

062143

BONNET PLUME

1982 WATER SAMPLING PROGRAM

Glenn R. Brown
ABERFORD RESOURCES LTD.
Calgary, Alberta
January, 1983

This report has been examined; declared acceptable as Representation Work under Section 32 and Schedule B of the Canada Mining Regulations and valued ^{in part} in the amount of \$127,320.52

for Chief, J.H. Laine

Date: Feb. 14, 1983.

MAP No.

106-E-2,3,6,7

ASSESSMENT REPORT

N. M. E. A. P.

CONFIDENTIAL

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TYPE OF
WORK:

Water
Sampling

REPORT FILED UNDER	Aberford Resources Ltd.	DOCUMENT NO. 062143
DATE PERFORMED	Feb.-Oct., 1982.	DATE FILED: Feb. 14, 1983.
LOCATION - LAT. LONG.	65° 15' N 135° 00' W	AREA: Bonnet Plume, Yukon
CLAIM NO.	Coal Licences 129, 132-154	
in part VALUE \$127,320.52		
WORK DONE BY	G.R. Brown	
WORK DONE FOR	Aberford Resources Ltd.	
REMARKS	Several water sample stations established in 1980 were continued in 1981 and 1982. The laboratory results for the 1982 data appear to show normal readings for dissolved oxygen, pH, etc.	

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INTRODUCTION

In 1982, the water sampling programme continued in the pattern established in 1981. Samples were taken through the winter, spring and into the fall, approximately bi-monthly. Given the financial and logistical restrictions and the fact that one winter of data had already been gathered, the programme was not carried through the winter of 1982-83. Field samples were taken on the following dates:

February 7 - 8	August 7 - 8
April 12 - 13	October 1
May 22 - 23	

The programme is not planned to continue in 1983. Since details of the water sampling programme are not recorded elsewhere, they are described below.

PURPOSE AND METHODS

The water chemistry programme was established to provide baseline pre-development data describing seasonal variations in the natural constituents of the water bodies of the project area. The number of locations sampled in 1980 was unnecessarily high so the programme was revised for 1981. Sample stations were established at exponentially increasing distances apart, on Illtyd Creek from above the project area to its junction with the Wind River. Stations were also maintained on the Wind River, above and below the junction of Illtyd Creek, and on the Peel River below the entry of the Wind River. Samples were also taken near the mouths of three streams draining the region of the coal deposits and from four lakes, two near the coal deposits and two near the proposed plant site. A map of site locations accompanies the 1980 report on the water sampling programme (Environmental Report #4 in the Bonnet Plume file).

At the time of sampling, field measurements were made of dissolved oxygen content and pH (1981-82) and of water temperature, conductivity and salinity (late 1982). Winter samples were taken through open leads in streams and through holes augered in the lake ice. A Yellow Springs Instrument Company Model 33 SCT Meter was used for field determinations of temperature, conductivity and salinity. Dissolved oxygen and temperature were measured with a YSI Model 57 Dissolved Oxygen Meter. The pH was determined in camp the evening following sample collection with an Orion Model 39A/F Portable pH Meter.

The water samples were collected with a sampling stick in an approximately "depth integrated" manner, and were analyzed by Chemex Laboratories using standard techniques acceptable to Environment Canada. Samples for analysis for dissolved metals were fixed with nitric acid in the field. In 1982 they were also filtered in the field. Several nutrients were added to the analyses in late 1981, and aluminum was added in 1982 when Chemex acquired new equipment that could measure it accurately.

RESULTS

The laboratory results compiled here (Appendix I) have not been formally compared to the literature, but they appear to be of a normal range. The field results (Appendix II) also appear normal. The dissolved oxygen remains high in the streams in winter, reflecting the numerous leads which remain unfrozen most of the winter. The lakes show a typical decline in oxygen content as the ice-covered period progresses.

ACIDIC PRECIPITATION

A simple measurement was undertaken in April of 1982 as a first step in determining baseline data on natural levels of precipitation acidity. A 10 centimetre diameter plastic tube was used to obtain vertical samples of snow from the vicinity of the weather station. The samples were melted in plastic tubs and their pH determined with an Orion Model 39A/F Portable pH Meter. The results, on the April data sheet (Appendix II) (confirmed by laboratory pH tests, Appendix I) show values typical of winter snow, thus suggesting an uncontaminated natural precipitation regime.

CONCLUSIONS

These programmes provide a sound beginning for water chemistry studies and an initial record of precipitation baseline data. Further work will be required however, both in interpreting the existing data and in field sampling, before an adequate data base exists for predevelopment environmental submissions to government agencies.

A P P E N D I X I

RESULTS OF LABORATORY ANALYSES

Feb. 82

ATTENTION: GLENN BROWN

PAN OCEAN OIL LTD.

WATER ANALYSIS BONNETT PLUME PROJECT

MARCH 11, 1982



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 TELEPHONE (403) 465-9877

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PAN OCEAN

DATE MARCH 11, 1982

BONNET PLUME PROJECT

PROJECT NO. 0411-5-6722

REC'D: FEB. 12/82

LAB NO. 1830

PARAMETERS	#1 I4		
CALCIUM (PPM)	34.6		
MAGNESIUM (PPM)	5.1		
CHLORIDE (PPM)	0.49		
SULPHATE (PPM)	19.7		
TOTAL ALKALINITY (PPM AS CaCO ₃)	130.		
pH	8.04		
CONDUCTANCE (UMHOS/CM)	280.		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.34		
TOTAL DISSOLVED SOLIDS (MG/L)	185.		
TOTAL SUSPENDED SOLIDS (MG/L)	<0.4		
ACIDITY (PPM AS CaCO ₂)	<1.0		
NITRATE -NITRITE (PPM N)	.595		
TOTAL PHOSPHOROUS (PPM P)	<0.003	TOTAL	IONIC
ARSENIC (PPM)		0.0020	<0.0002
CADMIUM (PPM)		<0.001	<0.001
COPPER (PPM)		0.003	<0.001
IRON (PPM)		0.06	<0.01
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		0.59	<0.01
ZINC (PPM)		0.011	0.005
LEAD (PPM)		0.002	<0.002
BARIUM (PPM)		<0.1	<0.1
NICKEL (PPM)		0.004	0.002
MERCURY (PPM)		0.00022	0.00022
TOTAL HARDNESS (PPM AS CaCO ₂)	107.		
S. REACTIVE PHOSPHATE (PPM P)	<0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	2.1		
T. KJELDAHL NITROGEN (PPM)	0.09		
AMMONIA - NITROGEN (PPM)	<0.01		



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 REC'D: FEB. 12/82
 LAB NO. 1830

