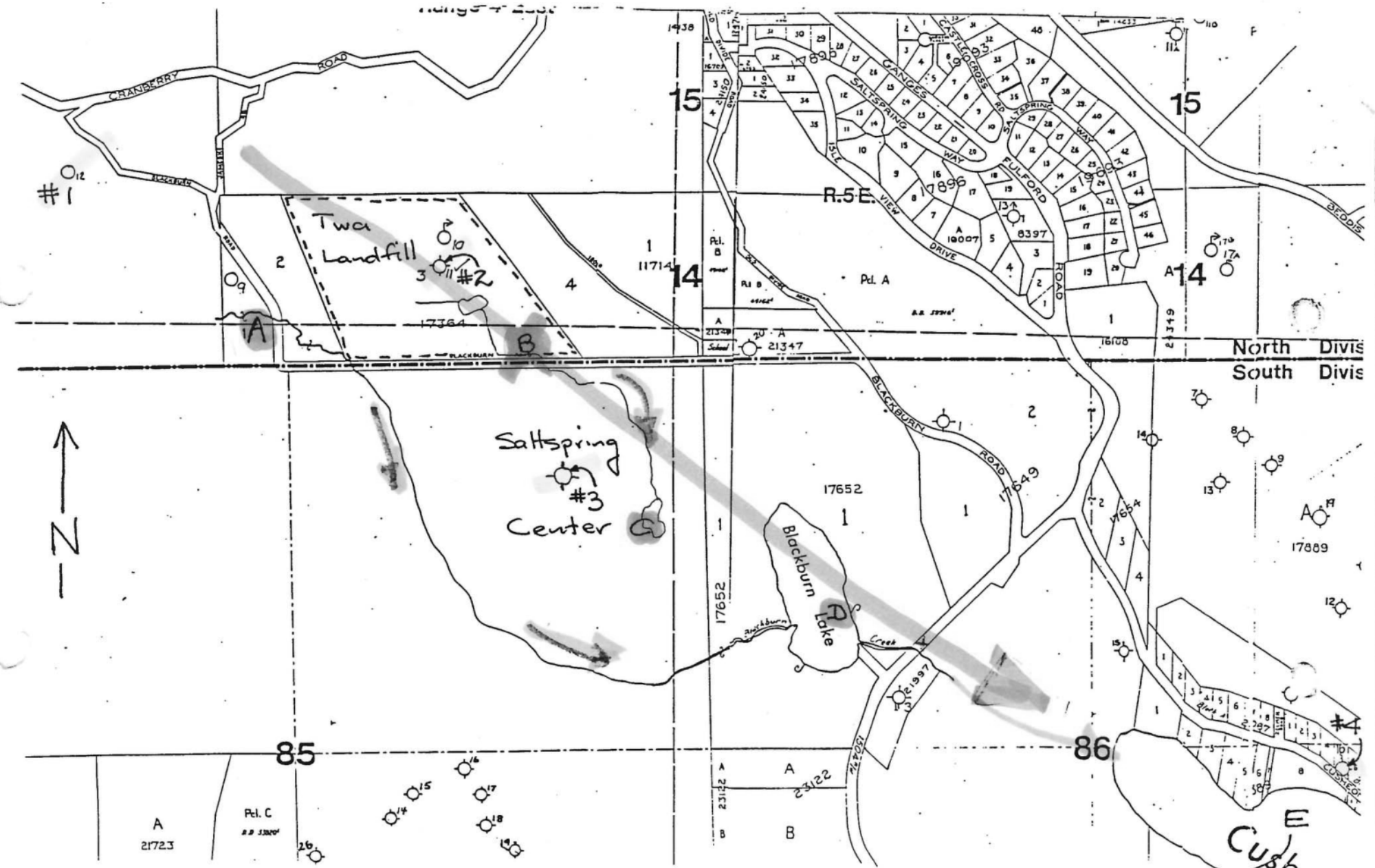
Well #1 - Background well located on Blackburn Road 200 m north of the landfill. It is felt that this location is not influenced by the landfill. Depth of well is to be undetermined.

Well #2 - Twa tapwater from well on property. Could be drilled well (50 m deep) or dug well (3 m deep). Suspect shallow well was being used at the time of sampling.

Well #3 - Domestic well located on Salt Spring Centre property, 200 m south of the landfill gate. Depth of the well is 30 m.

Well #4 - Domestic well located on Cusheon Lake Road western bank of Cusheon Lake. The depth of this well is 48 m.

all values in mg/L except pH (unitless) and specific conductance (uS/cm)



Appendix A:

#n - groundwater wells

alpha - surface water sites

→ - surface water movement

⟹ - suspected groundwater movement

To: J.O. Finnie, P. Eng.
Head
Municipal Section

Date: April 30, 1990

File: PR-1839

Re: Environmental Monitoring Program for Twa/CRD Landfill

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Note that sampling site 2 was the Twa residence tap water. The source could either have been a relatively shallow dug well or the 50 m deep drilled well. Both of these wells are located on the landfill property. During the next sampling the actual source of this sample should be determined.

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I recommend that we continue with the monitoring program. The next sample date should be tentatively scheduled for first flush conditions in the fall of 1990. While analysis for organics has not been considered to date, I recommend that it be implemented, particularly for sampling sites B and 2.

C.J. Jenkins, P. Eng.
Waste Management Officer
Municipal Section

CJJ/lq
TWAEMP.MEM

Attachment

(1) AFTER WRITING remove green sheet and forward the balance of set intact.
(2) WHEN REPLYING after writing your reply keep pink sheet for your file, forward white sheet.

ISLAND BUSINESS FORMS LTD. 71755

Province of British Columbia

MEMORANDUM

TO: Chris Jenkins

FROM: John Denuegar

SUBJECT: TWA Landfill Monitoring Data.

DATE: Apr. 19/90

FILE:

☐ For Your Information ☐ Please O.K. and Return ☐ Please Discuss With Me ☐ Per Your Request ☐ For Your Signature
☐ Please Process ☐ Return With More Details ☐ Investigate and Report ☐ Please Answer ☐ For Your File

Fold Here for Window Envelope

1. Groundwater – well #1 certainly has high nitrogen levels – perhaps well #2 should be resampled to ensure that deep well was sampled – this sample is of borderline drinking water quality with regards to SO4. – well #4 certainly exhibits very high iron & should be treated for removal prior to use. – perhaps this well should be resampled

2. Surface water – site B (drainage ditch) appears contaminated exhibiting very high total P, Fe and Al. Pb and Zn are borderline regarding the aquatic life criteria. If I remember correctly this ditch runs to the irrigation pond (site C) which has much better water quality. Correct

REPLY:

WRITE YOUR REPLY AND RETURN THIS SHEET

ISLAND BUSINESS FORMS LTD.

ENVIRONMENTAL INC.
B.C. LABORATORY SERVICES
Report for form 03000025
Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207977 WELL#1 TWA LANDFILL-SALTSPRING Webster Well

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

Submitted by (46288) MCLAREN D A

Address (69) Waste Management Branch
Vancouver Island Region
2569 Kenworth Road
Nanaimo, BC V9T 4P7

Phone No. 758-3951

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207977) WELL#1 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 10-JAN-1990 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	245.37
Special analysis:	$	0.00
Total	$	245.37

MINISTRY OF ENVIRONMENT
RECEIVED
APR 05 1990
VANCOUVER ISLAND REGION

Site: E207977 WELL#1 TWA LANDFILL-SALTSPRING

From : 90/01/09: 0930 To : 90/01/09: 0930
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	6.5	pH units	Automated pH Meter (00041220/01/01)
Specific Conductance	150	uS/cm	Cond. Meter Siebold (00111160/01/01)
Hardness Total	56.8	mg/L	Calculated Result (0107CALC/--/--)
Biochem. Oxygen Dem.	< 10	mg/L	Seeded Dil. Nit. Inh. 5 Day (01151110/02/01)
Chemical Oxygen Dem.	48	mg/L	K2Cr207 Dig: Titr. (01160500/04/05)
Sulfate Dissolved	11.7	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Aluminum	0.17	mg/L	HNO3 Dig: ICP Analysis (Al-T0040/05/02)
Barium	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Ba-T0040/05/02)
Calcium	14.5	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Cr-T0060/05/02)
Copper	0.03	mg/L	HNO3 Dig: ICP Analysis (Cu-T0040/05/02)
Iron	0.28	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)

B.C. LABORATORY SERVICES
Report for form 03000025
Vancouver Island - Waste Program ATTN: MCLAREN D A Sample 89019600

Site: E207977 WELL#1 TWA LANDFILL-SALTSPRING

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

From :90/01/09:0930 To :90/01/09:0930
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Spparcode/Medium/Pres'n)
Magnesium	5.00	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	0.03	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	0.003	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.03	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	0.007	mg/L	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Nitrogen Amm. Diss(N)	0.217	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	3.65	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	3.62	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	0.035	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Total	0.038	mg/L	Dig. Auto. Ascorbic Acid (P--T1390/01/01)
Chloride Dissolved	7.9	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

[redacted] ENVIRONMENTAL INC.
B.C. LABORATORY SERVICES
Report for form 03000031
Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207978 WELL#2 TWA LANDFILL-SALTSPRING TWA TAPWATER

Submitted by (46288) MCLAREN D A

Address (69) Waste Management Branch
Vancouver Island Region
2569 Kenworth Road
Nanaimo, BC V9T 4P7

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

Phone No. 758-3951

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207978) WELL#2 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 10-JAN-1990 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	245.37
Special analysis:	$	0.00
Total	$	245.37

Site: E207978 WELL#2 TWA LANDFILL-SALTSPRING

MINISTRY OF ENVIRONMENT
RECEIVED
APR 05 1990
VANCOUVER ISLAND REGION

From :90/01/09:0955 To :90/01/09:0955
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	6.6	pH units	Automated pH Meter (00041220/01/01)
Specific Conductance	545	uS/cm	Cond. Meter Siebold (00111160/01/01)
Hardness Total	228	mg/L	Calculated Result (0107CALC/--/--)
Biochem. Oxygen Dem.	< 10	mg/L	Seeded Dil. Nit. Inh. 5 Day (01151110/02/01)
Chemical Oxygen Dem.	< 10	mg/L	K2Cr2O7 Dig:Titr. (01160500/04/05)
Sulfate Dissolved	127	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Aluminum	< 0.10	mg/L	HNO3 Dig: ICP Analysis (Al-T0040/05/02)
Barium	0.03	mg/L	HNO3 Dig: ICP Analysis (Ba-T0040/05/02)
Calcium	68.8	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Cr-T0060/05/02)
Copper	0.07	mg/L	HNO3 Dig: ICP Analysis (Cu-T0040/05/02)
Iron	0.09	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)

B.C. LABORATORY SERVICES
Report for form 03000031

Vancouver Island - Waste Program ATTN: MCLAREN D A Sample 89019599

Site: E207978 WELL#2 TWA LANDFILL-SALTSPRING

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
ENGINEERING

From :90/01/09:0955 To :90/01/09:0955
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Magnesium	13.7	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	0.05	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	0.004	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.06	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	0.017	mg/L	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Nitrogen Amm. Diss(N)	0.006	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	0.62	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	0.62	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	< 0.005	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Total	0.006	mg/L	Dig. Auto. Ascorbic Acid (P--T1390/01/01)
Chloride Dissolved	37.2	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

NON ENVIRONMENTAL INC.
B.C. LABORATORY SERVICES
Report for form 03000030
Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207979 WELL#3 TWA LANDFILL-SALTSPRING Domestic well

Saltspring Centre

MINISTRY OF ENVIRONMENT
RECEIVED
APR 05 1990
VANCOUVER ISLAND REGION

Submitted by (46288) MCLAREN D A

Address (69) Waste Management Branch
Vancouver Island Region
2569 Kenworth Road
Nanaimo, BC V9T 4P7

Phone No. 758-3951

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207979) WELL#3 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 10-JAN-1990 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	245.37
Special analysis:	$	0.00
Total	$	245.37

Site: E207979 WELL#3 TWA LANDFILL-SALTSPRING

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

From :90/01/09:1030 To :90/01/09:1030
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	7.7	pH units	Automated pH Meter (00041220/01/01)
Specific Conductance	370	uS/cm	Cond. Meter Siebold (00111160/01/01)
Hardness Total	141	mg/L	Calculated Result (0107CALC/--/--)
Biochem. Oxygen Dem.	< 10	mg/L	Seeded Dil. Nit. Inh. 5 Day (01151110/02/01)
Chemical Oxygen Dem.	< 10	mg/L	K2Cr2O7 Dig:Titr. (01160500/04/05)
Sulfate Dissolved	31.2	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Aluminum	< 0.10	mg/L	HNO3 Dig: ICP Analysis (Al-T0040/05/02)
Barium	0.13	mg/L	HNO3 Dig: ICP Analysis (Ba-T0040/05/02)
Calcium	49.1	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Cr-T0060/05/02)
Copper	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Cu-T0040/05/02)
Iron	0.02	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND

Site: E207979 WELL#3 TWA LANDFILL-SALTSPRING

From :90/01/09:1030 To :90/01/09:1030
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Magnesium	4.36	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	0.09	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	< 0.001	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.03	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Nitrogen Amm. Diss(N)	0.150	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	0.02	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	< 0.02	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	< 0.005	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Total	0.021	mg/L	Dig. Auto. Ascorbic Acid (P--T1390/01/01)
Chloride Dissolved	22.7	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

MINISTRY OF ENVIRONMENT
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VANCOUVER ISLAND

Site: E207979 WELL#3 TWA LANDFILL-SALTSPRING

From :90/01/09:1030 To :90/01/09:1030
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Magnesium	4.36	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	0.09	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	< 0.001	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.03	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Nitrogen Amm. Diss(N)	0.150	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	0.02	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	< 0.02	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	< 0.005	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Total	0.021	mg/L	Dig.Auto.Ascorbic Acid (P--T1390/01/01)
Chloride Dissolved	22.7	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

NON ENVIRONMENTAL INC.
B.C. LABORATORY SERVICES
Report for form 03000029

Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207980 WELL#4 TWA LANDFILL-SALTSPRING

Domestic well on Costean Lake Rd.

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

Submitted by (46288) MCLAREN D A

Address (69) Waste Management Branch
Vancouver Island Region
2569 Kenworth Road
Nanaimo, BC V9T 4P7

Phone No. 758-3951

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207980) WELL#4 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 10-JAN-1990 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	226.87
Special analysis:	$	0.00
Total	$	226.87

MINISTRY OF ENVIRONMENT
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APR 03 1990
VANCOUVER REGION

Site: E207980 WELL#4 TWA LANDFILL-SALTSPRING

From :90/01/09:1240 To :90/01/09:1240
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	7.7	pH units	Automated pH Meter (00041220/01/01)
Specific Conductance	200	uS/cm	Cond. Meter Siebold (00111160/01/01)
Hardness Total	22.2	mg/L	Calculated Result (0107CALC/--/--)
Biochem. Oxygen Dem.	< 10	mg/L	Seeded Dil. Nit. Inh. 5 Day (01151110/02/01)
Chemical Oxygen Dem.	< 10	mg/L	K2Cr2O7 Dig:Titr. (01160500/04/05)
Sulfate Dissolved	9.1	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Aluminum	4.08	mg/L	HNO3 Dig: ICP Analysis (Al-T0040/05/02)
Barium	0.04	mg/L	HNO3 Dig: ICP Analysis (Ba-T0040/05/02)
Calcium	7.17	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Cr-T0060/05/02)
Copper	0.01	mg/L	HNO3 Dig: ICP Analysis (Cu-T0040/05/02)
Iron	4.38	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)

Site: E207980 WELL#4 TWA LANDFILL-SALTSPRING

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
EXAMINER REGION

From :90/01/09:1240 To :90/01/09:1240
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Magnesium	1.04	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	0.07	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	0.002	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.03	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	0.04	mg/L	HNO3 Dig: ICP Analysis (Zn-T0040/05/02)
Nitrogen Amm. Diss(N)	0.023	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	0.55	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	0.50	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	0.053	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Total	0.155	mg/L	Dig. Auto. Ascorbic Acid (P--T1390/01/01)
Chloride Dissolved	7.7	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

ENON ENVIRONMENTAL INC.
B.C. LABORATORY SERVICES
Report for form 03000028
Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207981 SURFACE#1 TWA LANDFILL-SALTSPRING

Blackburn creek
NW of Landfill

Submitted by (46288) MCLAREN D A

Address (69) Waste Management Branch
Vancouver Island Region
2569 Kenworth Road
Nanaimo, BC V9T 4P7

Phone No. 758-3951

MINISTRY OF ENVIRONMENT
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APR 05 1990
VANCOUVER ISLAND REGION

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207981) SURFACE#1 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 10-JAN-1990 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	245.37
Special analysis:	$	0.00
Total	$	245.37

Site: E207981 SURFACE#1 TWA LANDFILL-SALTSPRING

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER REGION

From :90/01/09:0935 To :90/01/09:0935
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	7.2	pH units	Automated pH Meter (00041220/01/01)
Specific Conductance	89	uS/cm	Cond.Meter Siebold (00111160/01/01)
Hardness Total	31.1	mg/L	Calculated Result (0107CALC/--/--)
Biochem. Oxygen Dem.	< 10	mg/L	Seeded Dil.Nit.Inh.5 Day (01151110/02/01)
Chemical Oxygen Dem.	23	mg/L	K2Cr2O7 Dig:Titr. (01160500/04/05)
Sulfate Dissolved	8.1	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Aluminum	0.24	mg/L	HNO3 Dig: ICP Analysis (Al-T0040/05/02)
Barium	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Ba-T0040/05/02)
Calcium	8.43	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Cr-T0060/05/02)
Copper	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Cu-T0040/05/02)
Iron	0.31	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)

B.C. LABORATORY SERVICES
Report for form 03000028

Vancouver Island - Waste Program ATTN: MCLAREN D A Sample 89019601

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

Site: E207981 SURFACE#1 TWA LANDFILL-SALTSPRING

From : 90/01/09: 0935 To : 90/01/09: 0935
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Magnesium	2.44	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	0.01	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	0.002	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.02	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Nitrogen Amm. Diss(N)	0.030	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	1.50	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	1.49	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	0.007	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Total	0.019	mg/L	Dig. Auto. Ascorbic Acid (P--T1390/01/01)
Chloride Dissolved	7.6	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

ZENON ENVIRONMENTAL INC.
[redacted]C. LABORATORY SERVICES
Report for form 03000026
Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207982 SURFACE#2 TWA LANDFILL-SALTSPRING

Drainage Ditch near landfill gate

Submitted by (46288) MCLAREN D A

Address (69) Waste Management Branch
Vancouver Island Region
2569 Kenworth Road
Nanaimo, BC V9T 4P7

Phone No. 758-3951

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207982) SURFACE#2 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 10-JAN-1990 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	226.87
Special analysis:	$	0.00
Total	$	226.87

Site: E207982 SURFACE#2 TWA LANDFILL-SALTSPRING

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

From : 90/01/09: 1010 To : 90/01/09: 1010
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	7.4	pH units	Automated pH Meter (00041220/01/01)
Specific Conductance	515	uS/cm	Cond. Meter Siebold (00111160/01/01)
Hardness Total	202	mg/L	Calculated Result (0107CALC/--/--)
Biochem. Oxygen Dem.	< 10	mg/L	Seeded Dil. Nit. Inh. 5 Day (01151110/02/01)
Chemical Oxygen Dem.	20	mg/L	K2Cr2O7 Dig: Titr. (01160500/04/05)
Sulfate Dissolved	96.3	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Aluminum	1.54	mg/L	HNO3 Dig: ICP Analysis (Al-T0040/05/02)
Barium	0.04	mg/L	HNO3 Dig: ICP Analysis (Ba-T0040/05/02)
Calcium	59.4	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Cr-T0060/05/02)
Copper	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Cu-T0040/05/02)
Iron	2.02	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)

Site: E207982 SURFACE#2 TWA LANDFILL-SALTSPRING

MINISTRY OF ENVIRONMENT
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APR 03 1990
VANCOUVER ISLAND

From :90/01/09:1010 To :90/01/09:1010
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Magnesium	13.0	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	0.09	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	0.003	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.06	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	0.03	mg/L	HNO3 Dig: ICP Analysis (Zn-T0040/05/02)
Nitrogen Amm. Diss(N)	0.025	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	1.07	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	1.04	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	0.032	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Total	0.116	mg/L	Dig. Auto. Ascorbic Acid (P--T1390/01/01)
Chloride Dissolved	48.3	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

ENON ENVIRONMENTAL INC.
B.C. LABORATORY SERVICES
Report for form 03000027
Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207983 SURFACE#3 TWA LANDFILL-SALTSPRING Irrigation Pond at Saltspring Centre

Submitted by (46288) MCLAREN D A

Address (69) Waste Management Branch
Vancouver Island Region
2569 Kenworth Road
Nanaimo, BC V9T 4P7

Phone No. 758-3951

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207983) SURFACE#3 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 10-JAN-1990 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	245.37
Special analysis:	$	0.00
Total	$	245.37

MINISTRY OF ENVIRONMENT
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APR 03 1990
VANCOUVER ISLAND REGION

Site: E207983 SURFACE#3 TWA LANDFILL-SALTSPRING

From :90/01/09:1025 To :90/01/09:1025
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	6.6	pH units	Automated pH Meter (00041220/01/01)
Specific Conductance	235	uS/cm	Cond.Meter Siebold (00111160/01/01)
Hardness Total	84.5	mg/L	Calculated Result (0107CALC/--/--)
Biochem. Oxygen Dem.	< 10	mg/L	Seeded Dil.Nit.Inh.5 Day (01151110/02/01)
Chemical Oxygen Dem.	< 10	mg/L	K2Cr207 Dig:Titr. (01160500/04/05)
Sulfate Dissolved	20.8	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Aluminum	0.10	mg/L	HNO3 Dig: ICP Analysis (Al-T0040/05/02)
Barium	0.02	mg/L	HNO3 Dig: ICP Analysis (Ba-T0040/05/02)
Calcium	23.3	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Cr-T0060/05/02)
Copper	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Cu-T0040/05/02)
Iron	0.09	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)

B.C. LABORATORY SERVICES
Report for form 03000027
Vancouver Island - Waste Program ATTN: MCLAREN D A Sample 89019602

MINISTRY OF ENVIRONMENT
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APR 03 1990
VANCOUVER ISLAND REGION

Site: E207983 SURFACE#3 TWA LANDFILL-SALTSPRING

From :90/01/09:1025 To :90/01/09:1025
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Magnesium	6.40	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	< 0.001	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.03	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Nitrogen Amm.Diss(N)	0.011	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	2.10	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	2.10	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	< 0.005	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Total	0.017	mg/L	Dig.Auto.Ascorbic Acid (P--T1390/01/01)
Chloride Dissolved	14.6	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

ZENON ENVIRONMENTAL INC.
[redacted]C. LABORATORY SERVICES
Report for form 03001956
Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207984 SURFACE#4 TWA LANDFILL-SALTSPRING

Outlet of Blackburn Lake d/s of road culvert

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

Submitted by (46288) MCLAREN D A

Address (69) Waste Management Branch
Vancouver Island Region
2569 Kenworth Road
Nanaimo, BC V9T 4P7

Phone No. 758-3951

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207984) SURFACE#4 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 10-JAN-1990 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	245.37
Special analysis:	$	0.00
Total	$	245.37

Site: E207984 SURFACE#4 TWA LANDFILL-SALTSPRING

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND

From :90/01/09:1300 To :90/01/09:1300
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	7.1	pH units	Automated pH Meter (00041220/01/01)
Specific Conductance	116	uS/cm	Cond.Meter Siebold (00111160/01/01)
Hardness Total	41.3	mg/L	Calculated Result (0107CALC/--/--)
Biochem. Oxygen Dem.	< 10	mg/L	Seeded Dil.Nit.Inh.5 Day (01151110/02/01)
Chemical Oxygen Dem.	16	mg/L	K2Cr2O7 Dig:Titr. (01160500/04/05)
Sulfate Dissolved	13.9	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Aluminum	0.29	mg/L	HNO3 Dig: ICP Analysis (Al-T0040/05/02)
Barium	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Ba-T0040/05/02)
Calcium	11.6	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Cr-T0060/05/02)
Copper	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Cu-T0040/05/02)
Iron	0.48	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)

B.C. LABORATORY SERVICES

Report for form 03001956

Vancouver Island - Waste Program ATTN: MCLAREN D A Sample 89019607

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

Site: E207984 SURFACE#4 TWA LANDFILL-SALTSPRING

From : 90/01/09: 1300 To : 90/01/09: 1300
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Magnesium	3.00	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	0.04	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	< 0.001	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.04	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Nitrogen Amm. Diss(N)	0.036	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	1.39	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	1.38	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	0.012	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Total	0.025	mg/L	Dig. Auto. Ascorbic Acid (P--T1390/01/01)
Chloride Dissolved	9.3	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

ZENON ENVIRONMENTAL INC.
[redacted]C. LABORATORY SERVICES
[redacted]eport for form 03001955
Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207985 SURFACE#5 TWA LANDFILL-SALTSPRING

Cusheon Lake Water Supply

Submitted by (46288) MCLAREN D A

Address (69) Waste Management Branch
Vancouver Island Region
2569 Kenworth Road
Nanaimo, BC V9T 4P7

Phone No. 758-3951

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
VANCOUVER ISLAND REGION

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207985) SURFACE#5 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 10-JAN-1990 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	245.37
Special analysis:	$	0.00
Total	$	245.37

Site: E207985 SURFACE#5 TWA LANDFILL-SALTSPRING

From : 90/01/09: 1230 To : 90/01/09: 1230
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

MINISTRY OF ENVIRONMENT
RECEIVED
APR 03 1990
LANDS AND PARKS ISLAND REGION

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	7.3	pH units	Automated pH Meter (00041220/01701)
Specific Conductance	126	uS/cm	Cond. Meter Siebold (00111160/01/01)
Hardness Total	45.1	mg/L	Calculated Result (0107CALC/--/--)
Biochem. Oxygen Dem.	< 10	mg/L	Seeded Dil. Nit. Inh. 5 Day (01151110/02/01)
Chemical Oxygen Dem.	16	mg/L	K2Cr2O7 Dig: Titr. (01160500/04/05)
Sulfate Dissolved	12.3	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Aluminum	< 0.10	mg/L	HNO3 Dig: ICP Analysis (Al-T0040/05/02)
Barium	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Ba-T0040/05/02)
Calcium	12.8	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	< 0.005	mg/L	HNO3 Dig: HGA Analysis (Cr-T0060/05/02)
Copper	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Cu-T0040/05/02)
Iron	0.16	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)

B.C. LABORATORY SERVICES

Report for form 03001955

Vancouver Island - Waste Program ATTN: MCLAREN D A Sample 89019608

Site: E207985 SURFACE#5 TWA LANDFILL-SALTSPRING

From :90/01/09:1230 To :90/01/09:1230
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

MINISTRY OF ENVIRONMENT
RECEIVED
APR 05 1990
VANCOUVER ISLAND REGION

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Magnesium	3.19	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	0.03	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	< 0.001	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.04	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	0.007	mg/L	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Nitrogen Amm. Diss(N)	0.031	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	0.33	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	0.33	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	< 0.005	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Total	0.018	mg/L	Dig. Auto. Ascorbic Acid (P--T1390/01/01)
Chloride Dissolved	11.4	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

~~JOF~~ + File

November 21, 1989

File: PR-1839

The Saltspring Centre
P.O. Box 1133
Ganges, B.C.
V0N 1E0

ATTENTION: S. Filkow
Centre Director

Dear Sirs:

Re: Sampling of the Centre's Domestic and Irrigation Water Sources

In response to your letter dated November 19, 1988, Waste Management has sampled the Centre's domestic well water supply twice and an irrigation well once in the past twelve months. The results show that all parameters, except for manganese, meet the Guidelines for Canadian Drinking Water Quality.

The results have been tabulated and are attached for your convenience. With regard to manganese, the levels exceed the aesthetic objective but do not constitute a health hazard.

On a related matter, would it be possible to continue sampling your domestic well and irrigation pond as part of a proposed water quality monitoring program in the Cusheon Lake watershed?

If you have any questions, do not hesitate to contact me.

Yours truly,

C. J. Jenkins, M.A.Sc.
Waste Management Officer
Municipal Section

CJJ/bc

Enclosure

Tabulated Results for Saltspring Centre Water Supply

Parameters(*)	Canadian Drinking Water Quality	Domestic Well 89.01.31	Domestic Well 89.08.31	Irrigation Well 89.08.31
pH	6.5-8.5	7.7	7.9	7.2
Specific Conductance	(**)	327	360	190
Hardness	<500	115	118	57.9
Coliform	<2	---	<2	---
Sulfate	500	---	17.2	16.8
Calcium	(***)	40	41	16.1
Cadmium	0.005	<0.0005	<0.0005	<0.0005
Cobalt	(***)	<0.1	<0.1	<0.1
Chromium	(***)	<0.01	0.02	0.02
Copper	1.0	<0.01	0.004	<0.001
Iron	0.3	0.03	0.10	0.22
Magnesium	(***)	3.61	---	4.3
Manganese	0.05	0.07	0.07	---
Molybdenum	0.05	<0.01	<0.01	0.01
Nickel	(***)	<0.05	0.08	>0.05
Lead	0.5	<0.001	<0.001	<0.001
Vanadium	(***)	<0.01	<0.01	0.01
Zinc	5	<0.005	0.006	0.008
N-ammonia	(***)	---	0.137	0.025
N-nitrate	10	---	<0.02	0.82
Phosphorus	(***)	---	0.028	0.034
Sodium	20	<0.5	17.5	10.2
Chloride	<250	16.4	25.1	16.5

NOTES: *All values expressed in mg/L except pH (unitless) and specific conductance (us/cm).

**No level specified. This parameter indicates the general level of ionic activity. These levels are consistent with pure tap water.

***No levels specified. None of these levels appear to be elevated. The majority are below normal detection limits.

ZENON ENVIRONMENTAL INC.
B.C. LABORATORY SERVICES
Report for form 00413148

EJF - JOF

FILE PR1839(S)

Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207983 SURFACE#3 TWA LANDFILL-SALTSPRING

Submitted by (46288) MCLAREN D A

MINISTRY OF ENVIRONMENT
RECEIVED
OCT 23 1989
VANCOUVER ISLAND REGION

Address (00) MINISTRY OF ENVIRONMENT
2569 KENWORTH ROAD
NANAIMO B C
V9T4P7

Phone No. -

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207983) SURFACE#3 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) Undefined

This form was processed to the computer on 1-SEP-1989 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	204.00
Special analysis:	$	0.00
Total	$	204.00

Site: E207983 SURFACE#3 TWA LANDFILL-SALTSPRING SALTSPRING CENTRE IRRIGATION WELL.

From :89/08/31:1315 To :89/08/31:1315
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	7.2	pH units	Automated pH Meter (00041220/01/01)
Specific Conductance	190	uS/cm	Cond. Meter Siebold (00111160/01/01)
Alkalinity Total 4.5	46.7	mg/L	Automated Electrometer (01021210/01/01)
Hardness Total	57.9	mg/L	Calculated Result (0107CALC/--/--)
Sulfate Dissolved	16.8	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Calcium	16.1	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	0.02	mg/L	HNO3 Dig: ICP Analysis (Cr-T0040/05/02)
Copper	< 0.001	mg/L	HNO3 Dig: HGA Analysis (Cu-T0060/05/02)
Iron	0.22	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)
Magnesium	4.30	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	0.01	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)

B.C. LABORATORY SERVICES

Report for form 00413148

Vancouver Island - Waste Program ATTN: MCLAREN D A Sample 89010873

Site: E207983 SURFACE#3 TWA LANDFILL-SALTSPRING

From :89/08/31:1315 To :89/08/31:1315
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	< 0.001	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	0.01	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	0.008	mg/L	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Nitrogen Amm. Diss(N)	0.025	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis	0.82	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)	0.81	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)	0.014	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Ort. Dis-P	0.005	mg/L	Auto. Ascorbic Acid (11181380/01/01)
Phosphorus Total	0.034	mg/L	Dig. Auto. Ascorbic Acid (P--T1390/01/01)
Sodium Dissolved	10.2	mg/L	Auto. Flame Emmission (Na-D1331/01/01)
Chloride Dissolved	16.5	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

no indication of landfill impact - Dmch

ZENON ENVIRONMENTAL INC.
B.C. LABORATORY SERVICES
Report for form 00413149

Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: E207979 WELL#3 TWA LANDFILL-SALTSPRING

Submitted by (46288) MCLAREN D A

MINISTRY OF ENVIRONMENT
RECEIVED
OCT 23 1989
VANCOUVER ISLAND REGION

Address (00) MINISTRY OF ENVIRONMENT
2569 KENWORTH ROAD
NANAIMO B C
V9T4P7

Phone No. -

Audit Sample ( )
Client study reference code (17)
Sampling agency code (01)

Site (E207979) WELL#3 TWA LANDFILL-SALTSPRING

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) Undefined

This form was processed to the computer on 1-SEP-1989 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	231.60
Special analysis:	$	0.00
Total	$	231.60

Site: E207979 WELL#3 TWA LANDFILL-SALTSPRING *SALTSPRING CENTRE WELL*

From :89/08/31:1300 To :89/08/31:1300
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	CDN. DRINKING WATER – MAX. ACCEPTABLE	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	6.5-8.5	7.9	pH units	Automated pH Meter (00041220/01/01)
Specific Conductance		360	uS/cm	Cond.Meter Siebold (00111160/01/01)
Alkalinity Phen. 8.3		< 0.5	mg/L	Automated Electrometer (01011211/01/01)
Alkalinity Total 4.5		118	mg/L	Automated Electrometer (01021210/01/01)
Hardness Total		118	mg/L	Calculated Result (0107CALC/--/--)
Coliform - Fecal	42	< 2	CFU	Membrane Filter Count-EL (04502480/30/01)
Sulfate Dissolved	500	17.2	mg/L	Auto Methyl Thymol Blue (11211400/01/01)
Calcium		41.0	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	.005	< 0.0005	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt		< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	.05	0.02	mg/L	HNO3 Dig: ICP Analysis (Cr-T0040/05/02)
Copper	1.0	0.004	mg/L	HNO3 Dig: HGA Analysis (Cu-T0060/05/02)
Iron	.3 aesthetic	0.10	mg/L	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)
Magnesium		3.75	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)

B.C. LABORATORY SERVICES

Report for form 00413149

Vancouver Island - Waste Program ATTN: MCLAREN D A Sample 89010868

Site: E207979 WELL#3 TWA LANDFILL-SALTSPRING

From :89/08/31:1300 To :89/08/31:1300
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description		Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Manganese	.05	0.07	mg/L	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum		< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)
Nickel		0.08	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	.05	< 0.001	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium		< 0.01	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc		0.006	mg/L	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Nitrogen Amm.Diss(N)		0.137	mg/L	Automated Bertholot meth (11081351/01/01)
Nitrogen NO3+NO2 Dis		< 0.02	mg/L	Auto. Cadmium Reduction (11091350/01/01)
Nitrogen NO3 Diss(N)		< 0.02	mg/L	Calculated Result (1110CALC/--/--)
Nitrogen NO2 Diss(N)		< 0.005	mg/L	Auto. Diazotization (11111354/01/01)
Phosphorus Ort.Dis-P		0.021	mg/L	Auto.Ascorbic Acid (11181380/01/01)
Phosphorus Total		0.028	mg/L	Dig.Auto.Ascorbic Acid (P--T1390/01/01)
Sodium Dissolved	<20	17.5	mg/L	Auto. Flame Emmission (Na-D1331/01/01)
Chloride Dissolved	250	25.1	mg/L	Auto. mercuric thiocyan. (11041330/01/01)

— water quality meets guidelines Dmch.
no sign of landfill impact

(1) AFTER WRITING remove green sheet and forward the balance of set intact.
(2) WHEN REPLYING after writing your reply keep pink sheet for your file, forward white sheet.

ISLAND BUSINESS FORMS LTD. 71755

Province of British Columbia

MEMORANDUM

TO: ~~LLOYD~~ → ~~IED~~ John.

CHRIS / ~~DUNC~~: proceed as recommended. John

FROM: JOHN

SUBJECT: TWA LANDFILL MONITORING

DATE: 26-7-89

FILE: PR-1839

☐ For Your Information ☐ Please O.K. and Return ☐ Please Discuss With Me ☐ Per Your Request ☐ For Your Signature
☐ Please Process ☐ Return With More Details ☐ Investigate and Report ☐ Please Answer ☐ For Your File

ATTACHED IS A PROPOSED SURFACE AND GROUNDWATER MONITORING PROGRAM FOR THE SSI LANDFILL FOR YOUR REVIEW, COMMENT & APPROVAL. I'D SUGGEST THAT JOHN D. AND DUNC M. CONDUCT THE MONITORING, AT LEAST FOR THE FIRST YEAR. I DON'T KNOW HOW SUCCESSFUL WE WOULD BE IN GETTING CRD TO ASSUME THE PROGRAM IN SUBSEQUENT YEARS. FUNDS FOR ANALYSIS COULD COME FROM MUNICIPAL LAB BUDGET - CODE 17, REC. ENV. FIRST YEAR ESTIMATED

REPLY:

COST = $2600 WHICH DOES NOT INCLUDE ANY ORGANICS - SOME PESTICIDE ANALYSIS WOULD BE DESIREABLE BUT WE CAN REASSESS AFTER THE FIRST SAMPLING.

John

Fold Here for Window Envelope

Fold Here for Window Envelope

WRITE YOUR REPLY AND RETURN THIS SHEET
REMOVE THIS SHEET AND FORWARD BALANCE OF SET

ISLAND BUSINESS FORMS LTD.

Province of British Columbia
Ministry of Environment and Parks

MEMORANDUM

2569 Kenworth Road, Nanaimo, British Columbia V9T 4P7 / Telephone: (604) 758-3951

To: J.O. Finnie, P. Eng.
Head,
Municipal Section

July 21,1989

File: ~~PE-1538~~
PR-1839

Re: Implementation of a Monitoring Program for Twa/CRD Landfill

Attached is a copy of "Proposed Environmental Monitoring Program for Twa/CRD Landfill - Saltspring Island" dated July 1989. I request approval to implement the program as soon as recommended.

C. J. Jenkins
Waste Management Officer
Municipal Section

Dec 4/89
Approved.

Attachment

CJJ/

PROVINCE OF BRITISH COLUMBIA

MINISTRY OF ENVIRONMENT

WASTE MANAGEMENT

Proposed Environmental Monitoring Program

for

Twa/CRD Landfill - Saltspring Island

by

C.J. Jenkins
Waste Management Officer
Municipal Section

2569 Kenworth Road
Nanaimo, B.C.
V9T 4P7

July 1989

1.0 INTRODUCTION

Saltspring Island is located approximately half an hour (by ferry) north of the Saanich Peninsula. While the centre of commercial activity is Ganges, B.C. the remainder of the island is somewhat rural in aspect. Nevertheless, its proximity to Victoria and Nanaimo allows for a mixed residential and commuter population base. Solid waste disposal on the island has to date been ad hoc. Over the years an historic dump site has evolved into a sanitary landfill. Unfortunately the location of the landfill, operated privately by Mr. N. Twa, was not selected according to engineering criteria. There have been and continue to be concerns about possible contamination of the Cusheon Lake watershed as a result of activities within it. The Twa landfill site is located within this watershed. Regardless of whether or not the landfill is closed and replaced with a transfer station (at another location), the potential for this operation to contribute to contamination of its watershed will remain.

2.0 OBJECTIVES

The purpose of this environmental monitoring program is to establish the present extent of contamination occurring within both surface and ground water as a result of the landfilling operation and to provide on-going monitoring protocol to trace future effects. The program proposed will provide real time data on surface and ground water quality, but it cannot nor should it be assumed that water

quality is linked solely and directly to the landfilling operation. Nevertheless, an on-going monitoring program will provide a continuum of data upon which to base decisions related to restoration and rehabilitation of the landfill site. As well, concerns about water quality as influenced by the landfill can best be addressed with continual and up-to-date information.

3.0 BACKGROUND

3.1 Permit

Application to authorize this site was first made in 1972. After seven years of negotiation and evaluation, Waste Management Permit No. PR - 1839 was issued jointly to Twa and the Capital Regional District (CRD). (The CRD denies any and all responsibility for this site by maintaining that they never gave their assent to being a joint Permittee.)

The landfill is permitted to operate as a Level C operation. While open burning was originally allowed, problems with fire control, continuous burning, and complaints from neighbours necessitated that this practice cease as of 1985.

Compliance of the operation has been intermittent. A recent site inspection revealed that out of compliance conditions were occurring with regard to exposed garbage. It has recently been recommended that a ticket be issued to Twa regarding non-compliance.

3.2 Alternatives

Over the years alternatives to this landfill have been discussed. During the development of the CRD's Solid Waste Management Plan it was identified that the preferred option for disposal of Saltspring Island's solid waste would be a transfer station and removal to the CRD's Hartland Road Landfill. This option is scheduled to go to public referendum in the fall of 1989.

4.0 SAMPLING PROTOCOL

The following sampling protocol is based on a need to produce consistent data with regards to this monitoring program. As much as possible procedures outlined in "Standard Methods" or "A Laboratory Manual for the Chemical Analysis of Waters, Wastewaters, Sediments and Biological Materials" should be followed.

4.1 Preferred Sampling Sites

4.1.1 Groundwater - The landfill site is located at the base of the northern slope of the Cusheon Lake watershed. Based on the landfill's location, the depth of drilled wells in the area, and the suspected groundwater regime in the area it is postulated that the groundwater generally moves away from the landfill to the south towards Cusheon Lake. The following wells have been selected as reasonable locations for groundwater sampling (see Appendix A):

4.1.1.1 Well #1 - Background well located on Blackburn Road 200 m north of the landfill. It is felt that this location is not influenced by the landfill. Depth of well is to be determined.

4.1.1.2 Well #2 - Well located on Twa property. Depth of well is 50 m.

4.1.1.3 Well #3 - Domestic well located on Salt Spring Centre property, 200 m south of the landfill gate. Depth of the well is 30 m.

4.1.1.4 Well #4 - Domestic well located on Cusheon Lake Road western bank of Cusheon Lake. The depth of this well is 48 m.

Caution should be used when interpreting the results from these existing wells. It would be preferable to design and install new wells at each of these locations for the sole purpose of groundwater monitoring. At this point in time, the associated costs may not warrant such action.

4.1.2 Surface water - Surface water is observed to flow from the landfill south towards Cusheon Lake. The following locations have been selected (see Appendix A):

4.1.2.1 Location A - Blackburn Creek north ~~east~~ west of the Blackburn Road ~~east~~ of the landfill. This site is considered to be upstream of the landfill.

4.1.2.2 Location B - Drainage ditch flowing under Blackburn Road near landfill gate.

4.1.2.3 Location C - Irrigation pond on Saltspring Centre property.

4.1.2.4 Location D - Blackburn Lake along eastern shore.

4.1.2.5 Location E - Cusheon Lake water supply intake.

Beddis Waterworks District
Ron McNally 537-2586.

4.2 Frequency

The minimum sampling frequency should be at least twice per year. It is recommended that each sampling set be collected on a single day; once in the late spring before the ditches dry completely (May) and once in the late fall to catch the "first flush" after the rains begin (late November).

The first sampling day is to be coordinated for fall 1989.

4.3 Parameters of Interest

The parameters of interest are those constituents which could be used to trace the landfill's influence on water quality. They are physical, inorganic and biochemical in nature. While it would be desirable to scan for chlorinated organics, at this point in time it is felt the costs significantly out-weigh the benefits.

4.3.1 Physical

Conductivity
pH

4.3.2 Inorganics

Total metals ICP scan (barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, vanadium, zinc)
Anion scan (chloride, nitrogen [ammonia], nitrite, nitrate, phosphate, sulphate)

4.3.3 Biochemical

Chemical Oxygen Demand, COD
5 Day Biochemical Oxygen Demand, BOD_5

4.4 Reporting Format

In order to maintain up-to-date information it is important that analysis, tabulation and reporting take place in a timely fashion. The selected laboratory should be able to provide prompt service. An annual report should be prepared based on the data and open for public inspection.

5.0 PROGRAM IMPLEMENTATION

5.1 Personnel Required

In order to facilitate collection and preservation of the required samples, sampling a team containing two individuals should be employed. It is recommended that a team consist of both a waste management technician and biologist. The program therefore corresponds to 4 personnel days per year (disregarding sample tracking and tabulating the results). Reports could be prepared by a waste management officer.

5.2 Funding

A portion of the appropriate budget will need to be dedicated to the sampling program. The only direct cost would be laboratory analysis. The annual cost is projected to be in the neighbourhood of $2600. It is hoped that the cost of and responsibility for this sampling program could eventually be shared or turned over to the Capital Regional District and/or The Saltspring Water Preservation Society. It is felt that the

importance and effectiveness of the program be demonstrated before approaching these organizations.

6.0 RECOMMENDATIONS

It is recommended that:

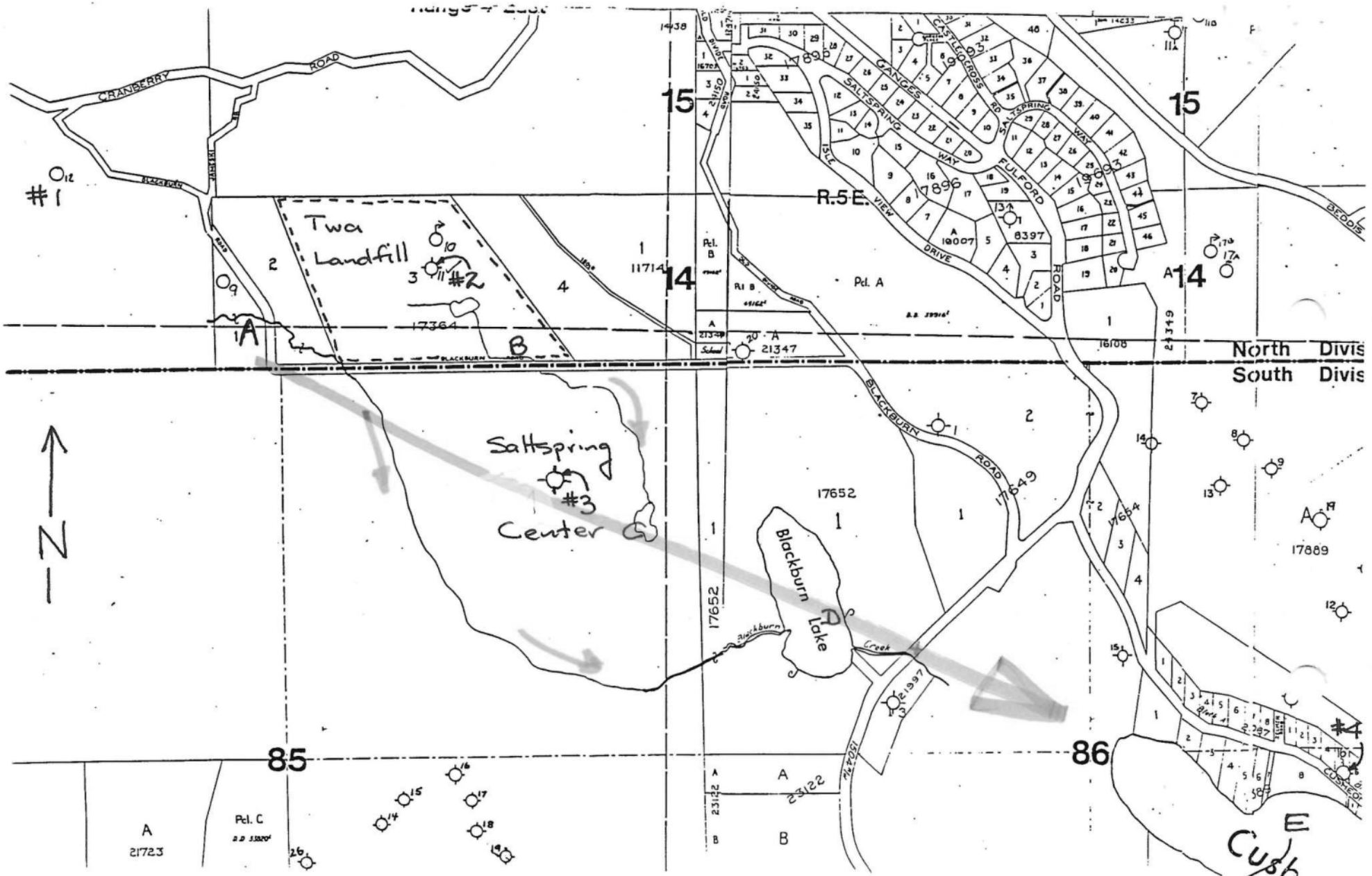
1. A sampling program similar to the one outlined herein be implemented.

2. The program be targeted to begin in the fall of 1989.

3. Initially Waste Management staff implement the program.

4. Regardless of the outcome of the sampling program, the landfill site be closed and replaced with a transfer station.

5. The Capital Regional District or another organization be encouraged to continue the program for a number of years after the landfill has been closed and rehabilitated.



Appendix A:

#n - groundwater wells
alpha - surface water sites
→ - surface water movement
⟹ - suspected groundwater movement

location to be determined

PROVINCE OF
BRITISH COLUMBIA

MINISTRY OF ENVIRONMENT

WASTE MANAGEMENT

Proposed Environmental Monitoring Program

for

Twa/CRD Landfill - Saltspring Island

by

C.J. Jenkins
Waste Management Officer
Municipal Section

2569 Kenworth Road
Nanaimo, B.C.
V9T 4P7

July 1989

1.0 INTRODUCTION

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4.0 SAMPLING PROTOCOL

The following sampling protocol is based on a need to produce consistent data with regards to this monitoring program. As much as possible procedures outlined in "Standard Methods" or "A Laboratory Manual for the Chemical Analysis of Waters, Wastewaters, Sediments and Biological Materials" should be followed.

4.1 Preferred Sampling Sites

4.1.1 Groundwater - The landfill site is located at the base of the northern slope of the Cusheon Lake watershed. Based on the landfill's location, the depth of drilled wells in the area, and the suspected groundwater regime in the area it is postulated that the groundwater generally moves away from the landfill to the south towards Cusheon Lake. The following wells have been selected as reasonable locations for groundwater sampling (see Appendix A):

E 207977

4.1.1.1 Well #1 - Background well located on Blackburn Road 200 m north of the landfill. It is felt that this location is not influenced by the landfill. Depth of well is to be determined.

4.1.1.2 Well #2 - Well located on Twa property. Depth of well is 50 m.

4.1.1.3 Well #3 - Domestic well located on Salt Spring Centre property, 200 m south of the landfill gate. Depth of the well is 30 m.

4.1.1.4 Well #4 - Domestic well located on Cusheon Lake Road western bank of Cusheon Lake. The depth of this well is 48 m.

Caution should be used when interpreting the results from these existing wells. It would be preferable to design and install new wells at each of these locations for the sole purpose of groundwater monitoring. At this point in time, the associated costs may not warrant such action.

4.1.2 Surface water - Surface water is observed to flow from the landfill south towards Cusheon Lake. The following locations have been selected (see Appendix A):

4.1.2.1 Location A - Blackburn Creek north east of the Blackburn Road east of the landfill. This site is considered to be upstream of the landfill.

4.1.2.2 Location B - Drainage ditch flowing under Blackburn Road near landfill gate.

4.1.2.3 Location C - Irrigation pond on Saltspring Centre property.

4.1.2.4 Location D - Blackburn Lake along eastern shore.

4.1.2.5 Location E - Cusheon Lake water supply intake.

4.2 Frequency

The minimum sampling frequency should be at least twice per year. It is recommended that each sampling set be collected on a single day; once in the late spring before the ditches dry completely (May) and once in the late fall to catch the "first flush" after the rains begin (late November).

The first sampling day is to be coordinated for fall 1989.

4.3 Parameters of Interest

The parameters of interest are those constituents which could be used to trace the landfill's influence on water quality. They are physical, inorganic and biochemical in nature. While it would be desirable to scan for chlorinated organics, at this point in time it is felt the costs significantly out-weigh the benefits.

4.3.1 Physical

Conductivity
pH

4.3.2 Inorganics

Total metals ICP scan (barium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, vanadium, zinc)
Anion scan (chloride, nitrogen [ammonia], nitrite, nitrate, phosphate, sulphate)

4.3.3 Biochemical

Chemical Oxygen Demand, COD
5 Day Biochemical Oxygen Demand, BOD_5

4.4 Reporting Format

In order to maintain up-to-date information it is important that analysis, tabulation and reporting take place in a timely fashion. The selected laboratory should be able to provide prompt service. An annual report should be prepared based on the data and open for public inspection.

5.0 PROGRAM IMPLEMENTATION

5.1 Personnel Required

In order to facilitate collection and preservation of the required samples, sampling a team containing two individuals should be employed. It is recommended that a team consist of both a waste management technician and biologist. The program therefore corresponds to 4 personnel days per year (disregarding sample tracking and tabulating the results). Reports could be prepared by a waste management officer.