DATE MARCH 11, 1982

PROJECT NO. 0411-5-6722

PARAMETERS	#2 I6		
CALCIUM (PPM)	34.9		
MAGNESIUM (PPM)	5.1		
CHLORIDE (PPM)	0.31		
SULPHATE (PPM)	16.8		
TOTAL ALKALINITY (PPM AS CaCO3)	140.		
pH	7.97		
CONDUCTANCE (UMHOS/CM)	260.		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.32		
TOTAL DISSOLVED SOLIDS (MG/L)	175.		
TOTAL SUSPENDED SOLIDS (MG/L)	4.0		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE-NITRITE (PPM N)	.30		
TOTAL PHOSPHOROUS (PPM P)	0.005	TOTAL	IONIC
ARSENIC (PPM)		0.0014	<0.0002
CADMIUM (PPM)		<0.001	<0.001
COPPER (PPM)		0.003	0.001
IRON (PPM)		0.15	0.04
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		0.05	<0.01
ZINC (PPM)		0.010	0.008
LEAD (PPM)		0.006	0.005
BARIUM (PPM)		I/S	I/S
NICKEL (PPM)		0.005	<0.001
MERCURY (PPM)		0.00022	<0.00010
TOTAL HARDNESS (PPM AS CaCO3)	108		
S. REACTIVE PHOSPHATE (PPM P)	<0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	2.0		
T. KJELDAHL NITROGEN (PPM)	0.08		
AMMONIA - NITROGEN (PPM)	<0.01		



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PARAMETERS	#3 I8		
CALCIUM (PPM)	47.7		
MAGNESIUM (PPM)	13.6		
CHLORIDE (PPM)	0.50		
SULPHATE (PPM)	20.9		
TOTAL ALKALINITY (PPM AS CaCO3)	164.		
PH	8.01		
CONDUCTANCE (UMHOS/CM)	350.		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.14		
TOTAL DISSOLVED SOLIDS (MG/L)	230.		
TOTAL SUSPENDED SOLIDS (MG/L)	<0.4		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE-NITRITE (PPM N)	.445		
TOTAL PHOSPHOROUS (PPM P)	0.004	TOTAL	IONIC
ARSENIC (PPM)		0.0004	<0.0002
CADMIUM (PPM)		0.001	0.001
COPPER (PPM)		0.003	0.001
IRON (PPM)		0.01	<0.01
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		0.03	<0.01
ZINC (PPM)		0.015	0.006
LEAD (PPM)		0.007	<0.002
BARIUM (PPM)		0.3	0.2
NICKEL (PPM)		0.005	0.002
MERCURY (PPM)		0.00020	0.00020
TOTAL HARDNESS (PPM AS CaCO3)	175.		
S. REACTIVE PHOSPHATE (PPM P)	<0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	2.2		
T. KJELDAHL NITROGEN (PPM)	0.08		
AMMONIA - NITROGEN (PPM)	<0.01		



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PARAMETERS	#4 I-14		
CALCIUM (PPM)	35.1		
MAGNESIUM (PPM)	13.6		
CHLORIDE (PPM)	1.64		
SULPHATE (PPM)	11.1		
TOTAL ALKALINITY (PPM AS CaCO3)	146.		
PH	8.13		
CONDUCTANCE (UMHOS/CM)	315.		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.22		
TOTAL DISSOLVED SOLIDS (MG/L)	220.		
TOTAL SUSPENDED SOLIDS (MG/L)	<0.4		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE-NITRITE (PPM N)	.28		
TOTAL PHOSPHOROUS (PPM P)	0.003		
ARSENIC (PPM)		TOTAL	IONIC
CADMIUM (PPM)		0.0014	<0.0002
COPPER (PPM)		0.001	0.001
IRON (PPM)		0.003	<0.001
CHROMIUM (PPM)		0.06	0.03
MANGANESE (PPM)		<0.01	<0.01
ZINC (PPM)		<0.01	<0.01
LEAD (PPM)		0.014	0.003
BARIUM (PPM)		0.005	0.003
NICKEL (PPM)		<0.1	<0.1
MERCURY (PPM)		0.004	0.001
TOTAL HARDNESS (PPM AS CaCO3)	144.	0.00022	0.00022
S. REACTIVE PHOSPHATE (PPM P)	<0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	2.1		
T. KJELDAHL NITROGEN (PPM)	0.20		
AMMONIA - NITROGEN (PPM)	<0.01		



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PARAMETERS	#5 I-17		
CALCIUM (PPM)	44.3		
MAGNESIUM (PPM)	14.8		
CHLORIDE (PPM)	IS		
SULPHATE (PPM)	IS		
TOTAL ALKALINITY (PPM AS CaCO ₃)	IS		
PH	IS		
CONDUCTANCE (UMHOS/CM)	IS		
COLOUR (PTCO UNITS)	IS		
TURBIDITY (JTU)	IS		
TOTAL DISSOLVED SOLIDS (MG/L)	IS		
TOTAL SUSPENDED SOLIDS (MG/L)	<0.4		
ACIDITY (PPM AS CaCO ₃)	IS		
NITRATE-NITRITE (PPM N)	IS		
TOTAL PHOSPHOROUS (PPM P)	<0.003	TOTAL	IONIC
ARSENIC (PPM)		0.0021	<0.0002
CADMIUM (PPM)		0.001	0.001
COPPER (PPM)		0.001	0.001
IRON (PPM)		0.04	0.01
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		<0.01	<0.01
ZINC (PPM)		0.006	0.003
LEAD (PPM)		0.005	0.004
BARIUM (PPM)		0.2	0.2
NICKEL (PPM)		0.005	0.001
MERCURY (PPM)		0.00018	0.00012
TOTAL HARDNESS (PPM AS CaCO ₃)	172.		
S. REACTIVE PHOSPHATE (PPM P)	IS		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	IS		
T. KJELDAHL NITROGEN (PPM)	0.06		
AMMONIA - NITROGEN (PPM)	<0.01		
* IS - INSUFFICIENT SAMPLE			



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PARAMETERS	#6 W1		
CALCIUM (PPM)	26.2		
MAGNESIUM (PPM)	12.3		
CHLORIDE (PPM)	1.60		
SULPHATE (PPM)	11.1		
TOTAL ALKALINITY (PPM AS CaCO3)	116.		
PH	8.13		
CONDUCTANCE (UMHOS/CM)	245		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.16		
TOTAL DISSOLVED SOLIDS (MG/L)	165.		
TOTAL SUSPENDED SOLIDS (MG/L)	0.4		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE-NITRITE (PPM N)	.135		
TOTAL PHOSPHOROUS (PPM P)	0.005	TOTAL	IONIC
ARSENIC (PPM)		0.0003	<0.0002
CADMIUM (PPM)		0.001	0.001
COPPER (PPM)		0.001	<0.001
IRON (PPM)		0.03	<0.01
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		<0.01	<0.01
ZINC (PPM)		0.014	0.001
LEAD (PPM)		0.008	0.006
BARIUM (PPM)		<0.1	<0.1
NICKEL (PPM)		0.005	0.004
MERCURY (PPM)		0.00022	0.00022
TOTAL HARDNESS (PPM AS CaCO3)	116.		
S. REACTIVE PHOSPHATE (PPM P)	<0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	1.6		
T. KJELDAHL NITROGEN (PPM)	0.08		
AMMONIA - NITROGEN (PPM)	<0.01		



MEMBER
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PARAMETERS	#7 W4		
CALCIUM (PPM)	32.4		
MAGNESIUM (PPM)	12.5		
CHLORIDE (PPM)	1.50		
SULPHATE (PPM)	12.8		
TOTAL ALKALINITY (PPM AS CaCO ₃)	128.		
PH	7.96		
CONDUCTANCE (UMHOS/CM)	275.		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.36		
TOTAL DISSOLVED SOLIDS (MG/L)	195.		
TOTAL SUSPENDED SOLIDS (MG/L)	0.8		
ACIDITY (PPM AS CaCO ₃)	<1.0		
NITRATE-NITRITE (PPM N)	1.36		
TOTAL PHOSPHOROUS (PPM P)	<0.003	TOTAL	IONIC
ARSENIC (PPM)		<0.0002	<0.0002
CADMIUM (PPM)		0.002	0.002
COPPER (PPM)		0.002	<0.001
IRON (PPM)		0.04	<0.01
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		<0.01	<0.01
ZINC (PPM)		0.015	0.001
LEAD (PPM)		0.002	<0.002
BARIUM (PPM)		<0.1	<0.1
NICKEL (PPM)		0.002	<0.001
MERCURY (PPM)		0.00030	0.00030
TOTAL HARDNESS (PPM AS CaCO ₃)	132.		
S. REACTIVE PHOSPHATE (PPM P)	<0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	2.0		
T. KJELDAHL NITROGEN (PPM)	0.05		
AMMONIA - NITROGEN (PPM)	0.02		



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 LAB NO. 1830

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PARAMETERS	#8 W8		
CALCIUM (PPM)	35.7		
MAGNESIUM (PPM)	12.7		
CHLORIDE (PPM)	1.20		
SULPHATE (PPM)	10.7		
TOTAL ALKALINITY (PPM AS CaCO3)	168.		
PH	7.63		
CONDUCTANCE (UMHOS/CM)	290		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.18		
TOTAL DISSOLVED SOLIDS (MG/L)	200.		
TOTAL SUSPENDED SOLIDS (MG/L)	1.2		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE -NITRITE (PPM N)	3.8		
TOTAL PHOSPHOROUS (PPM P)	0.004	TOTAL	IONIC
ARSENIC (PPM)		<0.0002	<0.0002
CADMIUM (PPM)		0.002	0.001
COPPER (PPM)		0.002	<0.001
IRON (PPM)		0.09	<0.01
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		<0.01	<0.01
ZINC (PPM)		0.010	0.003
LEAD (PPM)		0.002	<0.002
BARIUM (PPM)		0.2	0.2
NICKEL (PPM)		0.004	<0.001
MERCURY (PPM)		0.00026	0.00026
TOTAL HARDNESS (PPM AS CaCO3)	142.		
S. REACTIVE PHOSPHATE (PPM P)	0.004		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	2.5		
T. KJELDAHL NITROGEN (PPM)	0.08		
AMMONIA - NITROGEN (PPM)	<0.01		



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GRANDE PRAIRIE, ALBERTA, CANADA T8V 3J3
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PAN OCEAN
BONNET PLUME PROJECT
REC'D: FEB. 12/82
LAB NO. 1830

DATE MARCH 11, 1982

PROJECT NO. 0411-5-6722

PARAMETERS	#9 W10		
CALCIUM (PPM)	36.0		
MAGNESIUM (PPM)	13.2		
CHLORIDE (PPM)	1.23		
SULPHATE (PPM)	12.8		
TOTAL ALKALINITY (PPM AS CaCO3)	110.		
PH	8.10		
CONDUCTANCE (UMHOS/CM)	285		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.14		
TOTAL DISSOLVED SOLIDS (MG/L)	200.		
TOTAL SUSPENDED SOLIDS (MG/L)	1.2		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE-NITRITE (PPM N)	.25		
TOTAL PHOSPHOROUS (PPM P)	0.004		
ARSENIC (PPM)		TOTAL	IONIC
CADMIUM (PPM)		0.0010	<0.0002
COPPER (PPM)		0.001	0.001
IRON (PPM)		0.001	<0.001
CHROMIUM (PPM)		0.03	<0.01
MANGANESE (PPM)		<0.01	<0.01
ZINC (PPM)		<0.01	<0.01
LEAD (PPM)		<0.01	<0.001
BARIUM (PPM)		<0.002	<0.002
NICKEL (PPM)		0.3	0.2
MERCURY (PPM)		0.005	0.002
TOTAL HARDNESS (PPM AS CaCO3)	144.	<0.00010	<0.00010
S. REACTIVE PHOSPHATE (PPM P)	<0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	2.2		
T. KJELDAHL NITROGEN (PPM)	0.10		
AMMONIA - NITROGEN (PPM)	0.02		



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 REC'D: FEB. 12/82
 LAB NO. 1830

DATE MARCH 11, 1982

PROJECT NO. 0411-5-6722

PARAMETERS	#10 W12		
CALCIUM (PPM)	41.2		
MAGNESIUM (PPM)	14.2		
CHLORIDE (PPM)	21.5		
SULPHATE (PPM)	17.0		
TOTAL ALKALINITY (PPM AS CaCO3)	160.		
PH	8.11		
CONDUCTANCE (UMHOS/CM)	380		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.28		
TOTAL DISSOLVED SOLIDS (MG/L)	250.		
TOTAL SUSPENDED SOLIDS (MG/L)	2.0		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE-NITRITE (PPM N)	.355		
TOTAL PHOSPHOROUS (PPM P)	0.004	TOTAL	IONIC
ARSENIC (PPM)		0.0016	<0.0002
CADMIUM (PPM)		0.001	0.001
COPPER (PPM)		0.005	<0.001
IRON (PPM)		0.14	0.02
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		<0.01	<0.01
ZINC (PPM)		0.016	<0.001
LEAD (PPM)		0.005	<0.002
BARIUM (PPM)		0.2	0.02
NICKEL (PPM)		0.009	0.003
MERCURY (PPM)		<0.00010	<0.00010
TOTAL HARDNESS (PPM AS CaCO3)	161.		
S. REACTIVE PHOSPHATE (PPM P)	<0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	2.2		
T. KJELDAHL NITROGEN (PPM)	0.12		
AMMONIA - NITROGEN (PPM)	<0.01		