5.2 Funding

A portion of the appropriate budget will need to be dedicated to the sampling program. The only direct cost would be laboratory analysis. The annual cost is projected to be in the neighbourhood of $2600. It is hoped that the cost of and responsibility for this sampling program could eventually be shared or turned over to the Capital Regional District and/or The Saltspring Water Preservation Society. It is felt that the

importance and effectiveness of the program be demonstrated before approaching these organizations.

6.0 RECOMMENDATIONS

It is recommended that:

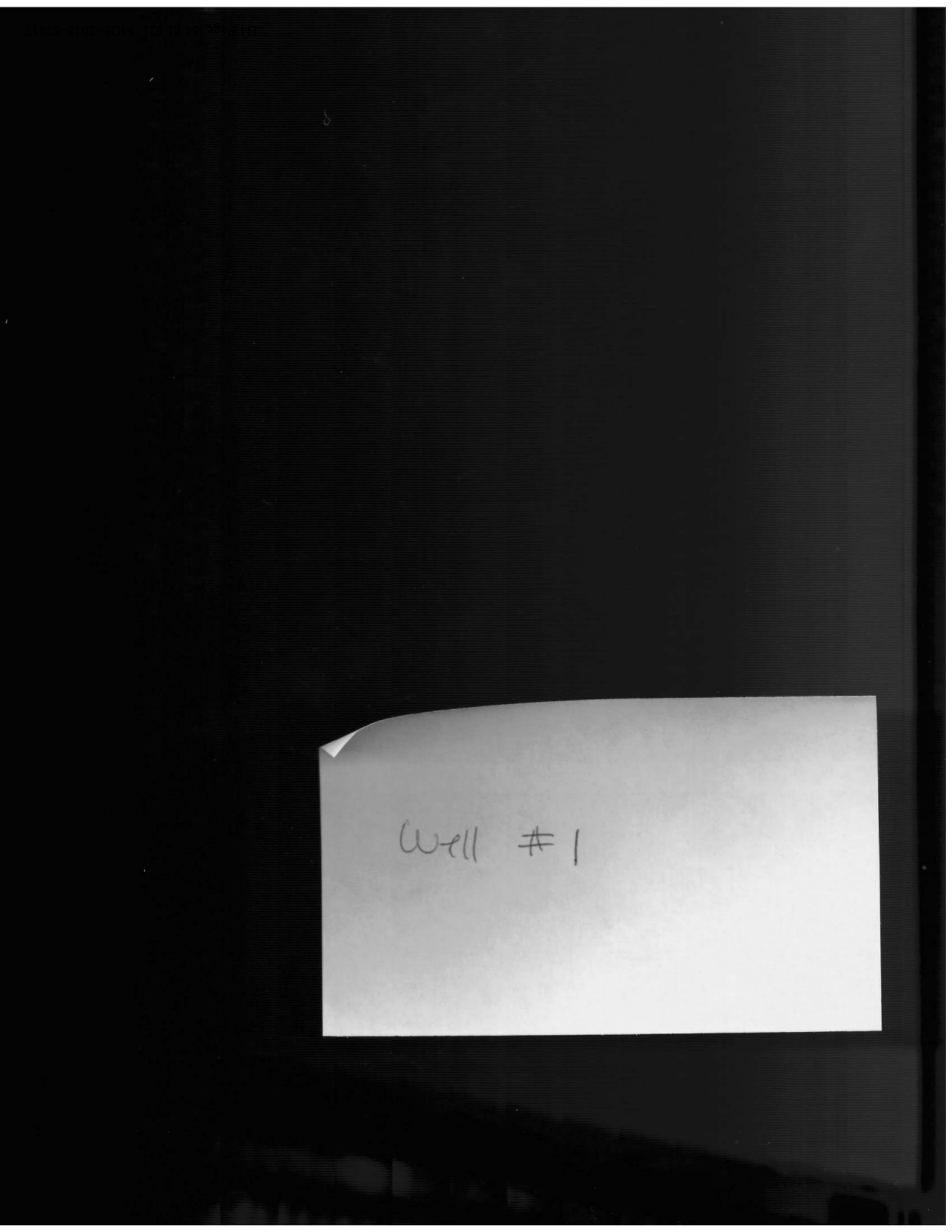
1. A sampling program similar to the one outlined herein be implemented.

2. The program be targeted to begin in the fall of 1989.

3. Initially Waste Management staff implement the program.

4. Regardless of the outcome of the sampling program, the landfill site be closed and replaced with a transfer station.

5. The Capital Regional District or another organization be encouraged to continue the program for a number of years after the landfill has been closed and rehabilitated.


Well #1

7 4 2 1	7 4 2 1	6 5 4 C E	2 1	7 4 2 1	2 1	7 4 2 1	NE SE SW NW	4 2 1	7 4 2 1
UNITS.	MUNICIPALITY	MERIDIAN	TENS	UNITS	TENS	UNITS	QUARTER	TENS	UNITS
			RANGE		SECTION			LAND DISTRICT	

92B·083·1·4·2

3

GROUND — WATER DIVISION, WATER INVESTIGATIONS BRANCH, DEPT. OF LANDS, FORESTS, and WATER RESOURCES, VICTORIA, B.C.

X5 Y9
#12

LOCATION SALT SPRING ISLAND (COMI s.22) COWICHAN DIST

OWNER'S NAME

DRILLER'S NAME ADDRESS DATE OF COMPLETION

DEPTH ? 20' ELEVATION OF COLLAR 535' CASING DIAM LENGTH TYPE

METHOD OF DIGGING SCREEN ☐ SIZE LENGTH TYPE

LOCATION OF SCREEN DEVELOPED ☐ DESCRIBE

PERFORATED CASING ☐ LENGTH LOCATION OF PERFORATIONS

GRAVEL PACK ☐ LENGTH DIAM. SIZE GRAVEL, ETC.

PUMP ☐ TYPE POWER

CAPACITY OTHER DATA

COSTS WELL PUMP PUMP HOUSE, ETC

MAINTENANCE

DISTANCE TO WATER FROM TOP OF CASING ☐ ESTIMATED ☐ MEASURED ELEVATION FLUCTUATION

HIGH WATER MONTH LOW WATER MONTH OBSERVATION DATA ☐ FILE No

WATER USE DOMESTIC (NO ANIMALS, IRRIGATION NOW)

MAX. RATE WITHDRAWAL ☐ ESTIMATED ☐ MEASURED

TEMPERATURE PUMPS SAND ☐

CLOGS SCREEN ☐ TYPE DEPOSIT AQUIFER DATA

LICENSE No DATE LICENSE AMOUNT

DATE APPLICATION USE

"The attached information has been supplied gratuitously to the Province of British Columbia and has not been independently confirmed. Those persons relying on it do so at their own risk, and all persons to whom it is supplied should be cautioned against its use in making financial and other commitments. Comments on the well records may be obtained on request by contacting the drillers confirmed."



LOCATION SKETCH—INDICATE NORTH

Sht 26

METHOD: DUG, DRIVEN, DRILLED, JETTED, BORED

DEPTH: 0 — 25, 25 — 50, 50 — 100, 100 — 200, 200 — 400, >400

OBSERVATION, ABANDONED, DEVELOPED, SCREEN, PERF. CASING, GRAVEL ENV, PUMP

TYPE WELL: FLOWING, NON-FLOW ARTESIAN, WATER TABLE, PART CONFINED

WATER QUALITY: ANALYSIS, SOFT, HARD, HIGH IRON, HIGH SULPHUR, SALTY, ALKALINE, SALINE, POLLUTED, INADEQUATE QUALITY

DRY HOLE, INADEQUATE QUANTITY, PUMPING TEST

CAPACITY GPD: 0 — 10^3, 10^3 — 10^4, 10^4 — 10^5, 10^5 — 10^6, 10^6

VISIrecord® 12708

SUPPLY AQUIFER		OTHER AQUIFER PRESENT		OTHER AQUIFER PRESENT		CHARACTER OF SUPPLY AQUIFER			WATER USE							RELIABILITY OF DATA			ROCK
TENS	UNITS	TENS	UNITS	TENS	UNITS	SAND	GRAVEL	TILL	DOMESTIC	GARDEN	STOCK	COOLING	IRRIGATION	INDUSTRIAL	WATERWORKS	GOOD	FAIR	POOR	SPRING
7 4 2 1	7 4 2 1	7 4 2 1	7 4 2 1	7 4 2 1	7 4 2 1														

LOG

FROM	TO	DESCRIPTION	NAME

"The attached information has been supplied gratuitously to the Province of British Columbia and has not been independently confirmed. Those persons relying on it do so at their own risk, and all persons to whom it is supplied should be cautioned against its use in making financial and other commitments. Comments on the well records may be obtained on request by contacting the drillers concerned."

SAMPLE No _____ DATE 26 July 1973

LAB WATER LAB U.B.C.

COLIFORM ORGANISMS _____

TOTAL BACTERIA _____

COLOUR clear ODOUR _____

TASTE _____

COND. 170

PUMPING TEST SUMMARY

TEST BY _____

DATE _____ FILE No _____

SPECIFIC CAPACITY _____ PERMIABILITY _____

STORAGE COEFF _____ TRANSMISSIBILITY _____

REMARKS _____

ANALYSIS

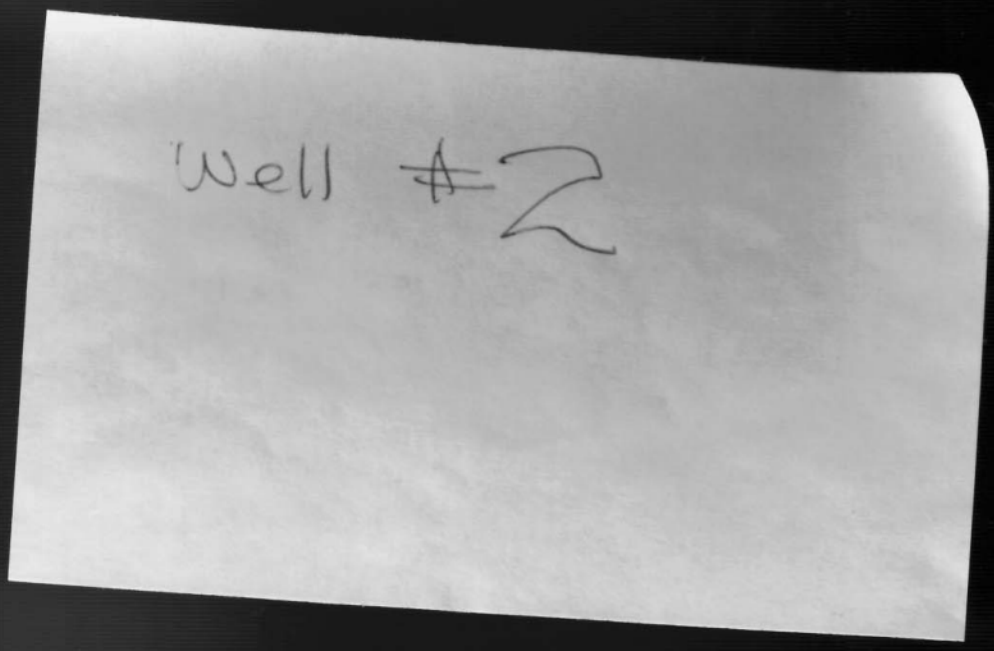
	PPM
Total Hardness	
Carbonate Hard	
Magnesium Hard	
Fe	0.1
SO_2	
Ca	
Mg	
Na	
K	
HCO_3	
CO_3	
Cl	
SO_4	
NO_3	
B	
E	
Total Dis-solids	
Total Alkalinity	
Suspended Solids	
Ph	6.5

OTHER DATA

SIZE ANALYSIS ETC _____

CARD BY S Thorn DATE 7 Aug 73

SOURCES INFORMATION MRS UNDERWOOD


Well #2

7 4 2 1	7 4 2 1	6 5 4 C E	2 1	7 4 2 1	2 1	7 4 2 1	NE SE SW NW	4 2 1	7 4 2 1
UNITS. TENS MUNICIPALITY		MERIDIAN	TENS	UNITS RANGE	TENS	UNITS SECTION	QUARTER	TENS	UNITS LAND DISTRICT

X 92B·003·2·3 1 GROUND — 5

WATER DIVISION, WATER INVESTIGATIONS BRANCH, DEPT. OF LANDS, FORESTS, and WATER RESOURCES, VICTORIA, B.C.

X5,49 #11

LOCATION Address LOT 3 PL 17364 SEC 14 R4E N. SALTSPRING COWICHAN DIST.
(COMPLETE LEGAL DESCRIPTION)

OWNER'S NAME MR. W. TWA ADDRESS BOX 255, BLACKBURN RD,

DRILLER'S NAME KEN'S DRILLING ADDRESS _____ DATE OF COMPLETION JUNE/72

DEPTH 170' & 165" ELEVATION OF COLLAR 375' CASING DIAM. 6 1/4" LENGTH 9.5' TYPE _____

METHOD OF DIGGING ROTARY SCREEN ☐ SIZE _____ LENGTH _____ TYPE _____

LOCATION OF SCREEN _____ DEVELOPED ☐ DESCRIBE _____

PERFORATED CASING ☐ LENGTH _____ LOCATION OF PERFORATIONS _____

GRAVEL PACK ☐ LENGTH _____ DIAM. _____ SIZE GRAVEL, ETC. _____

PUMP ☐ TYPE _____ POWER _____

CAPACITY _____ OTHER DATA _____

COSTS WELL _____ PUMP _____ PUMP HOUSE, ETC. _____

MAINTENANCE _____

DISTANCE TO WATER FROM TOP OF CASING 20' ☐ ESTIMATED ☐ MEASURED ELEVATION _____ FLUCTUATION _____

HIGH WATER _____ MONTH _____ LOW WATER _____ MONTH _____ OBSERVATION DATA ☐ FILE No. _____

WATER USE _____

MAX. RATE WITHDRAWAL ☑ ESTIMATED ☐ MEASURED 4 gpm

TEMPERATURE _____ PUMPS SAND ☐ _____

CLOGS SCREEN ☐ TYPE DEPOSIT _____ AQUIFER DATA water -0' down -175' down

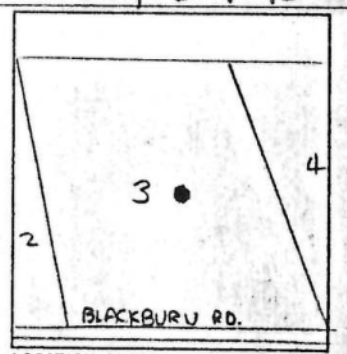
entirely thru shales

LICENSE No. _____ DATE LICENSE _____ AMOUNT _____

DATE APPLICATION _____ USE _____

"The attached information has been supplied gratuitously to the Province of British Columbia and has not been independently confirmed. Those persons relying on it do so at their own risk, and all persons to whom it is supplied should be cautioned against its use in making financial and other commitments. Comments on the well records may be obtained on request by contacting the drillers concerned."

See map 5-9-10-



LOCATION SKETCH—INDICATE NORTH

SALTSPRING ISLAND

Site I.D. 1400388

Sht 26

VISIrecord® 12708

ANALYSIS: SOFT, HARD, HIGH IRON, HIGH SULPHUR, SALTY, ALKALINE, SALINE, POLLUTED, INADEQUATE QUALITY — WATER QUALITY

DRY HOLE, INADEQUATE QUANTITY, PUMPING TEST

CAPACITY GPD: 0 — 10^3; 10^3 — 10^4; 10^4 — 10^5; 10^5 — 10^6; 10^6

METHOD: DUG, DRIVEN, DRILLED, JETTED, BORED

DEPTH: 0 — 25, 25 — 30, 50 — 100, 100 — 200, 200 — 400, >400

OBSERVATION, ABANDONED, DEVELOPED, SCREEN, PERF. CASING, GRAVEL ENV., PUMP

TYPE WELL: FLOWING, NON-FLOW ARTESIAN, WATER TABLE, PART CONFINED

SUPPLY AQUIFER		OTHER AQUIFER PRESENT		OTHER AQUIFER PRESENT		CHARACTER OF SUPPLY AQUIFER			WATER USE							RELIABILITY OF DATA			ROCK
TENS	UNITS	TENS	UNITS	TENS	UNITS	SAND	GRAVEL	TILL	DOMESTIC	GARDEN	STOCK	COOLING	IRRIGATION	INDUSTRIAL	WATERWORKS	GOOD	FAIR	POOR	SPRING
7 4 2 1	7 4 2 1	7 4 2 1	7 4 2 1	7 4 2 1	7 4 2 1														

B4 Page 68 of 121 MOE-2018-87417

LOG

FROM	TO	DESCRIPTION	NAME
0	3	RED CLAY	
	100	BLUE SHALE WITH TRACES OF WATER AT 20'	
	170	BLACK SHALE WITH 3 gpm AT 130', 4 gpm @ 170'	

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SAMPLE No _____ DATE 26 JUNE 1973

LAB WATER LAB U.B.C.

COLIFORM ORGANISMS _____

TOTAL BACTERIA _____

COLOUR clear ODOUR _____

TASTE _____

COND 320'

PUMPING TEST SUMMARY

TEST BY _____

DATE _____ FILE No _____

SPECIFIC CAPACITY _____ PERMIABILITY _____

STORAGE COEFF _____ TRANSMISSIBILITY _____

REMARKS _____

ANALYSIS

	PPM
Total Hardness	
Carbonate Hard	
Magnesium Hard	
Fe	0-5
SO_2	
Ca	
Mg	
Na	
K	
HCO_3	
CO_3	
Cl	
SO_4	
NO_3	
B	
E	
Total Dis-solids	
Total Alkalinity	
Suspended Solids	
Ph	7

OTHER DATA

SIZE ANALYSIS, ETC EST. YIELD: 4 gpm

CARD BY E Thom BWD DATE 14 Aug 73 JAN 73

SOURCES INFORMATION DRILL LOG

VISIrecord 1271

DEPT. OF ENVIRONMENT, WATER RESOURCES SERVICE, WATER INVESTIGATIONS BRANCH VICTORIA, BRITISH COLUMBIA

E
N
Z x6 Y8 NO 16

LEGAL DESCRIPTION: LOT 5 SEC. 86 BLK TP. B R. D.L. LAND DISTRICT COWICHAN PLAN 2067

DESCRIPTIVE LOCATION Cusheon Lake Rd Ganges BC LICENCE NO. DATE

OWNER'S NAME s.22 ADDRESS Ganges BC

DRILLER'S NAME Ken's Drilling ADDRESS 894 Goldstream Ave DATE COMPLETED July 77

NAT. TOPO. SHEET NO.

DEPTH 150' ELEVATION OF ☐ ESTIMATED ☐ SURVEYED CASING DIAM. 6 1/4" LENGTH 32'

METHOD OF CONSTRUCTION Drilled CASING DIAM LENGTH

SCREEN LOCATION SCREEN ☐ SIZE LENGTH TYPE

SANITARY SEAL YES ☐ NO ☐ SCREEN ☐ SIZE LENGTH TYPE

PERFORATED CASING ☐ LENGTH PERFORATIONS FROM TO

GRAVEL PACK ☐ LENGTH DIAM. SIZE GRAVEL, ETC.

DISTANCE TO WATER 27' ☐ ESTIMATED WATER LEVEL

FROM top of casing ☐ MEASURED ELEVATION ESIAN PRESSURE

DATE WATER LEVEL MEASURE

Well # 5

PRODUCTION TEST SUMMARY

DATE

TEST BY

BAIL TEST ☐ PUMP TEST ☐ DURATION OF TEST

RATE DRAWDOWN

WATER LEVEL AT COMPLETION OF TEST

AVAILABLE DRAWDOWN SPECIFIC CAPACITY

PERMEABILITY STORAGE COEFF.

TRANSMISSIVITY

RECOMMENDED PUMPING RATE

RECOMMENDED PUMP SETTING 1/4 GPM

CHEMISTRY

TEST BY DATE

TOTAL DISSOLVED SOLIDS SILICA (SiO_2) mg/l

CONDUCTANCE μmhos/cm AT 25°C SS ($CaCO_3$) mg/l

TOTAL ALKALINITY ($CaCO_3$) ng/l MANGANESE (Mn) mg/l

COLOUR TURBIDITY

ANIONS	mg/l	epm	ONS	mg/l	epm
CARBONATE (CO_3)			CIUM (Ca)		
BICARBONATE (HCO_3)			GNESIUM (Mg)		
SULPHATE (SO_4)			SODIUM (Na)		
CHLORIDE (Cl)			POTASSIUM (K)		
$O_2 + NO_3$ (NITROGEN)			IRON (DISSOLVED)		
• TKN. (NITROGEN)					
PHOSPHORUS (P)					

• TKN = TOTAL KJELDAHL NITROGEN

NO_2 = NITRITE NO_3 = NITRATE

CHEMISTRY SITE NO.

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CHEMISTRY FIELD TESTS

TEST BY DATE EQUIPMENT USED

CONTENTS OF FOLDER

☒ DRILL LOG ☐ PUMP TEST DATA ☐ CHEMICAL ANALYSIS

☐ SIEVE ANALYSIS ☐ GEOPHYSICAL LOGS ☐ REPORT

OTHER

SOURCES OF INFORMATION Driller

LITHOLOGY

FROM	TO	DESCRIPTION
0	21'	—
21	31	bedrock at 21' bottom of casing at 31'
31	115	Steady drilling to 115 in sandstone & shale
115	150	fracture at 115' 1/4 gpm Drilled to 150' - no more water
		OWNER SAYS WATER IS SOFT HAS A SULPHURY TASTE & SMELL & CONTAINS IRON OWNER PROVIDED STATIC WATER LEVEL
MER	78	AA1 JD 608 SD64 BEL ELIN M 00'333.000 - S.S1 LT 6 BLK B SEC 86 PL 2067 LD 16 (.419 Acs) LRO F664 10 Dep Tow. Cusheon Lk.



Siteno : E207977 SEAM SITE DATA ENTRY SCREEN

Establishing Agency ..... 01 VANCOUVER ISLAND R. Type of Site ..... 33 WELL
Region ..... 01 VANCOUVER ISLAND R. Site Category ..... 1 BACKGROUND
FAW MU ..... NOT IN EIS Discharge To .....

Date Site Closed ..... / /

Name.. WELL#1 TWA LANDFILL-SALTSPRING
Desc.. WELL 200M NORTH OF PR01839 ON BLACKBURN RD

Relationship of Site to Associated Permit Number or Non-Permitted Discharge Site Number (if Permit, Industry Code Required)
Rel # Ind Rel # Ind
1 CONTROL PR01839 0601 MUNICIPAL WASTE COLLECTION

SYSTEM GENERATED DATA - FOR INFORMATION ONLY

Latitude ..... Mapsheet No. ..... / / First Sampling Date .....
Longitude ..... Most Recent Sampling Date .....
Distance Upstream ..... 0000.0 Date Categorized ..... / / Number of Sampling Dates .....
Watershed . Category/Type Changed .....

Siteno : E207978 SEAM SITE DATA ENTRY SCREEN

Establishing Agency ..... 01 VANCOUVER ISLAND R. Type of Site ..... 33 WELL
Region ..... 01 VANCOUVER ISLAND R. Site Category ..... 2 TREND
FAW MU ..... NOT IN EIS Discharge To .....

Date Site Closed ..... / /

Name.. WELL#2 TWA LANDFILL-SALTSPRING
Desc.. WELL ON TWA PROPERTY BETWEEN HOUSE AND LANDFILL

Rel # Ind Rel # Ind
2 INITIAL DILUTION PR01839 0601 MUNICIPAL WASTE COLLECTION

SYSTEM GENERATED DATA - FOR INFORMATION ONLY

Latitude ..... Mapsheet No. ..... / / First Sampling Date .....
Longitude ..... Most Recent Sampling Date .....
Distance Upstream ..... 0000.0 Date Categorized ..... / / Number of Sampling Dates .....
Watershed . Category/Type Changed .....

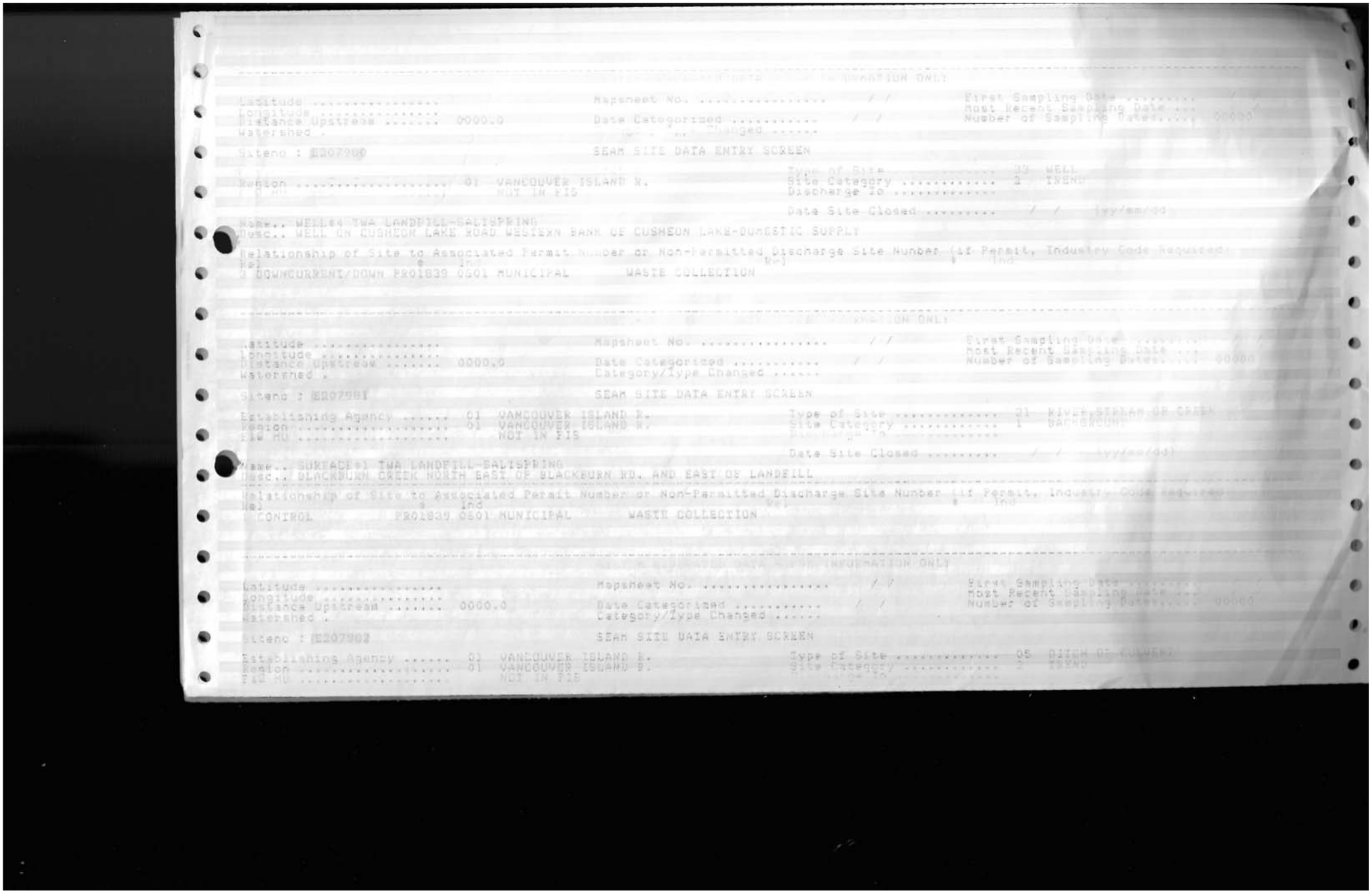
Siteno : E207979 SEAM SITE DATA ENTRY SCREEN

Establishing Agency ..... 01 VANCOUVER ISLAND R. Type of Site ..... 33 WELL
Region ..... 01 VANCOUVER ISLAND R. Site Category ..... 2 TREND
FAW MU ..... NOT IN EIS Discharge To .....