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PAN OCEAN
 BONNET PLUME PROJECT
 REC'D: FEB. 12/82
 LAB. NO. 1830

DATE **MARCH 11, 1982**

PROJECT NO. **0411-5-6722**

PARAMETERS	#11 L1		
CALCIUM (PPM)	9.21		
MAGNESIUM (PPM)	2.74		
CHLORIDE (PPM)	0.60		
SULPHATE (PPM)	2.4		
TOTAL ALKALINITY (PPM AS CaCO3)	37.0		
PH	7.57		
CONDUCTANCE (UMHOS/CM)	220		
COLOUR (PTCO UNITS)	60		
TURBIDITY (JTU)	0.48		
TOTAL DISSOLVED SOLIDS (MG/L)	150.		
TOTAL SUSPENDED SOLIDS (MG/L)	2.8		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE-NITRITE (PPM N)	.555		
TOTAL PHOSPHOROUS (PPM P)	0.008	TOTAL	IONIC
ARSENIC (PPM)		0.0014	<0.0002
CADMIUM (PPM)		<0.001	<0.001
COPPER (PPM)		0.007	0.002
IRON (PPM)		0.08	0.03
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		<0.01	<0.01
ZINC (PPM)		0.012	0.002
LEAD (PPM)		0.007	0.002
BARIUM (PPM)		<0.1	<0.1
NICKEL (PPM)		0.006	0.005
MERCURY (PPM)		<0.00010	<0.00010
TOTAL HARDNESS (PPM AS CaCO3)	34.3		
S. REACTIVE PHOSPHATE (PPM P)	0.003		
S. ORGANIC PHOSPHATE (PPM P)	0.003		
S. ORGANIC CARBON (PPM)	14.3		
T. KJELDAHL NITROGEN (PPM)	0.20		
AMMONIA - NITROGEN (PPM)	0.01		



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 LAB. NO. 1830

DATE **MARCH 11, 1982**

PROJECT NO. **0411-5-6722**

PARAMETERS	#12 L2		
CALCIUM (PPM)	8.13		
MAGNESIUM (PPM)	2.69		
CHLORIDE (PPM)	0.50		
SULPHATE (PPM)	2.9		
TOTAL ALKALINITY (PPM AS CaCO3)	33.0		
PH	7.38		
CONDUCTANCE (UMHOS/CM)	65		
COLOUR (PTCO UNITS)	65		
TURBIDITY (JTU)	0.92		
TOTAL DISSOLVED SOLIDS (MG/L)	45.		
TOTAL SUSPENDED SOLIDS (MG/L)	2.4		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE-NITRITE (PPM N)	.03		
TOTAL PHOSPHOROUS (PPM P)	0.010	TOTAL	IONIC
ARSENIC (PPM)		0.0012	<0.0002
CADMIUM (PPM)		<0.001	<0.001
COPPER (PPM)		0.011	0.006
IRON (PPM)		0.19	0.17
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		0.02	0.02
ZINC (PPM)		0.015	0.005
LEAD (PPM)		0.018	0.018
BARIUM (PPM)		<0.1	<0.1
NICKEL (PPM)		0.005	0.004
MERCURY (PPM)		<0.00010	<0.00010
TOTAL HARDNESS (PPM AS CaCO3)	31.4		
S. REACTIVE PHOSPHATE (PPM P)	0.004		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	16.8		
T. KJELDAHL NITROGEN (PPM)	0.59		
AMMONIA - NITROGEN (PPM)	0.16		



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DATE **MARCH 11, 1982**

PROJECT NO. **0411-5-6722**

PARAMETERS	#13 L3		
CALCIUM (PPM)	61.9		
MAGNESIUM (PPM)	19.6		
CHLORIDE (PPM)	1.20		
SULPHATE (PPM)	7.8		
TOTAL ALKALINITY (PPM AS CaCO3)	281.		
PH	8.02		
CONDUCTANCE (UMHOS/CM)	510		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.44		
TOTAL DISSOLVED SOLIDS (MG/L)	350.		
TOTAL SUSPENDED SOLIDS (MG/L)	1.6		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE-NITRITE (PPM N)	.059		
TOTAL PHOSPHOROUS (PPM P)	0.006	TOTAL	IONIC
ARSENIC (PPM)		0.0004	<0.0002
CADMIUM (PPM)		0.002	0.001
COPPER (PPM)		0.005	0.005
IRON (PPM)		0.12	0.12
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		0.03	0.02
ZINC (PPM)		0.022	0.002
LEAD (PPM)		0.007	0.006
BARIUM (PPM)		0.1	0.1
NICKEL (PPM)		0.005	0.005
MERCURY (PPM)		0.00010	<0.00010
TOTAL HARDNESS (PPM AS CaCO3)	235.		
S. REACTIVE PHOSPHATE (PPM P)	<0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	4.5		
T. KJELDAHL NITROGEN (PPM)	0.25		
AMMONIA - NITROGEN (PPM)	0.04		



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REC'D: FEB. 12/82

LAB. NO. 1830

DATE MARCH 11, 1982

PROJECT NO. 0411-5-6722

PARAMETERS	#14 L4		
CALCIUM (PPM)	4.14		
MAGNESIUM (PPM)	1.60		
CHLORIDE (PPM)	0.52		
SULPHATE (PPM)	3.5		
TOTAL ALKALINITY (PPM AS CaCO ₃)	14.0		
PH	6.59		
CONDUCTANCE (UMHOS/CM)	39		
COLOUR (PTCO UNITS)	60		
TURBIDITY (JTU)	1.6		
TOTAL DISSOLVED SOLIDS (MG/L)	30.		
TOTAL SUSPENDED SOLIDS (MG/L)	4.8		
ACIDITY (PPM AS CaCO ₃)	4.0		
NITRATE-NITRITE (PPM N)	.066		
TOTAL PHOSPHOROUS (PPM P)	0.015	TOTAL	IONIC
ARSENIC (PPM)		0.0007	<0.0002
CADMIUM (PPM)		<0.001	<0.001
COPPER (PPM)		0.005	0.002
IRON (PPM)		0.89	0.87
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		0.07	0.05
ZINC (PPM)		0.016	0.007
LEAD (PPM)		0.009	0.006
BARIUM (PPM)		0.1	0.1
NICKEL (PPM)		0.008	0.006
MERCURY (PPM)		0.00016	0.00016
TOTAL HARDNESS (PPM AS CaCO ₃)	16.9		
S. REACTIVE PHOSPHATE (PPM P)	0.006		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	18.4		
T. KJELDAHL NITROGEN (PPM)	0.63		
AMMONIA - NITROGEN (PPM)	0.03		



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PAN OCEAN
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 REC'D: FEB. 12/82
 LAB. NO. 1830