Date Site Closed ..... / /

Name.. WELL#3 TWA LANDFILL-SALTSPRING
Desc.. WELL ON SALTSPRING CENTRE PROPERTY 200M SOUTH OF LANDFILL GATE-DOMESTIC SUPPLY

Relationship of Site to Associated Permit Number or Non-Permitted Discharge Site Number (if Permit, Industry Code Required)
Rel # Ind Rel # Ind
3 DOWNCURRENT/DOWN PR01839 0601 MUNICIPAL WASTE COLLECTION



Latitude .....
Longitude .....
Distance Upstream 0000.0
Watershed .

Siteno : E207980

Region ..... 01 VANCOUVER ISLAND R.
Est MU ..... NOT IN FIS

Mapsheet No. ..... / /
Date Categorized ..... / /
Category/Type Changed .....

SEAM SITE DATA ENTRY SCREEN

Type of Site ..... 33 WELL
Site Category ..... 3 TREND
Discharge To .....
Date Site Closed ..... / / (yy/mm/dd)

First Sampling Date ..... / /
Most Recent Sampling Date ... / /
Number of Sampling Dates..... 00000

Name.. WELL#4 TWA LANDFILL-SALTSPRING
Desc.. WELL ON CUSHEON LAKE ROAD WESTERN BANK OF CUSHEON LAKE-DOMESTIC SUPPLY

Relationship of Site to Associated Permit Number or Non-Permitted Discharge Site Number (if Permit, Industry Code required)
Rel # Ind Rel # Ind
J DOWNCURRENT/DOWN PR01839 0601 MUNICIPAL WASTE COLLECTION

Latitude .....
Longitude .....
Distance Upstream 0000.0
Watershed .

Siteno : E207981

Establishing Agency ..... 01 VANCOUVER ISLAND R.
Region ..... 01 VANCOUVER ISLAND R.
Est MU ..... NOT IN FIS

Mapsheet No. ..... / /
Date Categorized ..... / /
Category/Type Changed .....

SEAM SITE DATA ENTRY SCREEN

Type of Site ..... 31 RIVER,STREAM OR CREEK
Site Category ..... 1 UPSTREAM
Discharge To .....
Date Site Closed ..... / / (yy/mm/dd)

First Sampling Date ..... / /
Most Recent Sampling Date ... / /
Number of Sampling Dates..... 00000

Name.. SURFACE#1 TWA LANDFILL-SALTSPRING
Desc.. BLACKBURN CREEK NORTH EAST OF BLACKBURN RD. AND EAST OF LANDFILL

Relationship of Site to Associated Permit Number or Non-Permitted Discharge Site Number (if Permit, Industry Code required)
Rel # Ind Rel # Ind
J CONTROL PR01839 0601 MUNICIPAL WASTE COLLECTION

Latitude .....
Longitude .....
Distance Upstream 0000.0
Watershed .

Siteno : E207982

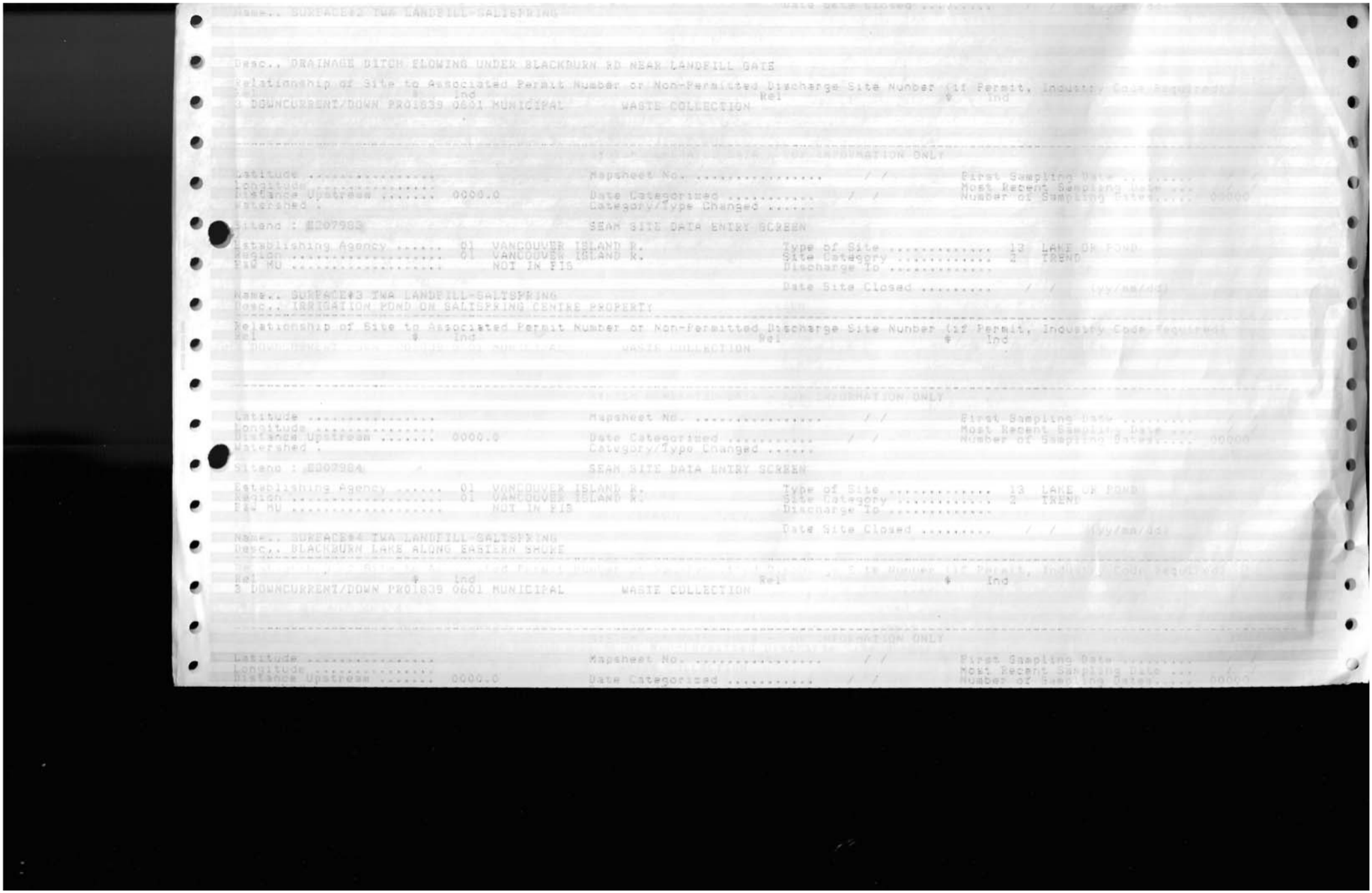
Establishing Agency ..... 01 VANCOUVER ISLAND R.
Region ..... 01 VANCOUVER ISLAND R.
Est MU ..... NOT IN FIS

Mapsheet No. ..... / /
Date Categorized ..... / /
Category/Type Changed .....

SEAM SITE DATA ENTRY SCREEN

Type of Site ..... 05 DITCH OR CULVERT
Site Category ..... 3 TREND
Discharge To .....

First Sampling Date ..... / /
Most Recent Sampling Date ... / /
Number of Sampling Dates..... 00000



Name.. SURFACE#2 TWA LANDFILL-SALTSPRING

Desc.. DRAINAGE DITCH FLOWING UNDER BLACKBURN RD NEAR LANDFILL GATE

Relationship of Site to Associated Permit Number or Non-Permitted Discharge Site Number (if Permit, Industry Code Required)

Rel	#	Ind		Rel	#	Ind
S			DOWNCURRENT/DOWN PR01839	0601	MUNICIPAL	WASTE COLLECTION

FOR INFORMATION ONLY

Latitude .....
Longitude .....
Distance Upstream 0000.0
Watershed .

Mapsheet No. ..... / /
Date Categorized ..... / /
Category/Type Changed .....

First Sampling Date ..... / /
Most Recent Sampling Date ... / /
Number of Sampling Dates.... 00000

Siteno : E207983

SEAM SITE DATA ENTRY SCREEN

Establishing Agency ..... 01 VANCOUVER ISLAND R.
Region ..... 01 VANCOUVER ISLAND R.
FSW MU ..... NOT IN FIS

Type of Site ..... 13 LAKE OR POND
Site Category ..... 2 TREND
Discharge To .....

Date Site Closed ..... / / (yy/mm/dd)

Name.. SURFACE#3 TWA LANDFILL-SALTSPRING

Desc.. IRRIGATION POND ON SALTSPRING CENTRE PROPERTY

Relationship of Site to Associated Permit Number or Non-Permitted Discharge Site Number (if Permit, Industry Code Required)

Rel	#	Ind		Rel	#	Ind
S			DOWNCURRENT/DOWN PR01839	0601	MUNICIPAL	WASTE COLLECTION

FOR INFORMATION ONLY

Latitude .....
Longitude .....
Distance Upstream 0000.0
Watershed .

Mapsheet No. ..... / /
Date Categorized ..... / /
Category/Type Changed .....

First Sampling Date ..... / /
Most Recent Sampling Date ... / /
Number of Sampling Dates.... 00000

Siteno : E207984

SEAM SITE DATA ENTRY SCREEN

Establishing Agency ..... 01 VANCOUVER ISLAND R.
Region ..... 01 VANCOUVER ISLAND R.
FSW MU ..... NOT IN FIS

Type of Site ..... 13 LAKE OR POND
Site Category ..... 2 TREND
Discharge To .....

Date Site Closed ..... / / (yy/mm/dd)

Name.. SURFACE#4 TWA LANDFILL-SALTSPRING

Desc.. BLACKBURN LAKE ALONG EASTERN SHORE

Relationship of Site to Associated Permit Number or Non-Permitted Discharge Site Number (if Permit, Industry Code Required)

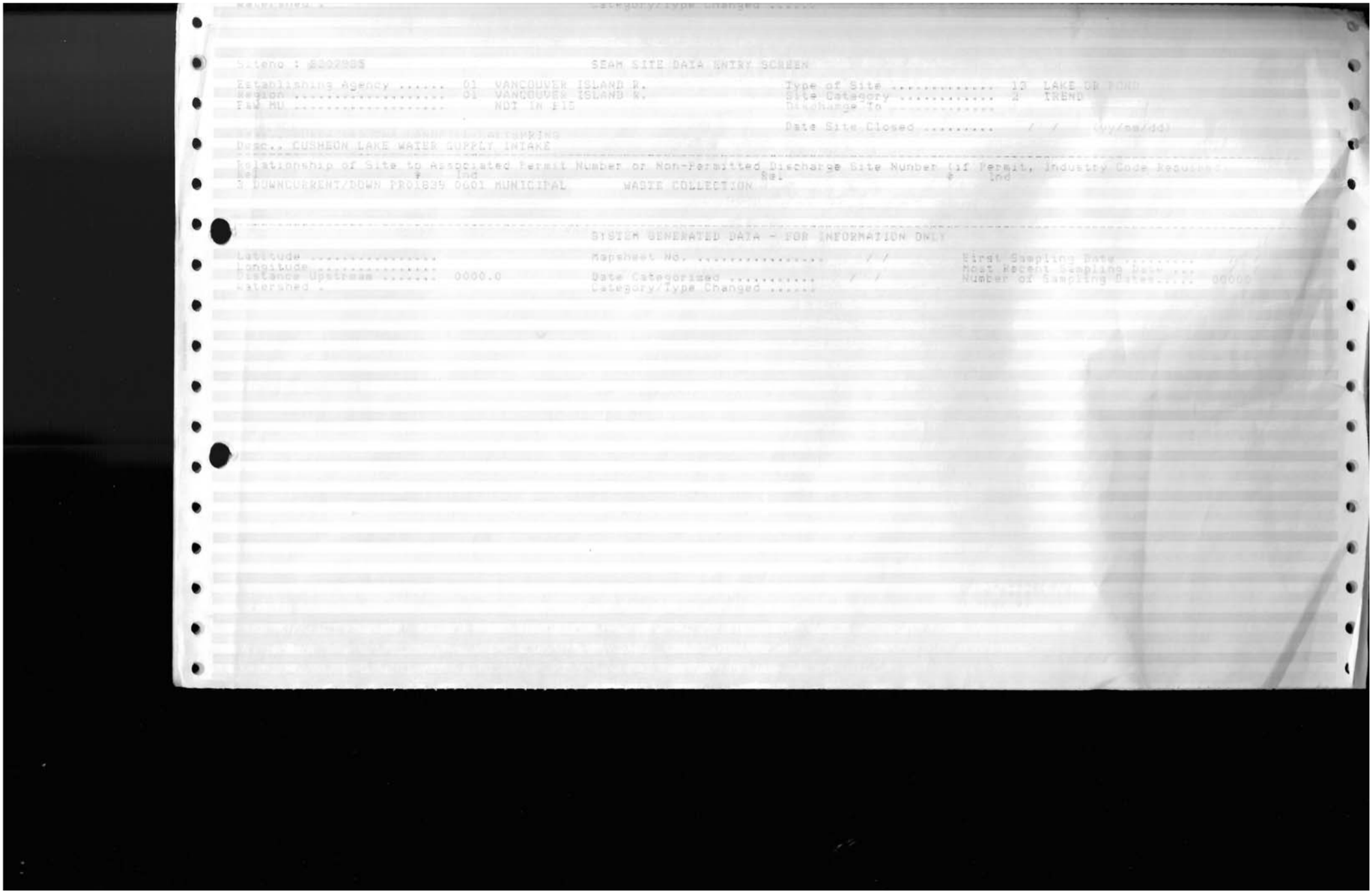
Rel	#	Ind		Rel	#	Ind
S			DOWNCURRENT/DOWN PR01839	0601	MUNICIPAL	WASTE COLLECTION

FOR INFORMATION ONLY

Latitude .....
Longitude .....
Distance Upstream 0000.0

Mapsheet No. ..... / /
Date Categorized ..... / /

First Sampling Date ..... / /
Most Recent Sampling Date ... / /
Number of Sampling Dates.... 00000



Sitenq : 0202005 SEAM SITE DATA ENTRY SCREEN

Establishing Agency ..... 01 VANCOUVER ISLAND R. Type of Site ..... 13 LAKE OR POND
Region ..... 01 VANCOUVER ISLAND R. Site Category ..... 2 TRENDS
FLW MU ..... NOT IN FIS Discharge To .....
Date Site Closed ..... / / (yy/mm/dd)

Desc.. CUSHEON LAKE WATER SUPPLY INTAKE

Relationship of Site to Associated Permit Number or Non-Permitted Discharge Site Number (if Permit, Industry Code Required)
Rel # Ind Rel # Ind
3 DOWNCURRENT/DOWN PR01835 0601 MUNICIPAL WASTE COLLECTION

SYSTEM GENERATED DATA - FOR INFORMATION ONLY

Latitude ..... Mapsheet No. ..... / / First Sampling Date ..... / /
Longitude ..... Most Recent Sampling Date ..... / /
Distance Upstream ..... 0000.0 Date Categorized ..... / / Number of Sampling Dates..... 00000
Watershed .. Category/Type Changed .....

WG 3000028

13155 Delf Place
Richmond, B.C.
V6V 2A2

Zenon Environmental Inc. (Laboratory)

WATER AND GENERAL CHEMISTRY REQUISITION

REGULAR ☑ RUSH ☐ EMERGENCY ☐

CLIENT STUDY: CA 17 — CLIENT NAME: VANC ISL. REG. WASTE

AUDIT SAMPLE? YES ☐ — SAMPLING AGENCY: 91

EMPLOYEE No.: 46288 — SAMPLER OR SUBMITTER NAME: D McLaren — PHONE NUMBER:

ATTENTION OF: NAME; BRANCH; ADDRESS; ADDRESS; CITY; PROVINCE; POSTAL CODE

ADJ. — SAMPLE ADJECTIVE

STATE: FW — SAMPLE STATE: FRESHWATER

DESC: GE — SAMPLE DESCRIPTOR: GENERAL

ADDRESS CODE: 69 — OR

E - MAIL ☐

SITE IDENTIFIER: E207981 — SITE NAME or SAMPLING SOURCE: SURFACE #1 TWA LANDFILL - SALTSPRING

DATE / TIME FROM (Y Y M M D D H H M M)	DATE / TIME TO (Y Y M M D D H H M M)	DEPTH (meters) UPPER	DEPTH (meters) LOWER	TIDE CODE	SEAM COMMENTS
9 9 0 1 0 9 0 9 3 5					

INSTRUCTIONS TO LAB.

GENERAL

Medium Pres'n.: 01 01

☐	Acidity: pH 4.5
☐	Acidity: pH 8.3
☐	Alkalinity: Phen.
☐	Alkalinity: Total: pH 4.5
☑	Chloride
☐	Colour: TAC
☐	Colour: True
☐	Colour: S.W.
☐	Fluoride
☑	Nitrogen: Ammonia
☐	Nit.: Nitrate & Nitrite
☑	Nitrogen: Nitrate
☑	Nitrogen: Nitrite
☐	Nitrogen: Organic
☐	Nitrogen: Tot. Kjeldahl
☐	Nitrogen: Total
☑	pH

☐	Phos. Diss. o-phosphate
☑	Phosphorus: Tot. Diss.
☑	Phosphorus: Total
☐	Potassium
☐	Residue: Filterable
☐	Residue: Nonfilterable
☐	Residue: Nonfilt., Fixed
☐	Residue: Total
☐	Residue: Total, Fixed
☐	Silica: Reactive
☑	Sodium
☑	Specific Conductance
☑	Sulfate
☐	Turbidity
☐	Alk. Titration Curve

ORGANICS

Medium	Pres'n.		
		☐	Petroleum Distillates
		☐	Mining Reagents
		☐	Polychlor. Biphenyls
		☐	Penta/Tetra Cl-phenols
		☐	Resin Acids
		☐	Trihalomethanes
		☐	Organochlorine P.-scan
		☐	Organophosphorus P.-scan
		☐	Phenoxy Acid Herb.-scan
		☐	Solvent Sol. Herb.-scan
		☐	Glyphosate / AMPA
		☐	Diagnostic Pest. - scan

METALS

TOTAL — Medium Pres'n: 05 02 — OR

DISSOLVED — Medium Pres'n: 05 13 — OR

High	Low		High	Low
☐	☐	Aluminum	☐	☐
☐	☐	Antimony	☐	☐
☐	☐	Arsenic	☐	☐
☐	☐	Barium	☐	☐
☐	☐	Boron	☐	☐
☐	☑	Cadmium	☐	☐
☐	☐	Calcium	☐	☐
☐	☑	Chromium	☐	☐
☐	☐	Cobalt	☐	☐
☐	☐	Copper	☐	☐
☐	☐	Iron	☐	☐
☐	☑	Lead	☐	☐
☐	☐	Magnesium	☐	☐
☐	☐	Manganese	☐	☐
☐	☐	Molybdenum	☐	☐
☐	☐	Nickel	☐	☐
☐	☐	Silver	☐	☐
☐	☐	Uranium	☐	☐
☐	☐	Vanadium	☐	☐
☐	☑	Zinc	☐	☐
☐	☐	Hardness	☐	☐
☑	☐	Metal Pkg.	☐	☐

SPECIFIC

	Medium Code	Pres'n. Code	Medium Code	Pres'n. Code	ANALYSES
☑	02	01			Biochemical Oxygen D.
☑	04	05			Chemical Oxygen D.
☐	04	01			Carbon: Organic
☐	04	01			Carbon: Inorganic
☐	04	01			Carbon: Total
☐	02	24			Cyanide: Strong Acid Diss.
☐	02	24			Cyanide: Weak Acid Diss.
☐	06	28			Mercury: Total
☐	07	20			Oil & Grease
☐	22	04			Phenols
☐	06	02			Radium
☐	03	08			Sulphide: Total
☐					Thiocyanate

MEDIA COUNT: 4

OTHER AND SPECIAL ANALYSES

Medium Code	Pres'n. Code	Parameter, Sparcode, Group or Package	Low

SAMPLER COPY — SEE DIRECTIONS ON BACK OF FORM — PLEASE PRINT

WG 3000026

13155 Delf Place
Richmond, B.C.
V6V 2A2

Zenon Environmental Inc. (C. Laboratory)

WATER AND GENERAL CHEMISTRY REQUISITION

REGULAR ☑ RUSH ☐ EMERGENCY ☐

CA 17 — CLIENT STUDY — VANC. ISL. REG. - WASTE — CLIENT NAME

AUDIT SAMPLE? YES ☐ — SAMPLING AGENCY 91

46288 — EMPLOYEE No. — D. McLaren — SAMPLER OR SUBMITTER NAME — PHONE NUMBER 7583951

ATTENTION OF — 69 ADDRESS CODE — OR — NAME / BRANCH / ADDRESS / ADDRESS / CITY / PROVINCE / POSTAL CODE

E - MAIL ☐

ADJ. — SAMPLE ADJECTIVE

STATE FW — SAMPLE STATE FRESHWATER

DESC GE — SAMPLE DESCRIPTOR GENERAL

SITE IDENTIFIER E207982 — SITE NAME or SAMPLING SOURCE SURFACE #2 TWA LANDFILL - SALT SPRING

DATE / TIME FROM (Y Y M M D D H H M M)	DATE / TIME TO (Y Y M M D D H H M M)	DEPTH (meters) UPPER	DEPTH (meters) LOWER	TIDE CODE	SEAM COMMENTS
90 01 09 10 10					

INSTRUCTIONS TO LAB.

GENERAL

Medium Pres'n. 01 01

	Acidity: pH 4.5
	Acidity: pH 8.3
	Alkalinity: Phen.
	Alkalinity: Total: pH 4.5
✓	Chloride
	Colour: TAC
	Colour: True
	Colour: S.W.
	Fluoride
✓	Nitrogen: Ammonia
	Nit.: Nitrate & Nitrite
✓	Nitrogen: Nitrate
✓	Nitrogen: Nitrite
	Nitrogen: Organic
	Nitrogen: Tot. Kjeldahl
✓	Nitrogen: Total
✓	pH

	Phos. Diss. o-phosphate
✓	Phosphorus: Tot. Diss.
	Phosphorus: Total
	Potassium
	Residue: Filterable
	Residue: Nonfilterable
	Residue: Nonfilt., Fixed
	Residue: Total
	Residue: Total, Fixed
	Silica: Reactive
✓	Sodium
✓	Specific Conductance
✓	Sulfate
	Turbidity
	Alk. Titration Curve

ORGANICS

Medium Pres'n.

			Petroleum Distillates
			Mining Reagents
			Polychlor. Biphenyls
			Penta/Tetra Cl-phenols
			Resin Acids
			Trihalomethanes
			Organochlorine P.-scan
			Organophosphorus P.-scan
			Phenoxy Acid Herb.-scan
			Solvent Sol. Herb.-scan
			Glyphosate / AMPA
			Diagnostic Pest. - scan

METALS

TOTAL — Medium Pres'n. 05 02 OR

DISSOLVED — Medium Pres'n. 05 13 OR

High	Low		High	Low
		Aluminum		
		Antimony		
		Arsenic		
		Barium		
		Boron		
	✓	Cadmium		
		Calcium		
	✓	Chromium		
		Cobalt		
		Copper		
		Iron		
	✓	Lead		
		Magnesium		
		Manganese		
		Molybdenum		
		Nickel		
		Silver		
		Uranium		
		Vanadium		
	✓	Zinc		
	✓	Hardness		
✓		Metal Pkg.		

SPECIFIC

✓	Medium Code	Pres'n. Code	Medium Code	Pres'n. Code	ANALYSES
✓	02	01			Biochemical Oxygen D.
✓	04	05			Chemical Oxygen D.
	04	01			Carbon: Organic
	04	01			Carbon: Inorganic
	04	01			Carbon: Total
	02	24			Cyanide: Strong Acid Diss.
	02	24			Cyanide: Weak Acid Diss.
	06	28			Mercury: Total
	07	20			Oil & Grease
	22	04			Phenols
	06	02			Radium
	03	08			Sulphide: Total
					Thiocyanate

MEDIA COUNT 4.