DATE **MARCH 11, 1982**

PROJECT NO. **0411-5-6722**

PARAMETERS	#15 S3		
CALCIUM (PPM)	37.1		
MAGNESIUM (PPM)	10.9		
CHLORIDE (PPM)	0.44		
SULPHATE (PPM)	13.6		
TOTAL ALKALINITY (PPM AS CaCO3)	141.		
PH	8.21		
CONDUCTANCE (UMHOS/CM)	280		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.16		
TOTAL DISSOLVED SOLIDS (MG/L)	200.		
TOTAL SUSPENDED SOLIDS (MG/L)	4.4		
ACIDITY (PPM AS CaCO3)	<1.0		
NITRATE-NITRITE (PPM N)	.495		
TOTAL PHOSPHOROUS (PPM P)	0.004	TOTAL	IONIC
ARSENIC (PPM)		0.0006	<0.0002
CADMIUM (PPM)		0.003	0.002
COPPER (PPM)		0.004	<0.001
IRON (PPM)		0.05	0.02
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		0.01	<0.01
ZINC (PPM)		0.012	<0.001
LEAD (PPM)		0.010	0.004
BARIUM (PPM)		0.2	0.2
NICKEL (PPM)		0.003	0.003
MERCURY (PPM)		0.00014	0.00014
TOTAL HARDNESS (PPM AS CaCO3)	138.		
S. REACTIVE PHOSPHATE (PPM P)	<0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	<0.2		
T. KJELDAHL NITROGEN (PPM)	0.24		
AMMONIA - NITROGEN (PPM)	<0.01		



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BONNET PLUME PROJECT

REC'D: FEB. 12/82

LAB. NO. 1830

DATE **MARCH 11, 1982**

PROJECT NO. **0411-5-6722**

PARAMETERS	#16 P		
CALCIUM (PPM)	45.0		
MAGNESIUM (PPM)	13.5		
CHLORIDE (PPM)	4.05		
SULPHATE (PPM)	26.8		
TOTAL ALKALINITY (PPM AS CaCO3)	156.		
PH	7.85		
CONDUCTANCE (UMHOS/CM)	290		
COLOUR (PTCO UNITS)	<5		
TURBIDITY (JTU)	0.38		
TOTAL DISSOLVED SOLIDS (MG/L)	200.		
TOTAL SUSPENDED SOLIDS (MG/L)	1.6		
ACIDITY (PPM AS CaCO3)	3.0		
NITRATE-NITRITE (PPM N)	.99		
TOTAL PHOSPHOROUS (PPM P)	0.004	TOTAL	IONIC
ARSENIC (PPM)		0.0003	<0.0002
CADMIUM (PPM)		0.001	0.001
COPPER (PPM)		0.005	0.001
IRON (PPM)		0.08	0.03
CHROMIUM (PPM)		<0.01	<0.01
MANGANESE (PPM)		<0.01	<0.01
ZINC (PPM)		0.014	0.004
LEAD (PPM)		0.010	<0.002
BARIUM (PPM)		0.3	0.2
NICKEL (PPM)		0.009	0.005
MERCURY (PPM)		0.00056	0.00016
TOTAL HARDNESS (PPM AS CaCO3)	168.		
S. REACTIVE PHOSPHATE (PPM P)	0.003		
S. ORGANIC PHOSPHATE (PPM P)	<0.003		
S. ORGANIC CARBON (PPM)	<0.2		
T. KJELDAHL NITROGEN (PPM)	0.15		
AMMONIA - NITROGEN (PPM)	<0.01		



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April 82

ATTENTION: Glenn Brown

Pan Ocean

Water Analysis



CALGARY

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EDMONTON, ALBERTA, CANADA T6E 5K8
TELEPHONE (403) 465-9877

GRANDE PRAIRIE

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GRANDE PRAIRIE, ALBERTA, CANADA T8V 5X4
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- VEGETATION
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ATTENTION: Glenn Brown

DATE April 30, 1982

Pan Ocean
Water Analysis - Rec. April 16, 1982
Bonnet Plume Prov.

PROJECT NO. 0411 5 7213

LAB # 7

~~RAIN~~ SNOW
"A"

SNOW
"B"

pH

5.64

5.80



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ATTENTION: Glenn Brown
 Pan Ocean

DATE April 30, 1982

Water Analysis

PROJECT NO. 0411 5 7213

PARAMETERS	SAMPLE NO. I - 4		
CALCIUM (ppm)			40.5
MAGNESIUM (ppm)			12.1
CHLORIDE (ppm)			0.3
SULFATE (ppm)			20.0
T. ALKALINITY (ppm as CaCO ₃)			120
pH			8.01
CONDUCTANCE (umhos/cm)			247
COLOUR pt.CO units)			< 5
TURBIDITY (JTU)			4.8
T. DISSOLVED SOLIDS (mg/L)			165.
T. SUSPENDED SOLIDS (mg/L)			10.8
ACIDITY (ppm)			< 1.0
NITRATE-NITRITE (ppm N)			64.
TOTAL PHOSPHOROUS (ppm P)			0.006
ARSENIC (ppm)	TOTAL		IONIC
CADMIUM (ppm)	0.0004		0.0004
COPPER (ppm)	< 0.001		< 0.001
IRON (ppm)	0.005		0.002
CHROMIUM (ppm)	0.07		< 0.01
MANGANESE (ppm)	< 0.001		< 0.001
ZINC (ppm)	< 0.01		< 0.01
LEAD (ppm)	0.047		0.007
* BARIUM (ppm)	0.011		< 0.002
NICKEL (ppm)	0.5		0.2
MERCURY (ppm)	0.001		< 0.001
T. HARDNESS (ppm as CaCO ₃)	0.00016		0.00016
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		151.	0.004
S. ORGANIC PHOSPHATE (ppm P)		0.004	< 0.003
S. ORGANIC CARBON (ppm)		1.1	0.56
T. KJELDAHL NITROGEN (ppm)		0.56	< 0.01
AMMONIA (ppm N)		< 0.01	

* Barium reanalyzed, see following letter



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ATTENTION: Glenn Brown

DATE **April 30, 1982**

Pan Ocean

PROJECT NO. **0411 5 7213**

Water Analysis - Rec. April 16, 1982

PARAMETERS	SAMPLE NO. I - 6		
CALCIUM (ppm)			50.0
MAGNESIUM (ppm)			14.8
CHLORIDE (ppm)			0.3
SULFATE (ppm)			20.7
T. ALKALINITY (ppm as CaCO ₃)			133
pH			7.64
CONDUCTANCE (umhos/cm)			326
COLOUR (pt. CO units)			< 5
TURBIDITY (JTU)			2.8
T. DISSOLVED SOLIDS (mg/L)			220.
T. SUSPENDED SOLIDS (mg/L)			7.6
ACIDITY (ppm)			< 1.0
NITRATE-NITRITE (ppm N)			.48
TOTAL PHOSPHOROUS (ppm P)			0.013
ARSENIC (ppm)	TOTAL		TONIC
	0.0004		0.0002
CADMIUM (ppm)	< 0.001		< 0.001
COPPER (ppm)	0.003		0.001
IRON (ppm)	0.17		< 0.01
CHROMIUM (ppm)	< 0.001		< 0.001
MANGANESE (ppm)	< 0.01		< 0.01
ZINC (ppm)	0.031		0.006
LEAD (ppm)	0.002		< 0.002
BARIUM (ppm)	0.5		0.2
NICKEL (ppm)	0.003		0.002
MERCURY (ppm)	0.00024		0.00024
T. HARDNESS (ppm as CaCO ₃)			186.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			< 0.003
S. ORGANIC PHOSPHATE (ppm P)			< 0.003
S. ORGANIC CARBON (ppm)			1.2
T. KJELDAHL NITROGEN (ppm)			0.20
AMMONIA (ppm N)			< 0.01



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PARAMETERS	SAMPLE NO. I - 8		
CALCIUM (ppm)			43.2
MAGNESIUM (ppm)			12.4
CHLORIDE (ppm)			0.25
SULFATE (ppm)			16.8
T. ALKALINITY (ppm as CaCO ₃)			118
pH			7.83
CONDUCTANCE (umhos/cm)			5522
COLOUR pt.CO units)			< 5
TURBIDITY (JTU)			.24
T. DISSOLVED SOLIDS (mg/L)			3600.
T. SUSPENDED SOLIDS (mg/L)			.4
ACIDITY (ppm)			< 1.0
NITRATE-NITRITE (ppm N)			8.5
TOTAL PHOSPHOROUS (ppm P)		TOTAL	0.003
ARSENIC (ppm)	0.0002		IONIC < 0.0002
CADMIUM (ppm)	< 0.001		< 0.001
COPPER (ppm)	0.002		0.001
IRON (ppm)	0.02		< 0.01
CHROMIUM (ppm)	< 0.001		< 0.001
MANGANESE (ppm)	< 0.01		< 0.01
ZINC (ppm)	0.011		0.011
LEAD (ppm)	0.011		0.011
BARIUM (ppm)	0.2		0.2
NICKEL (ppm)	0.001		< 0.001
MERCURY (ppm)	0.00018		0.00010
T. HARDNESS (ppm as CaCO ₃)			159
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.003
S. ORGANIC PHOSPHATE (ppm ⁴ P)			< 0.003
S. ORGANIC CARBON (ppm)			1.4
T. KJELDAHL NITROGEN (ppm)			0.40
AMMONIA (ppm N)			< 0.01





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PARAMETERS	SAMPLE I - 11	
CALCIUM (ppm)		47.3
MAGNESIUM (ppm)		13.3
CHLORIDE (ppm)		0.32
SULFATE (ppm)		15.3
T. ALKALINITY (ppm as CaCO ₃)		150
pH		7.87
CONDUCTANCE (umhos/cm)		314
COLOUR (pt.CO units)		<5
TURBIDITY (JTU)		.22
T. DISSOLVED SOLIDS (mg/L)		210.
T. SUSPENDED SOLIDS (mg/L)		1.6
ACIDITY (ppm)		<1.0
NITRATE-NITRITE (ppm N)		.345
TOTAL PHOSPHOROUS (ppm P)	TOTAL	<0.003
ARSENIC (ppm)	0.0002	IONIC <0.0002
CADMIUM (ppm)	<0.001	<0.001
COPPER (ppm)	0.002	<0.001
IRON (ppm)	0.07	<0.01
CHROMIUM (ppm)	<0.001	<0.001
MANGANESE (ppm)	<0.01	<0.01
ZINC (ppm)	0.057	0.007
LEAD (ppm)	<0.002	<0.002
BARIUM (ppm)	0.2	0.2
NICKEL (ppm)	<0.001	<0.001
MERCURY (ppm)	<0.00010	<0.00010
T. HARDNESS (ppm as CaCO ₃)		173.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		<0.003
S. ORGANIC PHOSPHATE (ppm P)		0.003
S. ORGANIC CARBON (ppm)		1.2
T. KJELDAHL NITROGEN (ppm)		0.24
AMMONIA (ppm N)		0.01



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PARAMETERS	SAMPLE NO. I - 14		
CALCIUM (ppm)			36.2
MAGNESIUM (ppm)			15.7
CHLORIDE (ppm)			1.90
SULFATE (ppm)			10.3
T. ALKALINITY (ppm as CaCO ₃)			140
pH			7.97
CONDUCTANCE (umhos/cm)			285
COLOUR (pt.CO units)			< 5
TURBIDITY (JTU)			.72
T. DISSOLVED SOLIDS (mg/L)			185.
T. SUSPENDED SOLIDS (mg/L)			6.4
ACIDITY (ppm)			< 1.0
NITRATE-NITRITE (ppm N)			5.0
TOTAL PHOSPHOROUS (ppm P)		TOTAL	0.007
ARSENIC (ppm)		TOTAL	0.0002
CADMIUM (ppm)		TOTAL	< 0.001
COPPER (ppm)		TOTAL	< 0.001
IRON (ppm)		TOTAL	< 0.01
CHROMIUM (ppm)		TOTAL	< 0.001
MANGANESE (ppm)		TOTAL	< 0.01
ZINC (ppm)		TOTAL	0.007
LEAD (ppm)		TOTAL	< 0.002
BARIUM (ppm)		TOTAL	0.2
NICKEL (ppm)		TOTAL	< 0.001
MERCURY (ppm)		TOTAL	< 0.00010
T. HARDNESS (ppm as CaCO ₃)			155.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			< 0.003
S. ORGANIC PHOSPHATE (ppm ⁴ P)			< 0.003
S. ORGANIC CARBON (ppm)			0.8
T. KJELDAHL NITROGEN (ppm)			0.15
AMMONIA (ppm N)			< 0.01



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PARAMETERS	SAMPLE NO. L - 1	
CALCIUM (ppm)		10.6
MAGNESIUM (ppm)		3.29
CHLORIDE (ppm)		0.35
SULFATE (ppm)		2.8
T. ALKALINITY (ppm as CaCO ₃)		34.4
pH		6.92
CONDUCTANCE (umhos/cm)		74
COLOUR (pt.CO units)		50
TURBIDITY (JTU)		.45
T. DISSOLVED SOLIDS (mg/L)		52.
T. SUSPENDED SOLIDS (mg/L)		2
ACIDITY (ppm)		< 1.0
NITRATE-NITRITE (ppm N)		.139
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.006
ARSENIC (ppm)	0.0003	IONIC < 0.0002
CADMIUM (ppm)	< 0.001	< 0.001
COPPER (ppm)	0.006	0.003
IRON (ppm)	0.13	0.13
CHROMIUM (ppm)	0.001	< 0.001
MANGANESE (ppm)	< 0.01	< 0.01
ZINC (ppm)	0.061	0.061
LEAD (ppm)	0.042	< 0.002
BARIUM (ppm)	0.2	0.2
NICKEL (ppm)	0.004	0.004
MERCURY (ppm)	0.00032	0.00018
T. HARDNESS (ppm as CaCO ₃)		40.0
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.003
S. ORGANIC PHOSPHATE (ppm ⁴ P)		< 0.003
S. ORGANIC CARBON (ppm)		12.3
T. KJELDAHL NITROGEN (ppm)		0.50
AMMONIA (ppm N)		< 0.01