OTHER AND SPECIAL ANALYSES

Medium Code	Pres'n. Code	Parameter, Sparcode, Group or Package	Low

SAMPLER COPY — SEE DIRECTIONS ON BACK OF FORM — PLEASE PRINT

WG 3000027

13155 Delf Place
Richmond, B.C.
V6V 2A2

Zenon Environmental Inc. (Lab. Laboratory)

WATER AND GENERAL CHEMISTRY REQUISITION

REGULAR ☑ RUSH ☐ EMERGENCY ☐

CLIENT STUDY: CA17 | CLIENT NAME: VANC. ISL. REG. - WASTE

AUDIT SAMPLE? YES ☐ | SAMPLING AGENCY: 01

EMPLOYEE No.: 46288 | SAMPLER OR SUBMITTER NAME | PHONE NUMBER: 7583951

ATTENTION OF

ADJ | SAMPLE ADJECTIVE

STATE: FW | SAMPLE STATE: FRESHWATER

DESC: GE | SAMPLE DESCRIPTOR: GENERAL

ADDRESS CODE: 69 OR

NAME
BRANCH
ADDRESS
ADDRESS
CITY | PROVINCE | POSTAL CODE

E - MAIL ☐

SITE IDENTIFIER: E207983 | SITE NAME or SAMPLING SOURCE: SURFACE #3 TMA LANDFILL - SALTSPRING

DATE / TIME FROM (Y Y M M D D H H M M)	TO (Y Y M M D D H H M M)	DEPTH (meters) UPPER	DEPTH (meters) LOWER	TIDE CODE	SEAM COMMENTS
90 01 09 1026					

INSTRUCTIONS TO LAB

GENERAL

Medium Pres'n.: 01 01

	Acidity: pH 4.5		Phos. Diss. o-phosphate
	Acidity: pH 8.3		Phosphorus: Tot. Diss.
	Alkalinity: Phen.	✓	Phosphorus: Total
	Alkalinity: Total: pH 4.5		Potassium
✓	Chloride		Residue: Filterable
	Colour: TAC		Residue: Nonfilterable
	Colour: True		Residue: Nonfilt., Fixed
	Colour: S.W.		Residue: Total
	Fluoride		Residue: Total, Fixed
✓	Nitrogen: Ammonia		Silica: Reactive
	Nit.: Nitrate & Nitrite		Sodium
✓	Nitrogen: Nitrate	✓	Specific Conductance
✓	Nitrogen: Nitrite	✓	Sulfate
	Nitrogen: Organic		Turbidity
	Nitrogen: Tot. Kjeldahl		Alk. Titration Curve
	Nitrogen: Total		
✓	pH		

ORGANICS

Medium	Pres'n.		
			Petroleum Distillates
			Mining Reagents
			Polychlor. Biphenyls
			Penta/Tetra Cl-phenols
			Resin Acids
			Trihalomethanes
			Organochlorine P.-scan
			Organophosphorus P.-scan
			Phenoxy Acid Herb.-scan
			Solvent Sol. Herb.-scan
			Glyphosate / AMPA
			Diagnostic Pest. - scan

METALS

TOTAL: Medium Pres'n. 05 02 OR ☐☐ | DISSOLVED: Medium Pres'n. 05 13 OR ☐☐

	High	Low		High	Low
	■		Aluminum		
			Antimony		
			Arsenic		
	■		Barium		■
■			Boron		■
	✓		Cadmium		
	■		Calcium		■
	✓		Chromium		
			Cobalt		
			Copper		
	■		Iron		
	✓		Lead		
	■		Magnesium		■
			Manganese		
			Molybdenum		
			Nickel		
			Silver		
	■		Uranium		■
			Vanadium		
	✓		Zinc		
	■		Hardness		■
✓			Metal Pkg		

SPECIFIC

✓	Medium Code	Pres'n. Code	Medium Code	Pres'n. Code	ANALYSES
✓	02	01			Biochemical Oxygen D.
✓	04	05			Chemical Oxygen D.
	04	01			Carbon: Organic
	04	01			Carbon: Inorganic
	04	01			Carbon: Total
	02	24			Cyanide: Strong Acid Diss.
	02	24			Cyanide: Weak Acid Diss.
	06	28			Mercury: Total
	07	20			Oil & Grease
	02	04			Phenols
	06	02			Radium
	03	08			Sulphide: Total
					Thiocyanate

MEDIA COUNT: 4.

OTHER AND SPECIAL ANALYSES

Medium Code	Pres'n. Code	Parameter, Sparcode, Group or Package	Low

SAMPLER COPY — SEE DIRECTIONS ON BACK OF FORM — PLEASE PRINT

WG 3001956

13155 Delf Place
Richmond, B.C.
V6V 2A2

Zenon Environmental Inc. (A.C. Laboratory)

WATER AND GENERAL CHEMISTRY REQUISITION

REGULAR ☑ RUSH ☐ EMERGENCY ☐

CLIENT STUDY: CA 17 — CLIENT NAME: VANC. ISL. REG. WASTE

AUDIT SAMPLE? YES ☐ — SAMPLING AGENCY: 01

EMPLOYEE No.: 46288 — SAMPLER OR SUBMITTER NAME: D. McLaren — PHONE NUMBER: 7583951

ATTENTION OF — NAME

ADJ. — SAMPLE ADJECTIVE

ADDRESS CODE: 69 OR — BRANCH

STATE: FW — SAMPLE STATE: FRESHWATER — ADDRESS

DESC.: GE — SAMPLE DESCRIPTOR: GENERAL — ADDRESS

E - MAIL ☐ — CITY — PROVINCE — POSTAL CODE

SITE IDENTIFIER: E207989 — SITE NAME or SAMPLING SOURCE: SURFACE #4 THA LANDFILL SALTSPRING

DATE / TIME FROM (Y Y M M D D H H M M)	DATE / TIME TO (Y Y M M D D H H M M)	DEPTH (meters) UPPER	DEPTH (meters) LOWER	TIDE CODE	SEAM COMMENTS
90,09,09,13,00					

INSTRUCTIONS TO LAB

GENERAL
Medium: 01 — Pres'n.: 01

ORGANICS
Medium: — Pres'n.:

METALS
TOTAL — Medium: 05 — Pres'n.: 02 — OR
DISSOLVED — Medium: 05 — Pres'n.: 13 — OR

	Acidity: pH 4.5
	Acidity: pH 8.3
	Alkalinity: Phen.
✓	Alkalinity: Total: pH 4.5
✓	Chloride
	Colour: TAC
	Colour: True
	Colour: S.W.
✓	Fluoride
✓	Nitrogen: Ammonia
	Nit.: Nitrate & Nitrite
✓	Nitrogen: Nitrate
✓	Nitrogen: Nitrite
	Nitrogen: Organic
	Nitrogen: Tot. Kjeldahl
✓	Nitrogen: Total
✓	pH

	Phos. Diss. o-phosphate
	Phosphorus: Tot. Diss.
✓	Phosphorus: Total
	Potassium
	Residue: Filterable
	Residue: Nonfilterable
	Residue: Nonfilt., Fixed
	Residue: Total
	Residue: Total, Fixed
	Silica: Reactive
✓	Sodium
✓	Specific Conductance
✓	Sulfate
	Turbidity
	Alk. Titration Curve

Medium	Pres'n.	
		Petroleum Distillates
		Mining Reagents
		Polychlor. Biphenyls
		Penta/Tetra Cl-phenols
		Resin Acids
		Trihalomethanes
		Organochlorine P.-scan
		Organophosphorus P.-scan
		Phenoxy Acid Herb.-scan
		Solvent Sol. Herb.-scan
		Glyphosate / AMPA
		Diagnostic Pest. - scan

High	Low		High	Low
	■	Aluminum		■
		Antimony		
		Arsenic		
	■	Barium		■
■		Boron		■
	✓	Cadmium		
	■	Calcium		■
	✓	Chromium		
		Cobalt		
		Copper		
	■	Iron		
	✓	Lead		
	■	Magnesium		■
		Manganese		
		Molybdenum		
		Nickel		
		Silver		
	■	Uranium		■
		Vanadium		
	✓	Zinc		
	■	Hardness		■
✓	■	Metal Pkg.		■

SPECIFIC

	Medium Code	Pres'n. Code	Medium Code	Pres'n. Code	ANALYSES
✓	02	01			Biochemical Oxygen D.
✓	04	05			Chemical Oxygen D.
	04	01			Carbon: Organic
	04	01			Carbon: Inorganic
	04	01			Carbon: Total
	02	24			Cyanide: Strong Acid Diss.
	02	24			Cyanide: Weak Acid Diss.
	06	28			Mercury: Total
	07	20			Oil & Grease
	22	04			Phenols
	06	02			Radium
	03	08			Sulphide: Total
					Thiocyanate

MEDIA COUNT: 4

OTHER AND SPECIAL ANALYSES

Medium Code	Pres'n. Code	Parameter, Sparcode, Group or Package	Low

SAMPLER COPY — SEE DIRECTIONS ON BACK OF FORM — PLEASE PRINT

WG 3001955

13155 Delf Place
Richmond, B.C.
V6V 2A2

Zenon Environmental Inc. (V.C. Laboratory)

WATER AND GENERAL CHEMISTRY REQUISITION

REGULAR ☑ RUSH ☐ EMERGENCY ☐

CLIENT STUDY: CA17 — CLIENT NAME: VANC. ISL. REG. WASTE

AUDIT SAMPLE? YES ☐ — SAMPLING AGENCY: 91

EMPLOYEE No.: 46288 — SAMPLER OR SUBMITTER NAME: D. MCLAREN — PHONE NUMBER: 7583951

ATTENTION OF — NAME

ADDRESS CODE ☐ OR — BRANCH

ADDRESS

ADDRESS

CITY — PROVINCE — POSTAL CODE

E - MAIL ☐

ADJ. — SAMPLE ADJECTIVE

STATE: FW — SAMPLE STATE: FRESHWATER

DESC: GE — SAMPLE DESCRIPTOR: GENERAL

SITE IDENTIFIER: E207985 — SITE NAME or SAMPLING SOURCE: SURFACE FS, TWA LANDFILL SALTSPRING

DATE / TIME FROM (YYMMDD HHMM)	DATE / TIME TO (YYMMDD HHMM)	DEPTH (meters) UPPER	DEPTH (meters) LOWER	TIDE CODE	SEAM COMMENTS
900109 1230					

INSTRUCTIONS TO LAB.

GENERAL

Medium Pres'n.: 01 01

☐	Acidity: pH 4.5
☐	Acidity: pH 8.3
☐	Alkalinity: Phen.
☐	Alkalinity: Total: pH 4.5
✓	Chloride
☐	Colour: TAC
☐	Colour: True
☐	Colour: S.W.
☐	Fluoride
✓	Nitrogen: Ammonia
☐	Nit.: Nitrate & Nitrite
✓	Nitrogen: Nitrate
✓	Nitrogen: Nitrite
☐	Nitrogen: Organic
☐	Nitrogen: Tot. Kjeldahl
☐	Nitrogen: Total
✓	pH

☐	Phos. Diss. o-phosphate
☐	Phosphorus: Tot. Diss.
✓	Phosphorus: Total
☐	Potassium
☐	Residue: Filterable
☐	Residue: Nonfilterable
☐	Residue: Nonfilt., Fixed
☐	Residue: Total
☐	Residue: Total, Fixed
☐	Silica: Reactive
☐	Sodium
✓	Specific Conductance
✓	Sulfate
☐	Turbidity
☐	Alk. Titration Curve

ORGANICS

Medium	Pres'n.		
☐			Petroleum Distillates
☐			Mining Reagents
☐			Polychlor. Biphenyls
☐			Penta/Tetra Cl-phenols
☐			Resin Acids
☐			Trihalomethanes
☐			Organochlorine P.-scan
☐			Organophosphorus P.-scan
☐			Phenoxy Acid Herb.-scan
☐			Solvent Sol. Herb.-scan
☐			Glyphosate / AMPA
☐			Diagnostic Pest. - scan

METALS

TOTAL — Medium Pres'n: 05 02 OR

DISSOLVED — Medium Pres'n: 05 13 OR

High	Low		High	Low
	■	Aluminum		■
		Antimony		
		Arsenic		
	■	Barium		■
■		Boron		■
	✓	Cadmium		
	■	Calcium		■
	✓	Chromium		
		Cobalt		
		Copper		
	■	Iron		
	✓	Lead		
	■	Magnesium		■
		Manganese		
		Molybdenum		
		Nickel		
		Silver		
	■	Uranium		■
		Vanadium		
	✓	Zinc		
	■	Hardness		■
✓	■	Metal Pkg.		

SPECIFIC

Medium Code	Pres'n. Code	Medium Code	Pres'n. Code	ANALYSES
✓ 02	01			Biochemical Oxygen D.
✓ 04	05			Chemical Oxygen D.
04	01			Carbon: Organic
04	01			Carbon: Inorganic
04	01			Carbon: Total
02	24			Cyanide: Strong Acid Diss.
02	24			Cyanide: Weak Acid Diss.
06	28			Mercury: Total
07	20			Oil & Grease
22	04			Phenols
06	02			Radium
03	08			Sulphide: Total
				Thiocyanate

MEDIA COUNT: 4

OTHER AND SPECIAL ANALYSES

Medium Code	Pres'n. Code	Parameter, Sparcode, Group or Package	Low

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WG 3000025

13155 Delf Place
Richmond, B.C.
V6V 2A2

Zenon Environmental Inc. (...C. Laboratory)

WATER AND GENERAL CHEMISTRY REQUISITION

REGULAR ☑ RUSH ☐ EMERGENCY ☐

CLIENT STUDY: CA 17 — CLIENT NAME: VANC ISL. REG. WASTE

AUDIT SAMPLE? YES ☐ — SAMPLING AGENCY: 01

EMPLOYEE No.: 46288 — SAMPLER OR SUBMITTER NAME: D. mclaren — PHONE NUMBER: 7583951

ADJ. — SAMPLE ADJECTIVE

STATE: FW — SAMPLE STATE: FRESHWATER

DESC.: GE — SAMPLE DESCRIPTOR: GENERAL

ATTENTION OF — ADDRESS CODE: 69 — OR

E - MAIL ☐

NAME
BRANCH
ADDRESS
ADDRESS
CITY — PROVINCE — POSTAL CODE

SITE IDENTIFIER: E207977 — SITE NAME or SAMPLING SOURCE: WELL #1 TUVA LANDFILL - SALTSPRING

DATE / TIME FROM (Y Y M M D D H H M M)	DATE / TIME TO (Y Y M M D D H H M M)	DEPTH (meters) UPPER	DEPTH (meters) LOWER	TIDE CODE	SEAM COMMENTS
9001090930					

INSTRUCTIONS TO LAB.

GENERAL

Medium: 01 — Pres'n.: 01

	Acidity: pH 4.5
	Acidity: pH 8.3
	Alkalinity: Phen.
	Alkalinity: Total: pH 4.5
✓	Chloride
	Colour: TAC
	Colour: True
	Colour: S.W.
	Fluoride
✓	Nitrogen: Ammonia
✓	Nit.: Nitrate & Nitrite
✓	Nitrogen: Nitrate
✓	Nitrogen: Nitrite
	Nitrogen: Organic
	Nitrogen: Tot. Kjeldahl
	Nitrogen: Total
✓	pH

	Phos. Diss. o-phosphate
	Phosphorus: Tot. Diss.
✓	Phosphorus: Total
	Potassium
	Residue: Filterable
	Residue: Nonfilterable
	Residue: Nonfilt., Fixed
	Residue: Total
	Residue: Total, Fixed
	Silica: Reactive
	Sodium
✓	Specific Conductance
✓	Sulfate
	Turbidity
	Alk. Titration Curve

ORGANICS

Medium	Pres'n.	
		Petroleum Distillates
		Mining Reagents
		Polychlor. Biphenyls
		Penta/Tetra Cl-phenols
		Resin Acids
		Trihalomethanes
		Organochlorine P.-scan
		Organophosphorus P.-scan
		Phenoxy Acid Herb.-scan
		Solvent Sol. Herb.-scan
		Glyphosate / AMPA
		Diagnostic Pest. - scan

METALS

TOTAL — Medium: 05 — Pres'n.: 02 — OR

DISSOLVED — Medium: 05 — Pres'n.: 13 — OR

High	Low		High	Low
		Aluminum		
		Antimony		
		Arsenic		
		Barium		
		Boron		
	✓	Cadmium		
		Calcium		
	✓	Chromium		
		Cobalt		
	✓	Copper		
		Iron		
	✓	Lead		
		Magnesium		
		Manganese		
		Molybdenum		
		Nickel		
		Silver		
		Uranium		
		Vanadium		
	✓	Zinc		
		Hardness		
✓		Metal Pkg.		

SPECIFIC

	Medium Code	Pres'n. Code	Medium Code	Pres'n. Code	ANALYSES
✓	02	01			Biochemical Oxygen D.
✓	04	05			Chemical Oxygen D.
	04	01			Carbon: Organic
	04	01			Carbon: Inorganic
	04	01			Carbon: Total
	02	24			Cyanide: Strong Acid Diss.
	02	24			Cyanide: Weak Acid Diss.
	06	28			Mercury: Total
	07	20			Oil & Grease
	22	04			Phenols
	06	02			Radium
	03	08			Sulphide: Total
					Thiocyanate

MEDIA COUNT: 4

OTHER AND SPECIAL ANALYSES

Medium Code	Pres'n. Code	Parameter, Sparcode, Group or Package	Low

SAMPLER COPY — SEE DIRECTIONS ON BACK OF FORM — PLEASE PRINT

WG 3000031

13155 Delf Place
Richmond, B.C.
V6V 2A2

Zenon Environmental Inc. (Y.C. Laboratory)

WATER AND GENERAL CHEMISTRY REQUISITION

REGULAR ☑ RUSH ☐ EMERGENCY ☐

CLIENT STUDY: CA 17 — CLIENT NAME: VANC. ISL. REG. WASTE

AUDIT SAMPLE? YES ☐ — SAMPLING AGENCY: 01

EMPLOYEE No.: 461288 — SAMPLER OR SUBMITTER NAME: D. MCLAREN — PHONE NUMBER: 7583951

ATTENTION OF — NAME

ADJ. — SAMPLE ADJECTIVE

STATE: FW — SAMPLE STATE: FRESHWATER

DESC.: GE — SAMPLE DESCRIPTOR: GENERAL

ADDRESS CODE: 69 OR — BRANCH / ADDRESS / ADDRESS / CITY / PROVINCE / POSTAL CODE

E - MAIL ☐

SITE IDENTIFIER: E207978 — SITE NAME or SAMPLING SOURCE: WELL #2 TILBURY LANDFILL - SALTSPRING

DATE / TIME FROM	DATE / TIME TO	DEPTH (meters) UPPER	DEPTH (meters) LOWER	TIDE CODE	SEAM COMMENTS
90/09/09 0955					

Y Y M M D D H H M M Y Y M M D D H H M M

INSTRUCTIONS TO LAB:

GENERAL

Medium: 01 — Pres'n.: 01

	Acidity: pH 4.5
	Acidity: pH 8.3
	Alkalinity: Phen.
	Alkalinity: Total: pH 4.5
✓	Chloride
	Colour: TAC
	Colour: True
	Colour: S.W.
	Fluoride
✓	Nitrogen: Ammonia
	Nit.: Nitrate & Nitrite
✓	Nitrogen: Nitrate
✓	Nitrogen: Nitrite
	Nitrogen: Organic
	Nitrogen: Tot. Kjeldahl
	Nitrogen: Total
✓	pH

	Phos. Diss. o-phosphate
	Phosphorus: Tot. Diss.
✓	Phosphorus: Total
	Potassium
	Residue: Filterable
	Residue: Nonfilterable
	Residue: Nonfilt., Fixed
	Residue: Total
	Residue: Total, Fixed
	Silica: Reactive
	Sodium
✓	Specific Conductance
✓	Sulfate
	Turbidity
	Alk. Titration Curve

ORGANICS

Medium	Pres'n.	
		Petroleum Distillates
		Mining Reagents
		Polychlor. Biphenyls
		Penta/Tetra Cl-phenols
		Resin Acids
		Trihalomethanes
		Organochlorine P.-scan
		Organophosphorus P.-scan
		Phenoxy Acid Herb.-scan
		Solvent Sol. Herb.-scan
		Glyphosate / AMPA
		Diagnostic Pest. - scan

METALS

TOTAL — Medium: 05 — Pres'n.: 02 — OR

DISSOLVED — Medium: 05 — Pres'n.: 13 — OR

High	Low		High	Low
		Aluminum		
		Antimony		
		Arsenic		
		Barium		
		Boron		
	✓	Cadmium		
		Calcium		
	✓	Chromium		
		Cobalt		
		Copper		
		Iron		
	✓	Lead		
		Magnesium		
		Manganese		
		Molybdenum		
		Nickel		
		Silver		
		Uranium		
		Vanadium		
	✓	Zinc		
		Hardness		
✓		Metal Pkg.		

SPECIFIC

Medium Code	Pres'n. Code	Medium Code	Pres'n. Code	ANALYSES
✓ 02	01			Biochemical Oxygen D.
✓ 04	05			Chemical Oxygen D.
04	01			Carbon: Organic
04	01			Carbon: Inorganic
04	01			Carbon: Total
02	24			Cyanide: Strong Acid Diss.
02	24			Cyanide: Weak Acid Diss.
06	28			Mercury: Total
07	20			Oil & Grease
22	04			Phenols
06	02			Radium
03	08			Sulphide: Total
				Thiocyanate

MEDIA COUNT: 4.

OTHER AND SPECIAL ANALYSES

Medium Code	Pres'n. Code	Parameter, Sparcode, Group or Package	Low

SAMPLER COPY — SEE DIRECTIONS ON BACK OF FORM — PLEASE PRINT

WG 3000030

13155 Delf Place
Richmond, B.C.
V6V 2A2

Zenon Environmental Inc. (E.C. Laboratory)

WATER AND GENERAL CHEMISTRY REQUISITION

REGULAR ☑ RUSH ☐ EMERGENCY ☐

CLIENT STUDY: CA17 — CLIENT NAME: VANC. ISL. REG. WASTE

AUDIT SAMPLE? YES ☐ — SAMPLING AGENCY ☐

EMPLOYEE No.: 46288 — SAMPLER OR SUBMITTER NAME: D. McLaren — PHONE NUMBER: 7583951

ATTENTION OF

ADJ. — SAMPLE ADJECTIVE

STATE: FW — SAMPLE STATE: FRESHWATER

DESC: GE — SAMPLE DESCRIPTOR: GENERAL

ADDRESS CODE: 69 OR

E - MAIL ☐

NAME
BRANCH
ADDRESS
ADDRESS
CITY — PROVINCE — POSTAL CODE

SITE IDENTIFIER: E207979 — SITE NAME or SAMPLING SOURCE: WELL #3, TWA LANDFILL - SALTSPRING.

DATE / TIME FROM (Y Y M M D D H H M M)	DATE / TIME TO (Y Y M M D D H H M M)	DEPTH (meters) UPPER	DEPTH (meters) LOWER	TIDE CODE	SEAM COMMENTS
900109 1030					

INSTRUCTIONS TO LAB.

GENERAL

Medium Pres'n.: 0 1 | 0 1

☐	Acidity: pH 4.5
☐	Acidity: pH 8.3
☐	Alkalinity: Phen.
☐	Alkalinity: Total: pH 4.5
☑	Chloride
☐	Colour: TAC
☐	Colour: True
☐	Colour: S.W.
☐	Fluoride
☑	Nitrogen: Ammonia
☐	Nit.: Nitrate & Nitrite
☑	Nitrogen: Nitrate
☐	Nitrogen: Nitrite
☐	Nitrogen: Organic
☐	Nitrogen: Tot. Kjeldahl
☐	Nitrogen: Total
☑	pH

☐	Phos. Diss. o-phosphate
☐	Phosphorus: Tot. Diss.
☑	Phosphorus: Total
☐	Potassium
☐	Residue: Filterable
☐	Residue: Nonfilterable
☐	Residue: Nonfilt., Fixed
☐	Residue: Total
☐	Residue: Total, Fixed
☐	Silica: Reactive
☑	Sodium
☑	Specific Conductance
☑	Sulfate
☐	Turbidity
☐	Alk. Titration Curve

ORGANICS

Medium	Pres'n.	
		Petroleum Distillates
		Mining Reagents
		Polychlor. Biphenyls
		Penta/Tetra Cl-phenols
		Resin Acids
		Trihalomethanes
		Organochlorine P.-scan
		Organophosphorus P.-scan
		Phenoxy Acid Herb.-scan
		Solvent Sol. Herb.-scan
		Glyphosate / AMPA
		Diagnostic Pest. - scan

METALS

TOTAL — Medium: Pres'n. OR: 0 5 | 0 2

DISSOLVED — Medium: Pres'n. OR: 0 5 | 1 3

High	Low		High	Low
	■	Aluminum		
		Antimony		
		Arsenic		
	■	Barium		■
■		Boron		
	☑	Cadmium		
	■	Calcium		■
	☑	Chromium		
		Cobalt		
		Copper		
	■	Iron		
	☑	Lead		
	■	Magnesium		■
		Manganese		
		Molybdenum		
		Nickel		
		Silver		
	■	Uranium		■
		Vanadium		
	☑	Zinc		
	■	Hardness		■
☑	■	Metal Pkg.		■

SPECIFIC

Medium Code	Pres'n Code	Medium Code	Pres'n. Code	ANALYSES
☑ 0 2	0 1			Biochemical Oxygen D.
☑ 0 4	0 5			Chemical Oxygen D.
0 4	0 1			Carbon: Organic
0 4	0 1			Carbon: Inorganic
0 4	0 1			Carbon: Total
0 2	2 4			Cyanide: Strong Acid Diss.
0 2	2 4			Cyanide: Weak Acid Diss.
0 6	2 8			Mercury: Total
0 7	2 0			Oil & Grease
2 2	0 4			Phenols
0 6	0 2			Radium
0 3	0 8			Sulphide: Total
				Thiocyanate

MEDIA COUNT: 4.

OTHER AND SPECIAL ANALYSES

Medium Code	Pres'n. Code	Parameter, Sparcode, Group or Package	Low

SAMPLER COPY — SEE DIRECTIONS ON BACK OF FORM — PLEASE PRINT

WG 3000029

13155 Delf Place
Richmond, B.C.
V6V 2A2

Zenon Environmental Inc. (Lab. Laboratory)

WATER AND GENERAL CHEMISTRY REQUISITION

REGULAR ☑ RUSH ☐ EMERGENCY ☐

CLIENT STUDY: CA 17 — CLIENT NAME: VANC. ISL. REG. WASTE

AUDIT SAMPLE? YES ☐ — SAMPLING AGENCY: 01

EMPLOYEE No.: 46288 — SAMPLER OR SUBMITTER NAME: D. McLaren — PHONE NUMBER: 7583951

ATTENTION OF — NAME:

ADJ — SAMPLE ADJECTIVE:

ADDRESS CODE: 69 — OR — BRANCH:

STATE: FW — SAMPLE STATE: FRESHWATER — ADDRESS:

DESC.: GE — SAMPLE DESCRIPTOR: GENERAL — ADDRESS:

E - MAIL ☐ — CITY: — PROVINCE: — POSTAL CODE:

SITE IDENTIFIER: E207980 — SITE NAME or SAMPLING SOURCE: WELL #4 TWA LANDFILL TSALTSPRING

DATE / TIME FROM (Y Y M M D D H H M M)	DATE / TIME TO (Y Y M M D D H H M M)	DEPTH (meters) UPPER	DEPTH (meters) LOWER	TIDE CODE	SEAM COMMENTS
90 01 09 1240					

INSTRUCTIONS TO LAB.

GENERAL

Medium Pres'n.: 01 01

ORGANICS

Medium Pres'n.

			Petroleum Distillates
			Mining Reagents
			Polycblor. Biphenyls
			Penta/Tetra Cl-phenols
			Resin Acids
			Trihalomethanes
			Organochlorine P.-scan
			Organophosphorus P.-scan
			Phenoxy Acid Herb.-scan
			Solvent Sol. Herb.-scan
			Glyphosate / AMPA
			Diagnostic Pest. - scan

METALS

TOTAL — Medium Pres'n. OR: 05 02

DISSOLVED — Medium Pres'n. OR: 05 13

High	Low		High	Low
	■	Aluminum		■
		Antimony		
		Arsenic		
	■	Barium		■
■		Boron		
	✓	Cadmium		
	■	Calcium		■
	✓	Chromium		
		Cobalt		
		Copper		
	■	Iron		
	✓	Lead		
	■	Magnesium		■
		Manganese		
		Molybdenum		
		Nickel		
		Silver		
	■	Uranium		■
		Vanadium		
	✓	Zinc		
	✓	Hardness		■
✓		Metal Pkg.		

			Acidity: pH 4.5
			Acidity: pH 8.3
			Alkalinity: Phen.
			Alkalinity: Total: pH 4.5
✓			Chloride
			Colour: TAC
			Colour: True
			Colour: S.W.
			Fluoride
✓			Nitrogen: Ammonia
			Nit.: Nitrate & Nitrite
✓			Nitrogen: Nitrate
✓			Nitrogen: Nitrite
			Nitrogen: Organic
			Nitrogen: Tot. Kjeldahl
			Nitrogen: Total
✓			pH

			Phos. Diss. o-phosphate
			Phosphorus: Tot. Diss.
✓			Phosphorus: Total
			Potassium
			Residue: Filterable
			Residue: Nonfilterable
			Residue: Nonfilt., Fixed
			Residue: Total
			Residue: Total, Fixed
			Silica: Reactive
			Sodium
✓			Specific Conductance
✓			Sulfate
			Turbidity
			Alk. Titration Curve

SPECIFIC

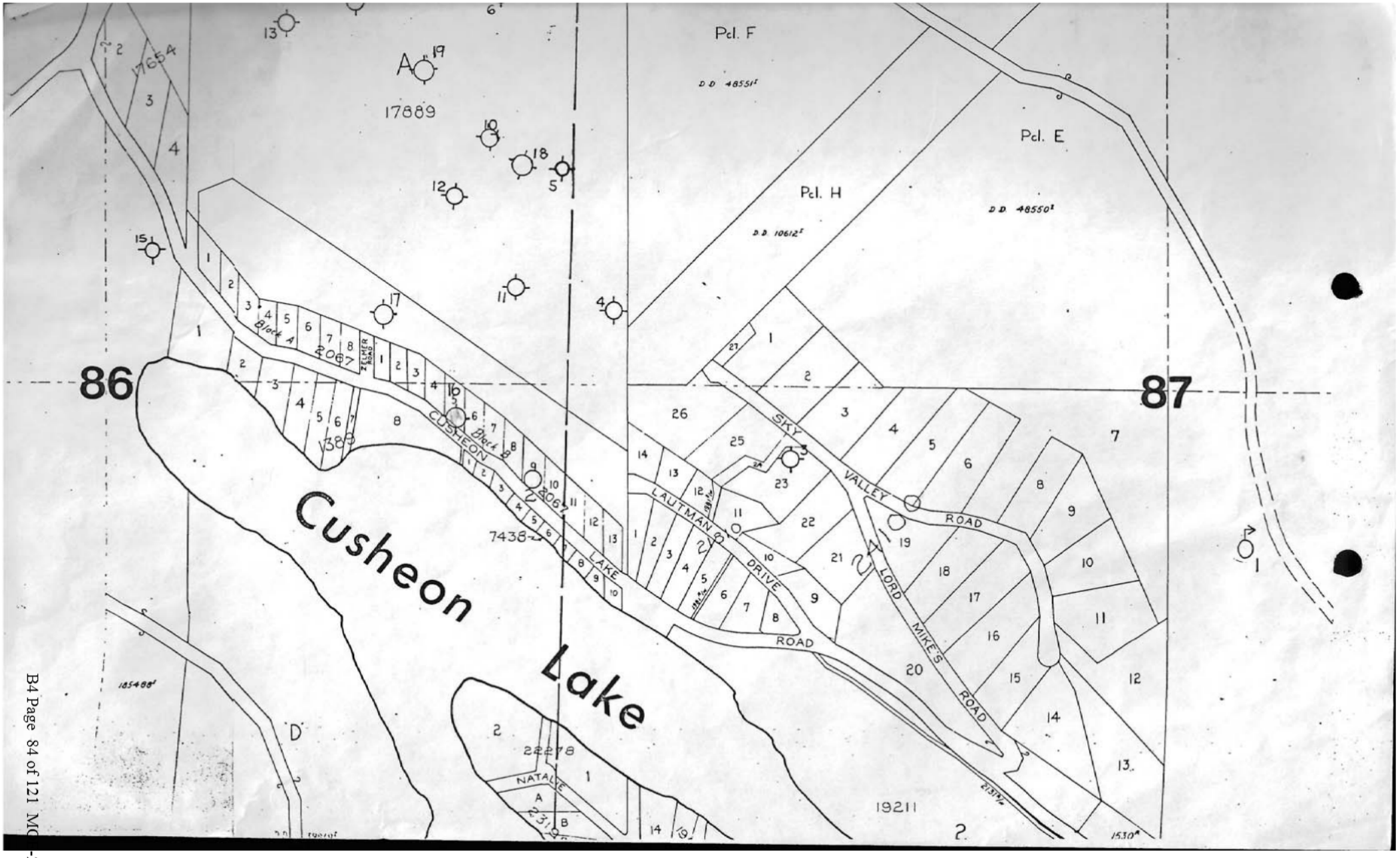
Medium Code	Pres'n. Code	Medium Code	Pres'n. Code	ANALYSES
✓ 02	01			Biochemical Oxygen D.
✓ 04	05			Chemical Oxygen D.
04	01			Carbon: Organic
04	01			Carbon: Inorganic
04	01			Carbon: Total
02	24			Cyanide: Strong Acid Diss.
02	24			Cyanide: Weak Acid Diss.
06	28			Mercury: Total
07	20			Oil & Grease
22	04			Phenols
06	02			Radium
03	08			Sulphide: Total
				Thiocyanate

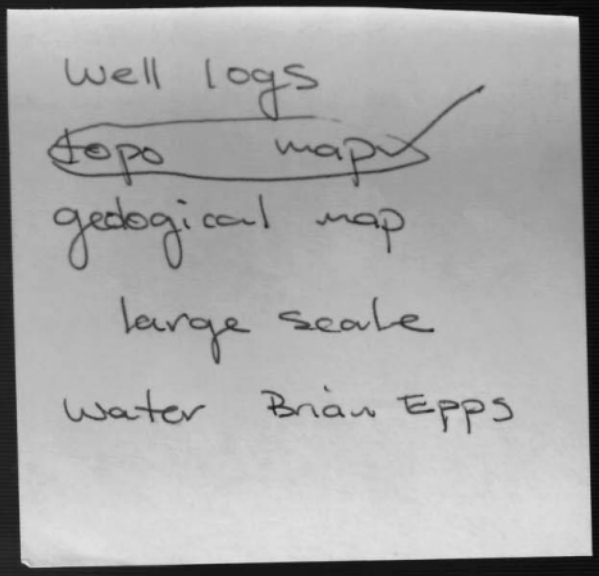
MEDIA COUNT: 4

OTHER AND SPECIAL ANALYSES

Medium Code	Pres'n. Code	Parameter, Sparcode, Group or Package	Low

SAMPLER COPY — SEE DIRECTIONS ON BACK OF FORM — PLEASE PRINT


Cusheon Lake
86
87
Pcl. F
Pcl. E
Pcl. H
D.D. 48551I
D.D. 48550I
D.D. 10612I
17889
17654
Y383
Block A
Block B
2067
CUSHEON
LAKE
LAUTMAN
DRIVE
SKY
VALLEY
ROAD
LORD MIKE'S
ROAD
NATALIE
22278
19211
7438
185488
2131
1530


Well logs
topo maps
gedogical map
large scale
water Brian Epps

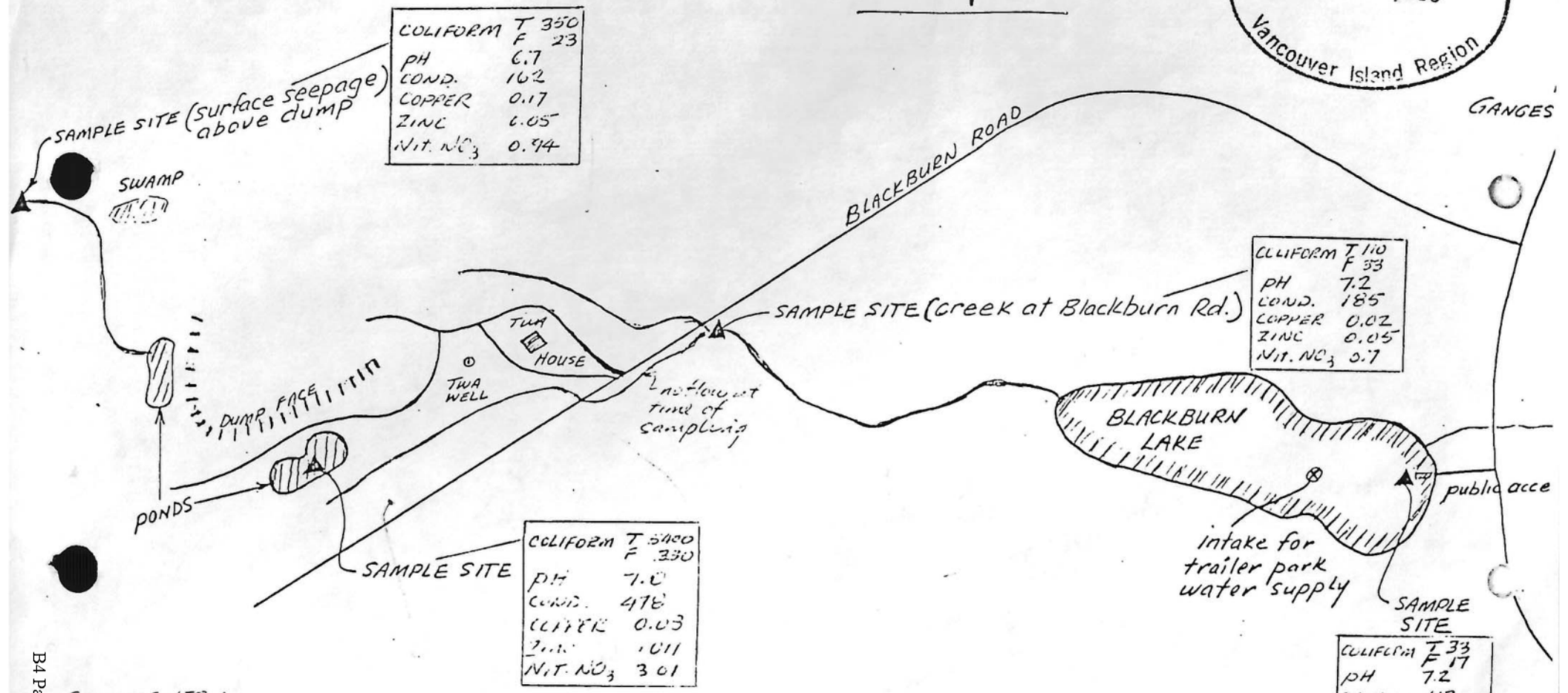
NANAIMO FR 1639

file

Waste Management Branch
RECEIVED
MAR 9 - 1983
Vancouver Island Region

~~507~~

ICHA to reply to SSI Ratepayers Association, and notify Les Allen, Public Health re Lake sample.



COMMENTS

The TWA well could not be sampled as it is not used at this time of year. They rely on another shallow well for their water in winter. At the time of sampling there was no surface flow between the lower dump pond and the ditch beside Blackburn Rd. There may be merit in investigating the possibility of diverting surface flow around the north side of the dump if contaminated surface water is occurring

TWA/CRD LANDFILL - SAMPLING LOCATIONS

SAMPLING DATE: DEC 8/82

B4 Page 86 of 121 MOE-2018-87417

SSI

5 sample sites

1. SS Centre supply well (Domestic)
2. " " (irrigation) in zone of
3. Background supply well not thought to be influence
4. leachate
5. lake itself

Analysis

metals Fe, Zn, Ni, Pb, Cd, Cr, Hg
organics phenol, Tannin-lignin, PCB, PCP
~~PAHs~~
COD
TKN
$NH_4^+ - NH_3$
$NO_3 - NO_2$
TOC

Hartland Rd landfill sampling conducted by CRD? US?

Start with topo & geo maps

landfill → leachate

well logs

Water licence for s.22

Blackburn
Cosheon

92B/14

B. C. LABORATORY SERVICES

Report for form 00413084

Vancouver Island - Waste Program ATTN: MCLAREN D A

Site: NOSITE SALTSPRING CENTER WELL

Submitted by (46288) MCLAREN D A

Address (69) Waste Management Branch
Vancouver Island Region
2569 Kenworth Road
Nanaimo, BC V9T 4P7

MINISTRY OF ENVIRONMENT
RECEIVED
MAY 7 1989
VANCOUVER ISLAND REGION

Phone No. -

Audit Sample ( )
Client study reference code (12)
Sampling agency code (01)

Site (NOSITE) SALTSPRING CENTER WELL

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 3-FEB-1989 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	152.40
Special analysis:	$	0.00
Total	$	152.40

B. C. LABORATORY SERVICES
Report for form 00413084

Vancouver Island - Waste Program ATTN: MCLAREN D A Sample 88015918

Site: NOSITE SALTSPRING CENTER WELL

From :89/01/31:1100 To :89/01/31:1100
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	7.7	pH units	Automated pH Meter (00041220/35/01)
Specific Conductance	327	uS/cm	Cond. Meter Siebold (00111160/35/01)
Alkalinity Total 4.5	112 ✓	mg/L	Automated Electrometer (01021210/35/01)
Hardness Total	115 ✓	mg/L	Calculated Result (0107CALC/--/--)
Chemical Oxygen Dem.	< 10	mg/L	K2Cr2O7 Dig:Titr. (01160500/04/05)
Calcium	40.2	mg/L	HNO3 Dig: ICP Analysis (Ca-T0040/05/02)
Cadmium	< 0.0005 ✓ ✓	mg/L	HNO3 Dig: HGA Analysis (Cd-T0060/05/02)
Cobalt	< 0.1	mg/L	HNO3 Dig: ICP Analysis (Co-T0040/05/02)
Chromium	< 0.01 ✓	mg/L	HNO3 Dig: ICP Analysis (Cr-T0040/05/02)
Copper	< 0.01 ✓ ✓	mg/L 1.0	HNO3 Dig: ICP Analysis (Cu-T0040/05/02)
Iron	0.03 ✓	mg/L .05	HNO3 Dig: ICP Analysis (Fe-T0040/05/02)
Magnesium	3.61 ?	mg/L	HNO3 Dig: ICP Analysis (Mg-T0040/05/02)
Manganese	fails 0.05 0.07 X X 0.05	mg/L 0.05	HNO3 Dig: ICP Analysis (Mn-T0040/05/02)
Molybdenum	< 0.01	mg/L	HNO3 Dig: ICP Analysis (Mo-T0040/05/02)

Site: NOSITE SALTSPRING CENTER WELL

From :89/01/31:1100 To :89/01/31:1100
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
Nickel	< 0.05	mg/L	HNO3 Dig: ICP Analysis (Ni-T0040/05/02)
Lead	< 0.001 ✓✓	mg/L	HNO3 Dig: HGA Analysis (Pb-T0060/05/02)
Vanadium	< 0.01	mg/L	HNO3 Dig: ICP Analysis (V--T0040/05/02)
Zinc	< 0.005 ✓✓	mg/L <5	HNO3 Dig: HGA Analysis (Zn-T0060/05/02)
Sodium Dissolved	< 0.5 ✓✓	mg/L	Auto. Flame Emmission (Na-D1331/35/01)
Chloride Dissolved	16.4 ✓✓	mg/L	Auto. mercuric thiocyan. (11041330/35/01)

< 250

Meets Canadian Drinking Water Quality

~~FOF~~

file

August 28, 1986

Our File: PR1839

s.22

Please find enclosed Xerox copies of data from samples taken in 1982, 1984 and 1986. Low level analysis for lead was made in Blackburn Lake in 1984, and at the pond in the landfill in 1982. Both samples had levels which are acceptable for drinking water. A low level lead analysis will be included in the next samples taken.

If you have any questions about the analyses, please let me know. My telephone number is 387-1133.

Yours truly,

K.H. Austin
Waste Management Technician

KHA/ew

x

~~JOF~~
fil

May 23, 1985

Our File: Pr-1839
(Saltspring Is.)

Capital Regional District
PO Drawer 1000
Victoria BC
V8W 2S6

Attention: Mr. R. Warman, P. Eng.

Dear Bob:

Please find enclosed the analytical data for Blackburn Lake and the pond at the Twa landfill. We were unable to find an agency capable of performing analysis for dioxins, as previously discussed.

When the present data for the pond at the landfill is compared with the results from 1982, it is found that the specific conductance, chloride, total nitrogen, iron, magnesium, manganese and aluminium levels are higher, and the COD, phosphorus, calcium, copper, zinc and faecal coliform levels are lower. The pesticides measured were all below detection limits.

Yours truly,

K.H. Austin
Technician
Waste Management

KHA/ew

Encl.

Waste Management Branch
1815 Blanshard Street
Victoria, B.C. V8V 1X5

Telephone: 387-1724

Waste Management Branch
RECEIVED
APR 13 1983
Vancouver Island Region

April 13, 1983

Our Files: PR 1839
PE 4361

Saltspring Island Planning Association,
PO Box 12,
Ganges, B.C. V0S 1E0

Attention: Mr. D.F. Skinner

Dear Mr. Skinner:

I must apologise for the delay in getting this information to you. The original report to us from the Environmental Laboratory got lost in the mail.

Enclosed are summaries of data for the Blackburn Road area, and the Acheson Farm area.

Two items related to the landfill are of significance:-

1. There is a higher level of faecal coliforms in the pond below the landfill than in the surrounding surface waters. This may be caused by birds or animals attracted to the landfill, or by discharge of diapers or other faecal-contaminated matter at the site. The level found is not high (cf. 200 MPN/100 mls for swimming). This faecal contamination may be the source of the coliforms in Blackburn Lake, although the surface water above the landfill has a higher coliform level than the lake, and there was no flow out of the pond towards the creek. The Health Inspector has been informed of the coliform levels, because of the use of the lake for domestic purposes.

2. No pesticides were found in the scan performed; all items tested were below the detectable limits.

...Page 2.

The data from the Acheson farm indicates that domestic wells west of the lagoons are not being affected by the operation.

We shall continue to monitor these sites as staffing allows. If you have any questions, please let us know.

Yours truly,

K.H. Austin,
Vancouver Island Region,
Waste Management Branch.

KHA/ev

Enclosure

TABLE 1.

SITE ① - SURFACE SEEPAGE ABOVE DUMP.
② - WATER POND AT DUMP.
③ CREEK AT BLACKBURN ROAD (E. OF DUMP).
④ BLACKBURN LAKE AT PUBLIC ACCESS.

TWA LANDFILL

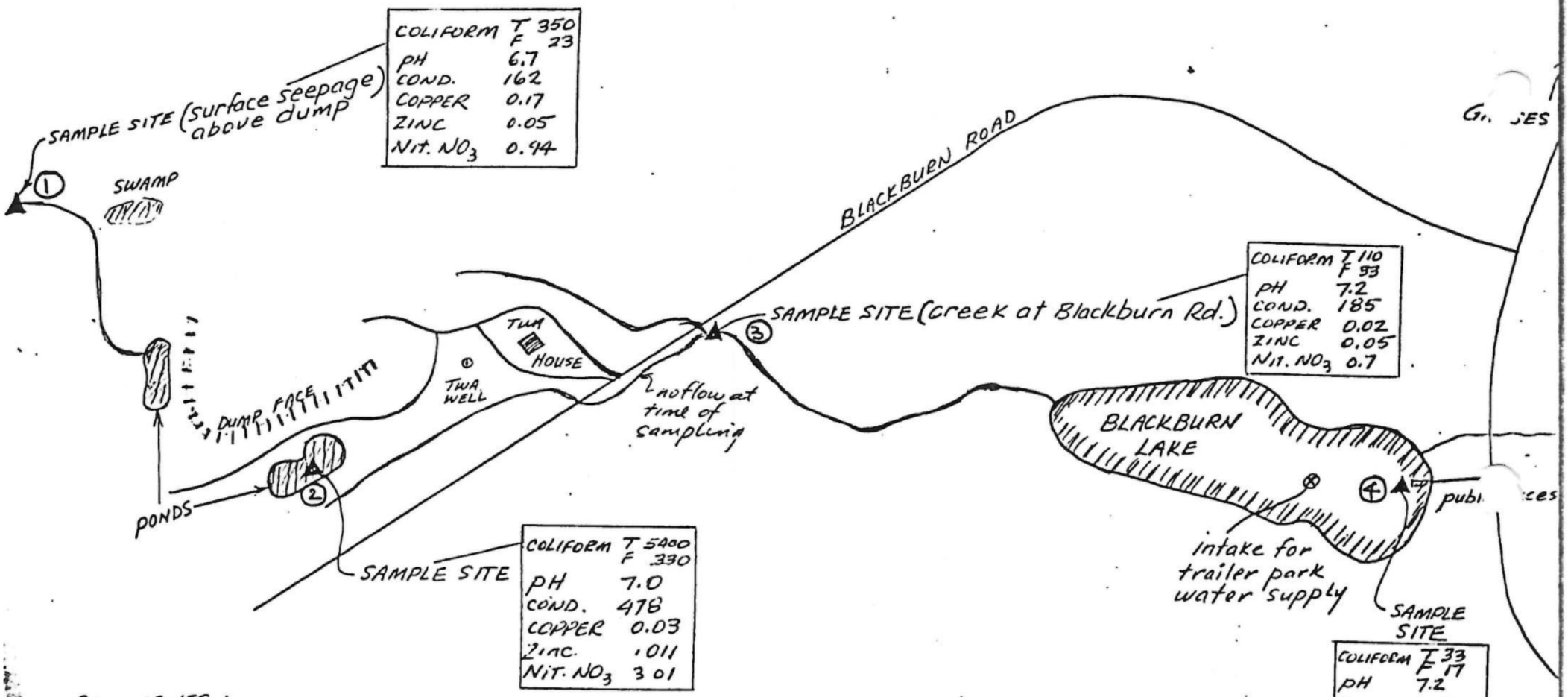
	SITE ①	SITE ②	SITE ③	SITE ④	UNITS
pH	6.7	7.0	7.2	7.2	—
SPECIFIC CONDUCTANCE	162	478	185	113	MICRO MHOS PER CENTIMETER
CHLORIDE	9.8	30.4	12.8	8.1	ppm.
TOTAL NITROGEN	1.16	3.40	1.02	1.60	ppm.
PHENOL	L0.002	L0.002	L0.002	0.002	ppm.
CHEMICAL OXYGEN DEMAND	13	L 10	13	26	ppm.
TOTAL PHOSPHORUS	0.056	0.030	0.028	0.035	ppm.
TOTAL/FAECAL COLIFORMS	350/23	5400/330	110/33	33/17	MPN/100 mls.
ARSENIC	L0.25	L0.25	L0.25	L0.25	ppm.
CADMIUM	L0.01	L0.01	L0.01	L0.01	ppm.
CHROMIUM	L0.01	L0.01	L0.01	L0.01	ppm.
COPPER	0.17	0.03	0.02	0.04	ppm.
IRON	0.56	0.27	0.80	1.56	ppm.
LEAD	L0.1	L0.1	L0.1	L0.1	ppm.
MAGNESIUM	2.56	8.04	2.70	1.80	ppm.
MANGANESE	0.01	0.04	0.08	0.04	ppm.
MOLYBDENUM	L0.01	0.02	L0.01	L0.01	ppm.
NICKEL	L0.05	L0.05	L0.05	L0.05	ppm.
ZINC	0.05	0.011	0.05	0.15	ppm.
ALUMINIUM	0.19	0.32	0.12	0.15	ppm.
COBALT	L0.1	L0.1	L0.1	L0.1	ppm.
VANADIUM	L0.01	L0.01	L0.01	L0.01	ppm.
CALCIUM	43.3	58.4	59.8	98.2	ppm.
ALDRIN	L0.0004	L0.0004	L0.0004	L0.0004	ppm.
TOTAL B.H.C.	L0.0004	L0.0004	L0.0004	L0.0004	ppm.
CHLORDANE	L0.005	L0.005	L0.005	L0.005	ppm.
DIELDRIN	L0.0001	L0.0001	L0.0001	L0.0001	ppm.
HEPTACHLOR	L0.0001	L0.0001	L0.0001	L0.0001	ppm.
LINDANE	L0.0001	L0.0001	L0.0001	L0.0001	ppm.
METHOXYCHLOR	L0.0008	L0.0008	L0.0008	L0.0008	ppm.

L = LESS THAN.

FAECAL COLIFORM LEVELS ACHESON FARM AREA.

DATE	EAST	SOUTH	NORTH	BLAGBOURNE	HUME
30.6.81	–	13	–	–	–
28.4.82	–	–	–	L2	L2
6.5.82	–	–	–	L2	L2
1.6.82	–	–	–	L2	L2
20.7.82	–	L2	–	–	–
11.1.83	L20	L20	790	L2	2
1.2.83	2	540	130	L2	L2
23.2.83	–	–	–	L2	–

NOTE: THE EAST, NORTH & SOUTH WELLS ARE LOCATED 10-15 FT. FROM THE LAGOONS. WE SUSPECT ANIMAL CONTAMINATION ON 11/1/83 & 1/2/83.