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PARAMETERS	SAMPLE NO. L - 2	
CALCIUM (ppm)		10.8
MAGNESIUM (ppm)		3.94
CHLORIDE (ppm)		0.70
SULFATE (ppm)		2.8
T. ALKALINITY (ppm as CaCO ₃)		39.2
pH		6.88
CONDUCTANCE (umhos/cm)		73
COLOUR pt.CO units)		60
TURBIDITY (JTU)		.50
T. DISSOLVED SOLIDS (mg/L)		55.
T. SUSPENDED SOLIDS (mg/L)		2.4
ACIDITY (ppm)		< 1.0
NITRATE-NITRITE (ppm N)		.5
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.008
ARSENIC (ppm)	0.0003	IONIC < 0.0002
CADMIUM (ppm)	< 0.001	< 0.001
COPPER (ppm)	0.003	0.001
IRON (ppm)	0.17	0.17
CHROMIUM (ppm)	< 0.001	< 0.001
MANGANESE (ppm)	0.02	< 0.01
ZINC (ppm)	0.101	0.008
LEAD (ppm)	0.028	< 0.002
BARIUM (ppm)	0.3	0.3
NICKEL (ppm)	< 0.001	< 0.001
MERCURY (ppm)	0.00025	0.00012
T. HARDNESS (ppm as CaCO ₃)		43.2
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.003
S. ORGANIC PHOSPHATE (ppm P)		< 0.003
S. ORGANIC CARBON (ppm)		17.5
T. KJELDAHL NITROGEN (ppm)		0.69
AMMONIA (ppm N)		0.17



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PARAMETERS	SAMPLE NO. L - 3		
CALCIUM (ppm)			31.1
MAGNESIUM (ppm)			8.96
CHLORIDE (ppm)			3.38
SULFATE (ppm)			3.7
T. ALKALINITY (ppm as CaCO ₃)			105
pH			7.12
CONDUCTANCE (umhos/cm)			210
COLOUR pt.CO units)			70
TURBIDITY (JTU)			1.6
T. DISSOLVED SOLIDS (mg/L)			140.
T. SUSPENDED SOLIDS (mg/L)			<.4
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			.46
TOTAL PHOSPHOROUS (ppm P)			0.010
	TOTAL		IONIC
ARSENIC (ppm)	0.0005		0.0005
CADMIUM (ppm)	<0.001		<0.001
COPPER (ppm)	0.003		0.002
IRON (ppm)	0.97		0.53
CHROMIUM (ppm)	<0.001		<0.001
MANGANESE (ppm)	0.14		0.14
ZINC (ppm)	0.085		0.023
LEAD (ppm)	<0.002		<0.002
BARIUM (ppm)	0.5		0.5
NICKEL (ppm)	0.002		0.001
MERCURY (ppm)	0.00020		0.00020
T. HARDNESS (ppm as CaCO ₃)			115.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.004
S. ORGANIC PHOSPHATE (ppm P)			<0.003
S. ORGANIC CARBON (ppm)			14.4
T. KJELDAHL NITROGEN (ppm)			0.58
AMMONIA (ppm N)			<0.01



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PARAMETERS	SAMPLE NO. L - 4
CALCIUM (ppm)	11.5
MAGNESIUM (ppm)	3.86
CHLORIDE (ppm)	1.10
SULFATE (ppm)	13.8
T. ALKALINITY (ppm as CaCO ₃)	32.8
pH	6.10
CONDUCTANCE (umhos/cm)	79
COLOUR (pt.CO units)	250.
TURBIDITY (JTU)	110.
T. DISSOLVED SOLIDS (mg/L)	55.
T. SUSPENDED SOLIDS (mg/L)	52.
ACIDITY (ppm)	< 1.0
NITRATE-NITRITE (ppm N)	5.0
TOTAL PHOSPHOROUS (ppm P)	TOTAL 0.049 IONIC
ARSENIC (ppm)	0.0014 0.0010
CADMIUM (ppm)	0.002 0.002
COPPER (ppm)	0.006 0.005
IRON (ppm)	8.82 4.92
CHROMIUM (ppm)	< 0.001 < 0.001
MANGANESE (ppm)	0.43 0.07
ZINC (ppm)	0.041 0.025
LEAD (ppm)	0.010 < 0.002
BARIUM (ppm)	0.5 0.2
NICKEL (ppm)	0.013 0.013
MERCURY (ppm)	0.00054 < 0.00010
T. HARDNESS (ppm as CaCO ₃)	44.6
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)	0.012
S. ORGANIC PHOSPHATE (ppm P)	0.003
S. ORGANIC CARBON (ppm)	32.7
T. KJELDAHL NITROGEN (ppm)	4.10
AMMONIA (ppm N)	0.09



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PARAMETERS	SAMPLE NO S - 2		
CALCIUM (ppm)			42.5
MAGNESIUM (ppm)			12.3
CHLORIDE (ppm)			0.35
SULFATE (ppm)			14.8
T. ALKALINITY (ppm as CaCO ₃)			135
pH			8.03
CONDUCTANCE (umhos/cm)			280
COLOUR (pt. CO units)			5
TURBIDITY (JTU)			.4
T. DISSOLVED SOLIDS (mg/L)			182.
T. SUSPENDED SOLIDS (mg/L)			< .4
ACIDITY (ppm)			< 1.0
NITRATE-NITRITE (ppm N)			11.5
TOTAL PHOSPHOROUS (ppm P)			0.003
	TOTAL		IONIC
ARSENIC (ppm)	0.0002		< 0.0002
CADMIUM (ppm)	< 0.001		< 0.001
COPPER (ppm)	0.002		< 0.001
IRON (ppm)	0.09		< 0.01
CHROMIUM (ppm)	< 0.001		< 0.001
MANGANESE (ppm)	0.01		< 0.01
ZINC (ppm)	0.026		0.007
LEAD (ppm)	0.020		< 0.002
BARIUM (ppm)	0.2		0.02
NICKEL (ppm)	< 0.001		< 0.001
MERCURY (ppm)	0.00010		< 0.00010
T. HARDNESS (ppm as CaCO ₃)			157.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.003
S. ORGANIC PHOSPHATE (ppm P)			< 0.003
S. ORGANIC CARBON (ppm)			1.7
T. KJELDAHL NITROGEN (ppm)			0.12
AMMONIA (ppm N)			< 0.01