COMMENTS:

The TWA well could not be sampled as it is not used at this time of year. They rely on another shallow well for their water in winter. At the time of sampling there was no surface flow between the lower dump pond

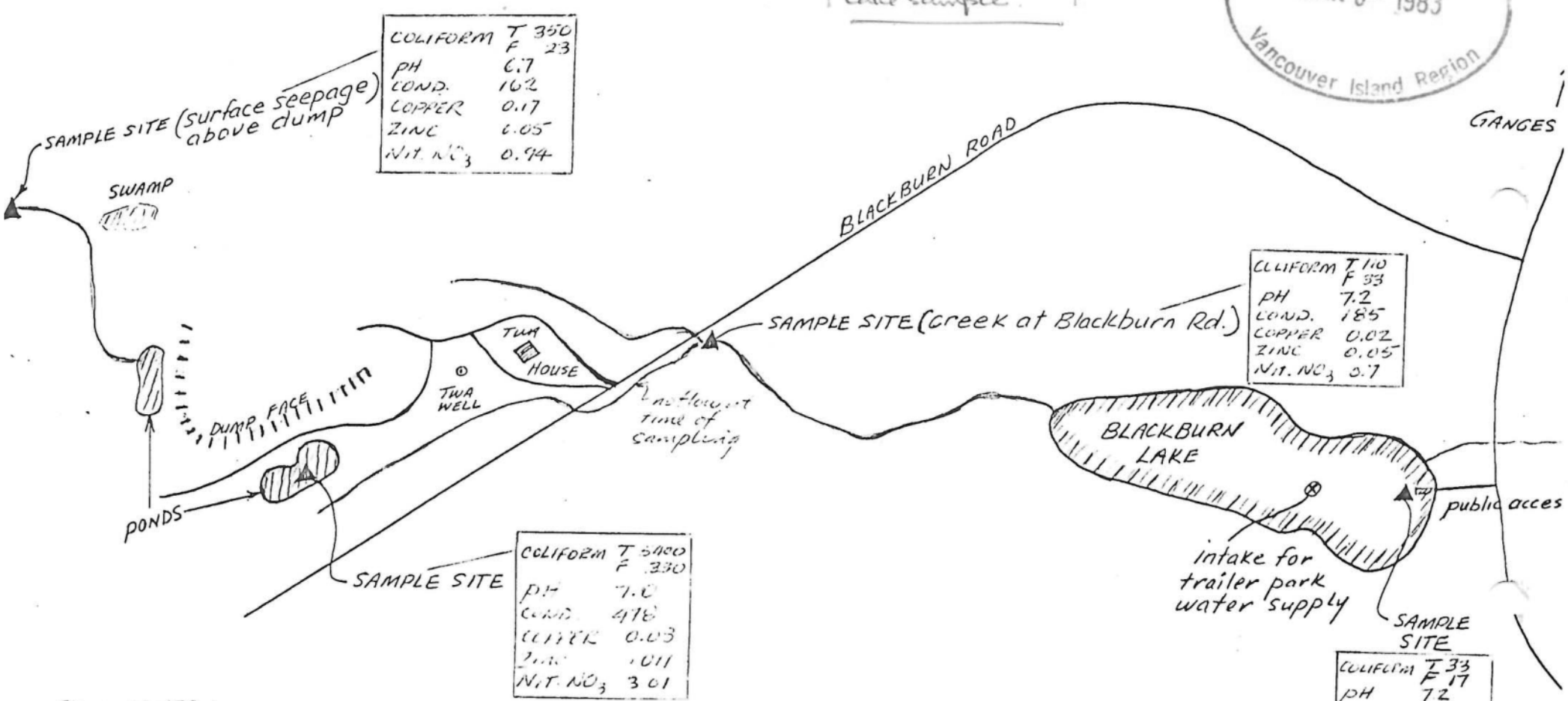
TWA / CRD LANDFILL - SAMPLING LOCATIONS

~~JOF~~ NANAIMO PR 1839

file

ICHA to reply to SSI Ratepayers Association, and notify Les Reaich, Public Health re Lake sample.

Waste Management Branch
RECEIVED
MAR 9 - 1983
Vancouver Island Region



COMMENTS:

The TWA well could not be sampled as it is not used at this time of year. They rely on another shallow well for their water in winter. At the time of sampling there was no surface flow between the lower dump pond and the ditch beside Blackburn Rd. There may be merit in investigating the possibility of diverting surface flow around the North side of the dump if contamination of surface water is occurring

TWA/CRD LANDFILL - SAMPLING LOCATIONS

SAMPLING DATE: DEC 8/82

WATER QUALITY REPORT FOR SAMPLE 216893W

TO: VANCOUVER IS. REG.-WMB
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X5
ATTENTION OF: D MCLAREN

Waste Management Branch RECEIVED MAR 9 - 1983 Vancouver Island Region

FOR SITE: SURFACE SEEPAGE ABOVE SALTSPRING DUMP

SAMPLING DATE(S): DEC 8/82 1100 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: VANCOUVER ISLAND REGION
CHARGE TO: WASTE (VANCOUVER ISLAND)
DATE RECEIVED BY LABORATORY: DEC 09/82

0040101	PH	6.7 REL UNIT	0110101	SPECIFIC CONDUC	162. UMHO/CM
1041702	CHLORIDE	9.8 MG/L	1081704	NITROGN:AMMONIA	0.005 MG/L
1091703	NITROGN:NO2 NO3	0.94 MG/L	1100001	NITROGEN:NO3	0.94* MG/L
1111701	NITROGEN:NO2	L 0.005* MG/L	1130101	NITROGN:KJELDAH	0.22 MG/L
1140001	NITROGEN:TOTAL	1.16* MG/L	1160501	OXYGEN:CHEM.DMD	13. MG/L
1170401	PHENOL	L 0.002 MG/L	1190103	PHOSPHORUS :TOT	0.056 MG/L

FOLLOWING ARE PACKAGE TESTS:

2510214	ARSENIC TOTAL	L 0.25 MG/L	2530214	CADMIUM TOTAL	L 0.01 MG/L
2540214	CALCIUM TOTAL	43.3 MG/L	2550214	CHROMIUM TOTAL	L 0.01 MG/L
2560214	COPPER TOTAL	0.17 MG/L	2570214	IRON TOTAL	0.56 MG/L
2580214	LEAD TOTAL	L 0.1 MG/L	2590214	MAGNESIUM TOTAL	2.56 MG/L
2600214	MANGANESE TOTAL	0.01 MG/L	2620214	MOLYBDENUM TOTAL	L 0.01 MG/L
2630214	NICKEL TOTAL	L 0.05 MG/L	2660214	ZINC TOTAL	0.05 MG/L

SAMPLE NO. 216893W CONTINUED ON NEXT PAGE.

JANUARY 5, 1983 ENVIRONMENTAL LABORATORY PAGE 2
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 216893W

2670214	ALUMINUM TOTAL	0.19 MG/L		2680214	COBALT TOTAL	L	0.1 MG/L
2720214	VANADIUM TOTAL	L	0.01 MG/L				

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 158.00

REMARKS:

FOR ENVIRONMENTAL LABORATORY

Province of British Columbia
Ministry of Health
DIVISION OF LABORATORIES

REQUISITION AND REPORT FORM 1805(L5) (Rev. 4-76)
WATER BACTERIOLOGY

LABORATORY USE ONLY
(1-7) 06654 DEC 982
8 III

SENT BY: VANCOUVER ISLAND REGION
WASTE MANAGEMENT BRANCH

DATE COLLECTED: Dec 8/82

ADDRESS: SUB OFFICE
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X4

Branch

DATE (10-15) REPORTED: YEAR/MONTH DAY 82 12 13

SOURCE OF SAMPLE: Surface seepage above Saltspring dump

SEE REVERSE SIDE FOR INSTRUCTIONS, INTERPRETATION AND NOTES

VANCOUVER ISLAND REGION
WASTE MANAGEMENT BRANCH
SUB OFFICE
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X4

PRINT OR TYPE IN BOX FULL POSTAL ADDRESS OF HEALTH UNIT OR OF PERSONS AUTHORIZED TO RECEIVE REPORT.

COMPLETE ONLY IF RESULTS ARE TO BE ENTERED INTO THE COMPUTER SYSTEM

SITE NUMBER 16 **
Sample Type 25
Sampling Agency
TIME OF SAMPLING 30 Year Month Day Hour Min. 8 2 12 08 11 00
Sampling Depth 36
Sample Locn. 43
Chlorine Residual 49
1 TOTAL 2 FREE (check one)
50 pH (units)
TEST CODE (OTHER)

THIS IS YOUR REPORT - LABORATORY USE ONLY FD

CHECK DILUTIONS FOR COLIFORM TEST PER ml / TESTS REQUIRED (✓)	0.00001	0.0001	0.001	0.01	0.1	1.0	10.0
TOTAL COLIFORM ☑			TOTAL	1/5	5/5	5/5	
FAECAL COLIFORM ☑			FAECAL	0/5	0/5	5/5	
OTHER (SPECIFY)							

62 1 CONFIRMED TEST 2 COMPLETED TEST
MPN PER 100 ml 63 350
MPN PER 100 ml 72 23
8H2 10

COPY TO: COMPUTER AND CONSULTING SERVICES

STANDARD PLATE COUNT PER ml 20C 35C
AT 20C 19
AT 35C 24

Province of British Columbia
Ministry of Health
DIVISION OF LABORATORIES

REQUISITION AND REPORT FORM 1805(L5) (Rev. 4-76)

WATER BACTERIOLOGY

LABORATORY USE ONLY

06656 DEC 982

8 III

SENT BY: VANCOUVER ISLAND REGION
WASTE MANAGEMENT BRANCH

DATE COLLECTED: Dec 8

ADDRESS: SUB OFFICE
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X4

DATE (10-15) REPORTED: YEAR/MONTH DAY 82 12 13

SOURCE OF SAMPLE: pond below PR 1839

Dmch

Waste Management Branch RECEIVED MAR 9 - 1983 Vancouver Island Region

SEE REVERSE SIDE FOR INSTRUCTIONS, INTERPRETATION AND NOTES

VANCOUVER ISLAND REGION
WASTE MANAGEMENT BRANCH
SUB OFFICE
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X4

PRINT OR TYPE IN BOX FULL POSTAL ADDRESS OF HEALTH UNIT OR OF PERSONS AUTHORIZED TO RECEIVE REPORT.

COMPLETE ONLY IF RESULTS ARE TO BE ENTERED INTO THE COMPUTER SYSTEM

SITE NUMBER 16 KK — Sample Type 25 — Sampling Agency

TIME OF SAMPLING: Year 29 82 | Month 12 | Day 08 | Hour 11 | Min 20 — Sampling Depth 39

Sample Locn. 43 — Chlorine Residual — 49 1 ☐ TOTAL 2 ☐ FREE (check one)

50 pH (units) — TEST CODE (OTHER)

THIS IS YOUR REPORT - LABORATORY USE ONLY FD

CHECK 3 DILUTIONS FOR COLIFORM TEST PER ml TESTS REQUIRED (✓)	☐ 0.00001	☐ 0.0001	☑ 0.001	☑ 0.01	☑ 0.1	☑ 1.0	☐ 10.0
TOTAL COLIFORM ☑		TOTAL	2/5	5/5	5/5		
FAECAL COLIFORM ☑		FAECAL	0/5	1/5	5/5		
OTHER (SPECIFY)							

62 1 ☐ CONFIRMED TEST 2 ☐ COMPLETED TEST

MPN PER 100 ml 63 5400

MPN PER 100 ml 72 330

8 H2 10

STANDARD PLATE COUNT PER ml 20C ☐ 35C ☐

AT 20C 19 — AT 35C 24

COPY TO: ☐ COMPUTER AND CONSULTING SERVICES ☐

This sample tested at 3 dils 1, .1, .01 ml.

JR

ENVIRONMENTAL LABORATORY
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 216895W

TO: VANCOUVER IS. REG.-WMB
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X5
ATTENTION OF: D MCLAREN

FOR SITE: POND BELOW PR 1839

SAMPLING DATE(S): DEC 8/82 1120 HRS
SAMPLE TYPE: DITCH WATER
SAMPLING DEPTH: 0
SAMPLED BY: VANCOUVER ISLAND REGION
CHARGE TO: WASTE (VANCOUVER ISLAND)
DATE RECEIVED BY LABORATORY: DEC 09/82

0040101	PH	7.0 REL UNIT	0110101	SPECIFIC CONDUC	478. UMHO/CM
1041702	CHLORIDE	30.4 MG/L	1081704	NITROGN:AMMONIA	L 0.005* MG/L
1091703	NITROGN:NO2 NO3	3.02 MG/L	1100001	NITROGEN:NO3	3.01 MG/L
1111701	NITROGEN:NO2	0.007 MG/L	1130101	NITROGN:KJELDAH	0.38 MG/L
1140001	NITROGEN:TOTAL	3.4 MG/L	1160501	OXYGEN:CHEM.DMD	L 10. MG/L
1170401	PHENOL	L 0.002 MG/L	1190103	PHOSPHORUS :TOT	0.030 MG/L
2530210	CADMIUM TOTAL	L 0.0005 MG/L	2580210	LEAD TOTAL	0.002 MG/L
2613503	MERCURY TOTAL	L 0.05 UG/L	2660210	ZINC TOTAL	0.011 MG/L

FOLLOWING ARE PACKAGE TESTS:

2510214	ARSENIC TOTAL	L 0.25 MG/L	2530214	CADMIUM TOTAL	L 0.01 MG/L
2540214	CALCIUM TOTAL	58.4 MG/L	2550214	CHROMIUM TOTAL	L 0.01 MG/L
2560214	COPPER TOTAL	0.03 MG/L	2570214	IRON TOTAL	0.27 MG/L
2580214	LEAD TOTAL	L 0.1 MG/L	2590214	MAGNESIUM TOTAL	8.04 MG/L

SAMPLE NO. 216895W CONTINUED ON NEXT PAGE.

WATER QUALITY REPORT FOR SAMPLE 216895W

2600214	MANGANESE TOTAL	0.04 MG/L	2620214	MOLYBDENUM TOTAL	0.02 MG/L
2630214	NICKEL TOTAL	L 0.05 MG/L	2660214	ZINC TOTAL	K MG/L
2670214	ALUMINUM TOTAL	0.32 MG/L	2680214	COBALT TOTAL	L 0.1 MG/L
2720214	VANADIUM TOTAL	L 0.01 MG/L	5260101	ALDRIN	L 0.0004 PPM
5270101	BHC-TOTAL	L 0.0004 PPM	5290101	CHLORDANE TOTAL	L 0.005 PPM
5370101	DIELDRIN	L 0.0001 PPM	5450101	HEPTACHLOR	L 0.0001 PPM
5470101	LINDANE	L 0.0001 PPM	5490101	METHOXYCHLOR	L 0.0008 PPM

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 434.00

REMARKS: Zinc Total = Please see Low level Result.

FOR ENVIRONMENTAL LABORATORY

Dunc

As promised — one report!
Originally mailed Jan 13/83
Sorry if it got lost.

Wayne Beg
Mar 1/83

JANUARY 10, 1983 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 216892W

TO: VANCOUVER IS. REG.-WMB
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X5
ATTENTION OF: D MCLAREN

Waste Management Branch
RECEIVED
MAR 9 - 1983
Vancouver Island Region

FOR SITE: CREEK AT BLACKBURN RD

SAMPLING DATE(S): DEC 8/82 1240 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: VANCOUVER ISLAND REGION
CHARGE TO: WASTE (VANCOUVER ISLAND)
DATE RECEIVED BY LABORATORY: DEC 09/82

0040101	PH	7.2 REL UNIT	0110101	SPECIFIC CONDUC	185. UMHO/CM
1041702	CHLORIDE	12.8 MG/L	1081704	NITROGN:AMMONIA	0.047 MG/L
1091703	NITROGN:NO2 NO3	0.71 MG/L	1100001	NITROGEN:NO3	0.70 MG/L
1111701	NITROGEN:NO2	0.005 MG/L	1130101	NITROGN:KJELDAH	0.32 MG/L
1140001	NITROGEN:TOTAL	1.02 MG/L	1160501	OXYGEN:CHEM.DMD	13. MG/L
1170401	PHENOL	L 0.002 MG/L	1190103	PHOSPHORUS :TOT	0.028 MG/L

FOLLOWING ARE PACKAGE TESTS:

2510214	ARSENIC TOTAL	L 0.25 MG/L	2530214	CADMIUM TOTAL	L 0.01 MG/L
2540214	CALCIUM TOTAL	59.8 MG/L	2550214	CHROMIUM TOTAL	L 0.01 MG/L
2560214	COPPER TOTAL	0.02 MG/L	2570214	IRON TOTAL	0.8 MG/L
2580214	LEAD TOTAL	L 0.1 MG/L	2590214	MAGNESIUM TOTAL	2.7 MG/L
2600214	MANGANESE TOTAL	0.08 MG/L	2620214	MOLYBDENUM TOTAL	L 0.01 MG/L
2630214	NICKEL TOTAL	L 0.05 MG/L	2660214	ZINC TOTAL	0.05 MG/L

SAMPLE NO. 216892W CONTINUED ON NEXT PAGE.

JANUARY 10, 1983 ENVIRONMENTAL LABORATORY PAGE 2
INISTRY OF THE ENVIRONMEN

WATER QUALITY REPORT FOR SAMPLE 216892W

2670214	ALUMINUM TOTAL	0.12 MG/L	2680214	COBALT TOTAL	L 0.1 MG/L
2720214	VANADIUM TOTAL	L 0.01 MG/L			

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 158.00

REMARKS:

FOR ENVIRONMENTAL LABORATORY

Province of British Columbia
Ministry of Health
DIVISION OF LABORATORIES

REQUISITION AND REPORT FORM L5 (Rev. 4-76)
WATER BACTERIOLOGY

LABORATORY USE ONLY
(1-7) 06653 DEC 982
8 HI

SENT BY: VANCOUVER ISLAND REGION
WASTE MANAGEMENT BRANCH

DATE COLLECTED: 1 Dec 8

ADDRESS: SUB OFFICE
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X4

DATE (10-15) REPORTED: YEAR/MONTH/DAY 82 12 13

SOURCE OF SAMPLE: creek @ Blackburn Rd

SEE REVERSE SIDE FOR INSTRUCTIONS, INTERPRETATION AND NOTES

VANCOUVER ISLAND REGION
WASTE MANAGEMENT BRANCH
SUB OFFICE
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X4

PRINT OR TYPE IN BOX FULL POSTAL ADDRESS OF HEALTH UNIT OR OF PERSONS AUTHORIZED TO RECEIVE REPORT.

COMPLETE ONLY IF RESULTS ARE TO BE ENTERED INTO THE COMPUTER SYSTEM

SITE NUMBER 16 KK | Sample Type 25 01 | Sampling Agency 01

TIME OF SAMPLING 29 Year 82 | Month 12 | Day 08 | Hour 12 | Min. 40 | Sampling Depth 39

Sample Locn. 43 | Chlorine Residual | 49 1 TOTAL 2 FREE (check one)

50 pH (units) | TEST CODE (OTHER)

THIS IS YOUR REPORT - LABORATORY USE ONLY

CHECK 3 DILUTIONS FOR COLIFORM TEST PER ml

TESTS REQUIRED (✓)	0.00001	0.0001	0.001	0.01	0.1	1.0	10.0
TOTAL COLIFORM ☑			TOTAL		1/5	3/5	5/5
FAECAL COLIFORM ☑			FAECAL		0/5	1/5	5/5
OTHER (SPECIFY)							

62 1 ☐ CONFIRMED TEST 2 ☐ COMPLETED TEST

MPN PER 100 ml 63 1.1.0

MPN PER 100 ml 72 33

8 H2 10

COPY TO: ☐ COMPUTER AND CONSULTING SERVICES ☐

STANDARD PLATE COUNT PER ml 20C ☐ 35C ☐

AT 20C 19 | AT 35C 24

WATER QUALITY REPORT FOR SAMPLE 216894W

TO: VANCOUVER IS. REG.-WMB
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X5
ATTENTION OF: D MCLAREN

Waste Management Branch
RECEIVED
MAR 9 - 1983
Vancouver Island Region

FOR SITE: BLACKBURN LAKE AT PUBLIC WHARF

SAMPLING DATE(S): DEC 8/82 1300 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: D
SAMPLED BY: VANCOUVER ISLAND REGION
CHARGE TO: WASTE (VANCOUVER ISLAND)
DATE RECEIVED BY LABORATORY: DEC 09/82

0040101	PH	7.2 REL UNIT	0110101	SPECIFIC CONDUC	113. UMHO/CM
1041702	CHLORIDE	8.1 MG/L	1081704	NITROGN:AMMONIA	0.007 MG/L
1091703	NITROGN:NO2 NO3	1.02 MG/L	1100001	NITROGEN:NO3	1.02* MG/L
1111701	NITROGEN:NO2	L 0.005* MG/L	1130101	NITROGN:KJELDAH	0.58 MG/L
1140001	NITROGEN:TOTAL	1.6* MG/L	1160501	OXYGEN:CHEM.DMD	26. MG/L
1170401	PHENOL	0.002 MG/L	1190103	PHOSPHORUS :TOT	0.035 MG/L

FOLLOWING ARE PACKAGE TESTS:

2510214	ARSENIC TOTAL	L 0.25 MG/L	2530214	CADMIUM TOTAL	L 0.01 MG/L
2540214	CALCIUM TOTAL	98.2 MG/L	2550214	CHROMIUM TOTAL	L 0.01 MG/L
2560214	COPPER TOTAL	0.04 MG/L	2570214	IRON TOTAL	1.56 MG/L
2580214	LEAD TOTAL	L 0.1 MG/L	2590214	MAGNESIUM TOTAL	1.8 MG/L
2600214	MANGANESE TOTAL	0.04 MG/L	2620214	MOLYBDENUM TOTAL	L 0.01 MG/L
2630214	NICKEL TOTAL	L 0.05 MG/L	2660214	ZINC TOTAL	0.15 MG/L

SAMPLE NO. 216894W CONTINUED ON NEXT PAGE.

WATER QUALITY REPORT FOR SAMPLE 216894W

2670214	ALUMINUM TOTAL	0.15 MG/L	2680214	COBALT TOTAL	L 0.1 MG/L
2720214	VANADIUM TOTAL	L 0.01 MG/L			

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 158.00

REMARKS:

FOR ENVIRONMENTAL LABORATORY

Province of British Columbia
Ministry of Health
DIVISION OF LABORATORIES

REQUISITION AND REPORT FORM 1805(L5) (Rev. 4-76)
WATER BACTERIOLOGY

LABORATORY USE ONLY
(1-7) 06655 DEC 982
8 HI

SENT BY: VANCOUVER ISLAND REGION
WASTE MANAGEMENT BRANCH

DATE COLLECTED: Dec 8/82

ADDRESS: SUB OFFICE
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X4

DMCH

DATE (10-15) REPORTED: YEAR/MONTH DAY 82 12 13

SOURCE OF SAMPLE: BLACKBURN LAKE AT PUBLIC WHARF

SEE REVERSE SIDE FOR INSTRUCTIONS, INTERPRETATION AND NOTES

VANCOUVER ISLAND REGION
WASTE MANAGEMENT BRANCH
SUB OFFICE
1815 BLANSHARD ST.
VICTORIA, B.C. V8V 1X4

PRINT OR TYPE IN BOX FULL POSTAL ADDRESS OF HEALTH UNIT OR OF PERSONS AUTHORIZED TO RECEIVE REPORT.

COMPLETE ONLY IF RESULTS ARE TO BE ENTERED INTO THE COMPUTER SYSTEM

SITE NUMBER 16 XX
Sample Type 25 01
Sampling Agency 01
TIME OF SAMPLING 29 Year 82 Month 12 Day 08 Hour 13 Min. 00
Sampling Depth 39
Sample Locn. 43
Chlorine Residual
49 1 TOTAL 2 FREE (check one)
50 pH (units)
TEST CODE (OTHER)

THIS IS YOUR REPORT - LABORATORY USE ONLY

CHECK 3 DILUTIONS FOR COLIFORM TEST PER ml

TESTS REQUIRED (✓)	0.00001	0.0001	0.001	0.01	0.1	1.0	10.0
TOTAL COLIFORM ✓			TOTAL		0/5	1/5	5/5
FAECAL COLIFORM ✓			FAECAL		0/5	1/5	4/5
OTHER (SPECIFY)							

62 1 CONFIRMED TEST 2 COMPLETED TEST

MPN PER 100 ml 63 33

MPN PER 100 ml 72 17

8 H2 10

COPY TO: COMPUTER AND CONSULTING SERVICES

STANDARD PLATE COUNT PER ml 20C 35C

AT 20C 19

AT 35C 24

WATER QUALITY REPORT FOR SAMPLE 802886W

POLLUTION CONTROL BRANCH
RECEIVED
FEB 30 1978
CONTROL SECTION

TO: PCB COAST
1106 COOK ST.
VICTORIA,B.C. V8V 3Z9
ATTENTION OF: T MURPHY

AR-1839

FOR SITE: LOWER POND AR-1839

SAMPLING DATE(S): FEB 22/78 1030 HRS
SAMPLE TYPE: LANDFILL GROUNDWATER
SAMPLING DEPTH: 0
SAMPLED BY: PCB - COAST REGION
DATE RECEIVED BY LABORATORY: FEB 24/78

0040101	PH	7.1 REL UNIT	0110101	SPECIFIC CONDUC	313. UMHO/CM
1091703	NITROGN:NO2 NO3	0.14 MG/L	1130101	NITROGN:KJELDAH	0.91 MG/L
1140001	NITROGEN:TOTAL	1.05 MG/L	1150101	OXYGEN:BIOCHEM	L 10. MG/L
1160501	OXYGEN:CHEM.DMN	20. MG/L	1190103	PHOSPHORUS :TOT	0.035 MG/L
1230101	TANNIN&LIGNIN	1.0 MG/L	2570204	IRON TOTAL	0.2 MG/L

REMARKS:

FOR ENVIRONMENTAL LABORATORY

MARCH 10, 1978 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 802888W

TO: PCB COAST
1106 COOK ST.
VICTORIA, B.C. V8V 3Z9
ATTENTION OF: T MURPHY

POLLUTION CONTROL BRANCH
RECEIVED
MAR 16 1978
COAST REGION
AR 1839.

FOR SITE: POND AT RD AR-1839

SAMPLING DATE(S): FEB 22/78 1000 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: PCB - COAST REGION
DATE RECEIVED BY LABORATORY: FEB 24/78

0040101	PH	7.1 REL UNIT	0110101	SPECIFIC CONDUC	55. UMHO/CM
1091703	NITROGN:NO2 NO3	L 0.02 MG/L	1130102	NITROGN:KJELDAH	1. MG/L
1140001	NITROGEN:TOTAL	1. MG/L	1150101	OXYGEN:BIOCHEM	L 10. MG/L
1160501	OXYGEN:CHEM.DMN	36. MG/L	1190103	PHOSPHORUS :TOT	0.226 MG/L
1230101	TANNIN&LIGNIN	3.6 MG/L	2570204	IRON TOTAL	4.4 MG/L

REMARKS:

R. Sylvestre
FOR ENVIRONMENTAL LABORATORY

WATER QUALITY REPORT FOR SAMPLE 802889W

POLLUTION CONTROL BRANCH
RECEIVED
MAR 16 1978
AR 1839
COAST REGION

TO: PCB COAST
1106 COOK ST.
VICTORIA,B.C. V8V 3Z9
ATTENTION OF: T MURPHY

FOR SITE: POND IN DUMP AR-1839

SAMPLING DATE(S): FEB 22/78 1015 HRS
SAMPLE TYPE: LANDFILL GROUNDWATER
SAMPLING DEPTH: 0
SAMPLED BY: PCB - COAST REGION
DATE RECEIVED BY LABORATORY: FEB 24/78

0040101	PH	6.8 REL UNIT	0110101	SPECIFIC CONDUC	122. UMHO/CM
1091703	NITROGN:NO2 NO3	L 0.02 MG/L	1130101	NITROGN:KJELDAH	0.46 MG/L
1140001	NITROGEN:TOTAL	0.46 MG/L	1150102	OXYGEN:BIOCHEM	L 10. MG/L
1160501	OXYGEN:CHEM.DMN	16. MG/L	1190103	PHOSPHORUS :TOT	0.043 MG/L
1230101	TANNIN&LIGNIN	0.4 MG/L	2570204	IRON TOTAL	0.5 MG/L

REMARKS:

R. Sylvestre
FOR ENVIRONMENTAL LABORATORY

Blackburn Landfill PR-1839

Groundwater Sampling Data 1973 - 1995

Sites

G1 Blackburn Road 200m north of landfill
G2 Twa well 50m depth
G3 Salt Spring Centre well 30 m depth
G4 287 Cusheon Lake Road domestic well

Sampling Dates

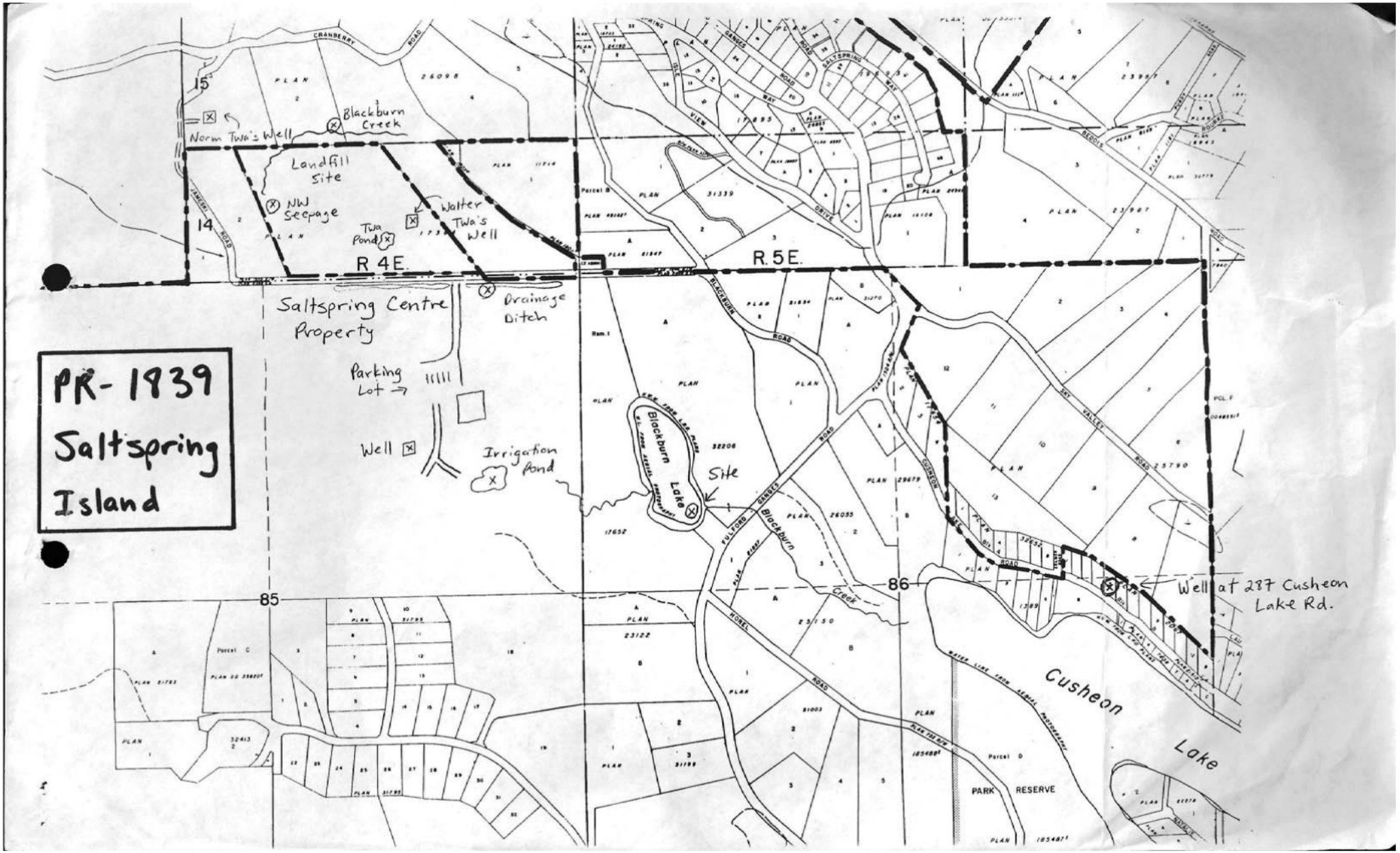
A Jul 26/73
B Dec 8/82
C Jan 31/89
D Aug 31/89
E Jan 09/90
F Feb 19/92
G Nov 10/92
H Feb 20/95
I Oct 17/95

SITE	DATE	Parameter	pH	Specific Conductance	Residue Total	Residue Filterable 1.0u	Alkalinity	Hardness	BOD5	COD	Nitrogen Kjel. Tot	Nitrogen Total	Nitrogen Ammonia Dissolved	NO3 + NO2	NO3 Dissolved	NO2 Dissolved
		Units		uS/cm	mg/L	mg/L	mg/L CaCO3	mg/L CaCO3	mg/L	mg/L	Mg/L N	Mg/L N	Mg/L N	Mg/L N	Mg/L N	Mg/L N
		Criteria for Drinking Water	6.5 - 8.5	700	500 Aesthetics	500 Aesthetics	30 - 250 Food Processing	100 Acceptable <200 Tolerable	no criteria specified	no criteria specified	no criteria specified	no criteria specified	no criteria specified	10	10	1
G1	A		6.5	170												
	D		6.5	150				56.8	<10	48						
	E		0.4	75				24.5	<10	11						
	F		6.6	325				125	<10	11						
G2	A		7	320												
	D		6.6	545				228	<10	<10						
	E		6.5	520				236	<10	<10						
	G		6.5	790				435	<6	58						
	H		7.8	407	214		186	102			<0.04	<0.05	<0.005	<0.02	<0.02	<0.005
G3	B		7.7	327				112		<10						
	C		7.9	360				118								
	D		7.7	370				141	<10	<10						
	E		7.7	311				112	<10	<10						
	F		7.6	363				153	<10	14						
	G		7.5	311				133	<6	<10						
G4	D		7.7	200				22.2	<10	<10						
	E		8.3	437				21.7	<10	<10						
	H		6.8	185	132		41.8	59.3			0.26	0.37	<0.005	0.11	0.11	<0.005

SITE	DATE	Chloride Dissolved	Potassium Dissolved	Sodium Dissolved	Sulphate	Silver	Aluminum	Arsenic	Boron	Barium	Beryllium	Bismuth	Calcium	Cadmium	Cobalt	Chromium	Copper
		mg/L Cl	mg/L K	mg/L Na	mg/L SO4	mg/L Ag	mg/L Al	mg/L As	mg/L B	mg/L Ba	mg/L Be	mg/L Bi	mg/L Ca	mg/L Cd	mg/L Co	mg/L Cr	mg/L Cu
		250	20	200 Aesthetic	500	no criteria specified	0.2	.025 (proposed)	5	1	no criteria specified	no criteria specified	20 - 100 food processing	0.005	no criteria specified	0.05	0.5
G1	A																
	D				11.7		0.17			<0.01			14.5	<0.0005	<0.1	<0.005	0.03
	E				4		<0.02			0.005			7.36	<0.0005	<0.003	<0.005	0.08
	F				24.3		<0.02			0.018			37.2	<0.0005	<0.003	<0.005	0.044
G2	A																
	D				127		<0.10			0.03			68.8	<0.0005	<0.1	<0.005	0.07
	E				133		0.03			0.022			71.6	<0.0005	<0.003	<0.005	0.158
	G				258		<0.06			0.04			133	<0.0001	<0.004	<0.002	0.114
	H	20.8	<0.4	63.8	29.3	<0.03	<0.06	<0.04	0.14	0.046	<0.001	<0.02	35.8	<0.002	<0.004	<0.002	<0.002
G3	B												40.2	<0.0005	<0.1	<0.01	<0.01
	C				17.2								41	0.0005	<0.1	0.02	<0.0001
	D				31.2		<0.1			0.13			49.1	<0.0005	<0.1	<0.005	<0.01
	E				19.6		0.02			0.087			39.6	<0.0005	<0.003	<0.005	0.004
	F				20.5		<0.02			0.114			53.7	<0.0005	<0.003	<0.002	0.006
	G				21.1		<0.06			0.102			47.1	<0.0001	<0.004	<0.002	0.023
G4	D				9.1		4.08			0.04			7.17	<0.0005	<0.1	<0.005	0.01
	E				18.3		1.29			0.029			7.45	<0.0005	<0.003	<0.005	0.01
	H	20.2	<0.4	11.3	15.7	<0.03	<0.06	<0.04	0.09	0.012	<0.001	<0.02	16.1	<0.002	<0.004	<0.002	0.098

SITE	DATE	Iron	Potassium	Magnesium	Manganese	Molybdenum	Sodium	Nickel	Phosphorus	Lead	Sulphur
		mg/L Fe	mg/L K	mg/L Mg	mg/L Mn	mg/L Mo	mg/L Na	mg/L Ni	mg/L P	mg/L Pb	mg/L S
		0.3 Aesthetics	no criteria specified	>700 laxative effects	0.05	0.25	no criteria specified	0.2	0.01	0.05	no criteria specified
G1	A										
	D										
	E										
	F										
G2	A										
	D										
	E										
	G										
	H	0.17	<0.4	3.06	0.038	<0.004	65.2	<0.01	<0.04	<0.03	7.1
G3	B										
	C										
	D										
	E										
	F										
	G										
G4	D										
	E										
	H	0.13	0.7	4.63	0.054	<0.004	10.8	<0.01	<0.04	<0.03	4.6

SITE	DATE	Antimony	Selenium	Silicon	Tin	Strontium	Thallium	Vanadium	Zinc	Zirconium	Fecal Coliform
		mg/L Sb	mg/L Se	mg/L Si	mg/L Sn	mg/L Sr	mg/L Th	mg/L V	mg/L Zn	mg/L Zr	CFU/100mL
		0.006	0.01	no criteria specified	no criteria specified	no criteria specified	0.013	0.1	5	no criteria specified	0: no treatment <10 (90th perc.): disinfection only <100 (90th perc.): partial treatment
G1	A										
	D										
	E										
	F										
G2	A										
	D										
	E										
	G										
	H	<0.02	<0.03	3.8	<0.02	0.868	<0.03	<0.003	0.03	<0.003	<1
G3	B										
	C										
	D										
	E										
	F										
	G										
G4	D										
	E										
	H	<0.02	<0.03	4.4	<0.02	0.098	<0.003	<0.003	0.06	<0.003	3


PR-1939
Saltspring
Island
Norm Twa's Well
Blackburn Creek
Landfill Site
NW Seepage
Twa Pond
Walter Twa's Well
Saltspring Centre Property
Drainage Ditch
Parking Lot
Well
Irrigation Pond
Blackburn Lake
Site
Well at 287 Cusheon Lake Rd.
Cusheon Lake
PARK RESERVE
R 4E.
R.5E.
15
14
85
86
CRANBERRY ROAD
BLACKBURN ROAD
GANGES ROAD
FULFORD GANGES ROAD
SKY VALLEY ROAD
MOREL ROAD
Blackburn Creek

Blackburn Landfill PR-1839
Surface Water Sampling Data 1982 - 1995

S1 Blackburn Creek Upstream of landfill
S2 Surface seepage west of landfill
S3 Twa pond
S4 Ditch at landfill gate
S5 Saltspring Centre pond
S6 Blackburn Lake
S7 Cusheon Lake

A Dec 8/82
B Aug 31/89
C Jan 9/90
D Feb 19/92
E Nov 10/92
F Feb 20/95
G Oct 17/95

Parameter	Unit	Criteria for Drinking Water	Site S1				Site S2		Site S3			
			C	D	E	F	A	D	A	D	E	F
pH	pH units	6.5 - 8.5	7.2	7.5	7.3	7.3	6.7	7.4	7	7	7.3	6.8
Sp. Conductance	uS/cm	700	89	78	131	90	162	442	478	191	141	172
Residue Total	mg/L	500 Aesthetics										
Residue. Filterable 1.0u	mg/L	500 Aesthetics										
Alkalinity Total 4.5	mg/L CaCO3	30-250 Food Processing										
Hardness Total	mg/L CaCO3	100 Acceptable, <200 Tolerable	31.1	25.1	50.3	29.4						
COD	mg/L	no criteria specified	23	18	21	13	13	16	<10	<10	30	15
Chloride diss.	mg/L Cl	250	7.6	5.1	6.7	8.9	9.8	27.6	30.4	13.1	9	10
Nitrogen Kjel. Tot (N)	mg/L N	no criteria specified										
Nitrogen Total	Mg/L N	no criteria specified										
Nitrogen Amm. Diss	mg/L N	no criteria specified	0.03	0.01	<0.005	<0.005	0.005	0.051	<0.005	0.006	0.005	<0.005
NO3+NO2	mg/L as N	10	1.5	0.63	1.66	0.41	0.94	0.13	3.02	3.34	<0.02	0.49
NO3 Diss (N)	mg/L as N	10	1.49	0.62		0.41	0.94	0.12	3.01	3.34		0.48
NO2 Diss (N)	mg/L as N	1	0.007	0.007	<0.005	<0.005	<0.005	0.007	0.007	<0.005	<0.005	0.007
Silver	mg/L Ag	no criteria specified										
Aluminum	mg/L Al	0.2	**0.24**	**0.22**	<0.02	0.08	0.19	0.09	**0.32**	0.08	<0.02	0.16
Arsenic	mg/L As	.025 (proposed)										
Boron	mg/L B	5										
Barium	mg/L Ba	1	<0.01	0.007	0.007	0.006		0.023		0.01	0.009	0.01
Beryllium	mg/L Be	no criteria specified										
Bismuth	mg/L Bi	no criteria specified										
Calcium	mg/L Ca	20 -100 food processing	8.43	6.86	13.6	8.4	43.3	50.5	58.4	16.7	15.5	17.9
Cadmium	mg/L Cd	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.01	<0.0005	<0.01	<0.0005	<0.0005	<0.0001
Cobalt	mg/L Co	no criteria specified	<0.1	<0.003	<0.003	<0.004	<0.1	<0.003	<0.1	<0.003	<0.003	<0.004
Chromium	mg/L Cr	0.05	<0.005	<0.005	<<0.002	<0.002	<0.01	<0.005	<0.01	<0.005	<0.002	<0.002

Parameter	Unit	Criteria for Drinking Water	Site S1				Site S2		Site S3			
			C	D	E	F	A	D	A	D	E	F
Copper	mg/L Cu	0.5	<0.01	0.002	0.002	<0.002	0.17	0.001	0.03	0.001	0.002	<0.002
Iron	mg/L Fe	0.13	**0.31**	**0.23**	0.091	0.08	**0.56**	**0.149**	**0.27**	0.12	**1.12**	**0.24**
Potassium	mg/L K	no criteria specified										
Magnesium	mg/L Mg	>700: laxative effects	2.44	1.94	3.96	2.05	2.56	10.7	8.04	4.67	4.16	3.65
Manganese	mg/L Mn	0.05	0.01	0.008	0.006	0.004	0.01	**0.066**	0.04	0.013	**0.098**	**0.063**
Molybdenum	mg/L Mo	0.25	<0.01	<0.004	<0.004	<0.0002	<0.01	<0.004	0.02	<0.004	<0.004	<0.0002
Sodium	mg/L Na	no criteria specified										
Nickel	mg/L Ni	0.2	<0.05	<0.008	<0.008	<0.005	<0.05	<0.008	<0.05	<0.008	<0.008	<0.005
Phosphorus	mg/L P	0.01	**<0.05**	<0.008	<0.008	<0.005						
Lead	mg/L Pb	0.05	0.002	0.001	<0.001	<0.003	**<0.1**	<0.001	**<0.1**	<0.001	<0.001	<0.003
Sulphur	mg/L S	no criteria specified										
Antimony	mg/L Sb	0.006										
Selenium	mg/L Se	0.01										
Silicon	mg/L Si	no criteria specified										
Tin	mg/L Sn	no criteria specified										
Strontium	mg/L Sr	no criteria specified										
Tellurium	mg/L Te	no criteria specified										
Titanium	mg/L Ti	0.1										
Thallium	mg/L Tl	0.013										
Vanadium	mg/L V	0.1	0.02	<0.003	<0.003	<0.001	0.05	0.007	0.011	0.022	0.005	0.03
Zinc	mg/L Zn	5	<0.005	0.006	0.003	0.09	0.05	0.007	0.011	0.022	0.005	0.03
Zirconium	mg/L Zr	no criteria specified										
Potassium Dissolved	mg/L K	20										
Phosphorus Ort. Dis -P	mg/L P	no criteria specified	0.019	<0.04	<0.04	0.27		<0.04		<0.04	0.07	0.024
Sodium Dissolved	mg/L Na	200 aesthetic										
Sulphate Dissolved	mg/L SO4	500	8.1	7.4	12	9.2		81		22.5	8.5	25.6
Coliform - Fecal	CFU/100ml	<10 disinfection only <100 partial treatment										

Parameter	Unit	Site S4					Site S5						Site S6						Site S7				
		A	C	D	E	F	B	C	D	E	F	G	A	C	D	E	F	G	C	D	E	F	G
Copper	mg/L Cu	0.02	<0.01	0.003	0.002	<0.002	<0.001	<0.01	0.001		0.002	<0.002	0.04	<0.01			0.004	<0.002	<0.01			0.002	0.002
Iron	mg/L Fe	0.8	**0.48**	**0.41**	**0.182**	**0.34**	**0.22**	0.09	**0.182**		**0.42**	**0.14**	**1.56**	**0.48**	**0.41**	**0.18**	**1.07**	**0.44**	**0.16**	**0.18**	**0.29**	**0.58**	**0.33**
Potassium	mg/L K											0.5						0.6					0.9
Magnesium	mg/L Mg	2.7	13	2.73	3.78	4.02	4.3	6.4	2.32	3.2	4.39	8.72	1.8	3	2.73	3.78	2.76	3.95	3.19	2.32	3.2	2.56	2.81
Manganese	mg/L Mn	**0.08**	**0.09**	0.047	0.024	0.024	0.01	<0.01	0.026	0.047	0.015	**0.082**	0.04	0.04	0.05	0.02	**0.053**	**0.099**	0.03	0.03	0.05	0.039	**0.176**
Molybdenum	mg/L Mo	<0.01	<0.01	<0.004	<0.004	<0.0002	<0.01	<0.01	<0.004	<0.004	<0.0002	<0.004	<0.01	<0.01			<0.0002	<0.004	<0.01			<0.0002	<0.004
Sodium	mg/L Na											9.7						7.6					7.3
Nickel	mg/L Ni	<0.05	<0.05	<0.008	<0.008	<0.005	<0.05	<0.05	<0.008	<0.008	<0.005	<0.01	<0.05	<0.05	<0.01	<0.01	<0.005	<0.01	<0.05	<0.01	<0.01	0.005	<0.01
Phosphorus	mg/L P											**<0.04**						**0.05**					**0.06**
Lead	mg/L Pb	**<0.1**	0.003	0.001	0.001	<0.003	<0.001	<0.001	<0.001	<0.001	<0.003	<0.03	<0.01	<0.001	0.001	0.001	<0.003	<0.03	<0.001	<0.001	<0.001	<0.003	<0.03
Sulphur	mg/L S											11.5						2.6					2.9
Antimony	mg/L Sb											**<0.02**						**<0.02**					**<0.02**
Selenium	mg/L Se											**<0.03**						**<0.03**					**<0.03**
Silicon	mg/L Si											3.8						1.7					0.8
Tin	mg/L Sn											<0.02						<0.02					<0.02
Strontium	mg/L Sr											0.196						<0.105					0.074
Tellurium	mg/L Te											<0.02						<0.02					<0.02
Titanium	mg/L Ti											<0.003						<0.003					<0.003
Thallium	mg/L Tl											**<0.03**						**<0.03**					**0.02**
Vanadium	mg/L V	<0.01	0.06	0.007	0.007	**0.12**	0.08	<0.005	0.005	0.002	0.04	<0.003	**0.15**	<0.005	0.01	0.01	0.05	<0.003	0.007	0.005		0.03	<0.003
Zinc	mg/L Zn	0.05	0.03	0.007	0.007	0.12	0.008	<0.005	0.005	0.002	0.04	0.05	0.15	<0.005	0.01	0.01	0.05	0.03	0.007	0.005		0.03	0.02
Zirconium	mg/L Zr											<0.003						<0.003					<0.003
Potassium Dissolved	mg/L K											0.6						<0.4					0.5
Phosphorus Ort. Dis -P	mg/L P		0.025	<0.04	<0.04	0.037		0.017	<0.04	<0.04	0.036	0.005		0.025			0.038	0.009	0.018			0.026	0.005
Sodium Dissolved	mg/L Na											9.87						7.62					7.56
Sulphate Dissolved	mg/L SO4			12.9	18	22.7	16.8	20.8	10	10.5	18.5	42.9		13.9	12.9	18	9.3	8.6	12.3	10	10.5	8.7	10.5
Coliform - Fecal	CFU/100ml											2						2					1

Parameter	Unit	Site S4					Site S5						Site S6						Site S7				
		A	C	D	E	F	B	C	D	E	F	G	A	C	D	E	F	G	C	D	E	F	G
pH	pH units	7.2	7.4	7.1	7.1	7.1	7.2	6.6	6.9	7.1	6.8	7.2	7.2	7.1	7.1	7.1	6.7	7.1	7.3	6.9	7.1	7.4	7
Sp. Conductance	uS/cm	185	515	111	174	169	190	235	100	114	164	239	113	116	111	174	112	127	126	100	114	94	124
Residue Total	mg/L											188						10					98
Residue. Filterable 1.0u	mg/L																						
Alkalinity Total 4.5	mg/L CaCO3											67.1						45.1					32
Hardness Total	mg/L CaCO3		41.3									112						52					37.5
COD	mg/L	13	20	22	16	22		<10	18	25	22		26	16	22	16	35		16	18	25	13	
Chloride diss.	mg/L Cl	12.8	48.3	7.6	14.3	11.4	16.5	14.6	8	9.2	11.8	19.1	8.1	9.3	7.6	14.3	15.3	10.1	11.4	8	9.2	10.5	10.6
Nitrogen Kjel. Tot (N)	mg/L N											0.38						0.37					0.51
Nitrogen Total	Mg/L N											0.38						0.37					0.51
Nitrogen Amm. Diss	mg/L N	0.047	0.025	0.033	0.03	<0.005	0.025	0.011	0.016	0.024	<0.005	0.015	0.007	0.036	0.033	0.03	0.051	0.005	0.031	0.016	0.024	0.005	<0.005
NO3+NO2	mg/L as N	0.71	1.07	0.44	0.98	0.34	0.82	2.1	0.6	0.03	2.92	<0.02	1.02	1.39		0.98	0.94	<0.02	0.33	0.6	0.03	0.37	<0.02
NO3 Diss (N)	mg/L as N	0.71	1.04	0.41		0.34		2.1	0.59		2.92	<0.02	1.02	1.38-		0.93		<0.02	0.33			0.37	<0.02
NO2 Diss (N)	mg/L as N	0.005	0.032	0.006	<0.005	<0.005	0.014	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	0.012	0.006	<0.005	0.007	<0.005	<0.005	0.006	<0.005	0.005	<0.005
Silver	mg/L Ag											<0.03						<0.03					<0.03
Aluminum	mg/L Al	0.12	**1.54**	**0.25**	<0.02	**0.22**		0.1	0.12	>0.02	**0.28**	<0.06	0.15	**0.29**	**0.25**	<0.02	**0.96**	<0.06	<0.1	0.12	<0.02	**0.52**	<0.06
Arsenic	mg/L As											**<0.04**						**<0.04**					**<0.04**
Boron	mg/L B											0.04						0.07					0.08
Barium	mg/L Ba		0.04	0.008	0.008	0.011	0.02	0.007	0.006	0.006	0.011	0.013		<0.01	0.01	0.01	0.016	0.007	<0.01	0.01	0.01	0.01	0.006
Beryllium	mg/L Be											<0.001						<0.001					<0.001
Bismuth	mg/L Bi											<0.02						<0.02					<0.02
Calcium	mg/L Ca	59.8	59.4	10.2	13.5	18	16.1	23.3	8.55	12.7	15.4	30.6	98.2	11.6	10.2	13.5	8.79	14.3	12.8	8.55	12.7	8.35	10.4
Cadmium	mg/L Cd	<0.01	<0.0005	<0.0005	<0.0005	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.0001	<0.002	<0.01	<0.0005	<0.0005	<0.0005	<0.0001	<0.002	<0.0005	<0.0005	<0.0005	<0.0001	<0.002
Cobalt	mg/L Co	<0.1	<0.1	<0.003	<0.003	<0.004	<0.1	<0.1	<0.003	<0.003	<0.004	<0.004	<0.1	<0.1			<0.004	<0.004	<0.1			<0.004	<0.004
Chromium	mg/L Cr	<0.01	<0.005	<0.005	<0.002	<0.002	0.02	<0.005	<0.005	<0.002	<0.002	<0.002	<0.01	<0.005	<0.005		<0.002	0.003	<0.005	<0.005		0.007	<0.002