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PARAMETERS	SAMPLE NO. S - 3	
CALCIUM (ppm)		41.2
MAGNESIUM (ppm)		13.3
CHLORIDE (ppm)		0.32
SULFATE (ppm)		12.6
T. ALKALINITY (ppm as CaCO ₃)		140
pH		8.09
CONDUCTANCE (umhos/cm)		281
COLOUR (pt.CO units)		< 5
TURBIDITY (JTU)		2.8
T. DISSOLVED SOLIDS (mg/L)		190.
T. SUSPENDED SOLIDS (mg/L)		8
ACIDITY (ppm)		< 1.0
NITRATE-NITRITE (ppm N)		10.9
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.011
ARSENIC (ppm)	0.0003	IONIC < 0.0002
CADMIUM (ppm)	< 0.001	< 0.001
COPPER (ppm)	0.002	< 0.001
IRON (ppm)	0.19	< 0.01
CHROMIUM (ppm)	< 0.001	< 0.001
MANGANESE (ppm)	0.01	< 0.01
ZINC (ppm)	0.018	0.005
LEAD (ppm)	0.017	< 0.002
BARIUM (ppm)	0.2	0.2
NICKEL (ppm)	< 0.001	< 0.001
MERCURY (ppm)	< 0.00010	< 0.00010
T. HARDNESS (ppm as CaCO ₃)		158.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.003
S. ORGANIC PHOSPHATE (ppm P)		< 0.003
S. ORGANIC CARBON (ppm)		2.1
T. KJELDAHL NITROGEN (ppm)		0.20
AMMONIA (ppm N)		0.02



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PARAMETERS	SAMPLE NO. W-1		
CALCIUM (ppm)			36.2
MAGNESIUM (ppm)			14.1
CHLORIDE (ppm)			1.60
SULFATE (ppm)			9.5
T. ALKALINITY (ppm as CaCO ₃)			133
pH			7.90
CONDUCTANCE (umhos/cm)			265
COLOUR (pt. CO units)			< 5
TURBIDITY (JTU)			1.5
T. DISSOLVED SOLIDS (mg/L)			180.
T. SUSPENDED SOLIDS (mg/L)			8
ACIDITY (ppm)			< 1.0
NITRATE-NITRITE (ppm N)			.51
TOTAL PHOSPHOROUS (ppm P)		TOTAL	0.007
ARSENIC (ppm)		TOTAL	0.0003
CADMIUM (ppm)		TOTAL	< 0.001
COPPER (ppm)		TOTAL	0.002
IRON (ppm)		TOTAL	0.04
CHROMIUM (ppm)		TOTAL	< 0.001
MANGANESE (ppm)		TOTAL	< 0.01
ZINC (ppm)		TOTAL	0.016
LEAD (ppm)		TOTAL	0.016
BARIUM (ppm)		TOTAL	0.5
NICKEL (ppm)		TOTAL	< 0.001
MERCURY (ppm)		TOTAL	< 0.00010
T. HARDNESS (ppm as CaCO ₃)			148.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.003
S. ORGANIC PHOSPHATE (ppm P)			< 0.003
S. ORGANIC CARBON (ppm)			0.6
T. KJELDAHL NITROGEN (ppm)			0.39
AMMONIA (ppm N)			0.03
		IONIC	
		TOTAL	0.0002
		TOTAL	< 0.001
		TOTAL	< 0.001
		TOTAL	< 0.01
		TOTAL	< 0.001
		TOTAL	< 0.01
		TOTAL	0.005
		TOTAL	< 0.002
		TOTAL	0.5
		TOTAL	< 0.001
		TOTAL	< 0.00010



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PARAMETERS	SAMPLE NO. W - 4	
CALCIUM (ppm)		34.9
MAGNESIUM (ppm)		16.0
CHLORIDE (ppm)		1.32
SULFATE (ppm)		12.0
T. ALKALINITY (ppm as CaCO ₃)		129
pH		8.09
CONDUCTANCE (umhos/cm)		267
COLOUR pt.CO units)		< 5
TURBIDITY (JTU)		.15
T DISSOLVED SOLIDS (mg/L)		180.
T SUSPENDED SOLIDS (mg/L)		2
ACIDITY (ppm)		< 1.0
NITRATE-NITRITE (ppm N)		.55
TOTAL PHOSPHOROUS (ppm P)	TOTAL	< 0.003
ARSENIC (ppm)	< 0.0002	IONIC < 0.0002
CADMIUM (ppm)	< 0.001	< 0.001
COPPER (ppm)	0.029	< 0.001
IRON (ppm)	< 0.01	< 0.01
CHROMIUM (ppm)	< 0.001	< 0.001
MANGANESE (ppm)	< 0.01	< 0.01
ZINC (ppm)	0.055	0.003
LEAD (ppm)	0.016	< 0.002
BARIUM (ppm)	0.5	0.3
NICKEL (ppm)	< 0.001	< 0.001
MERCURY (ppm)	< 0.00010	< 0.00010
T. HARDNESS (ppm as CaCO ₃)		153.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		< 0.003
S. ORGANIC PHOSPHATE (ppm P)		< 0.003
S. ORGANIC CARBON (ppm)		2.5
T. KJELDAHL NITROGEN (ppm)		0.20
AMMONIA (ppm N)		< 0.01



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PARAMETERS	SAMPLE NO. W - 8		
CALCIUM (ppm)			39.3
MAGNESIUM (ppm)			16.3
CHLORIDE (ppm)			1.52
SULFATE (ppm)			12.3
T. ALKALINITY (ppm as CaCO ₃)			143
pH			8.06
CONDUCTANCE (umhos/cm)			290
COLOUR pt.CO units)			< 5
TURBIDITY (JTU)			.70
T. DISSOLVED SOLIDS (mg/L)			195.
T. SUSPENDED SOLIDS (mg/L)			3.2
ACIDITY (ppm)			< 1.0
NITRATE-NITRITE (ppm N)			31.5
TOTAL PHOSPHOROUS (ppm P)			0.009
	TOTAL		IONIC
ARSENIC (ppm)	< 0.0002		< 0.0002
CADMIUM (ppm)	< 0.001		< 0.001
COPPER (ppm)	0.002		< 0.001
IRON (ppm)	0.05		< 0.01
CHROMIUM (ppm)	< 0.001		< 0.001
MANGANESE (ppm)	< 0.01		< 0.01
ZINC (ppm)	0.058		0.003
LEAD (ppm)	< 0.002		< 0.002
BARIUM (ppm)	0.4		0.3
NICKEL (ppm)	< 0.001		< 0.001
MERCURY (ppm)	0.00024		0.00018
T. HARDNESS (ppm as CaCO ₃)			165.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.007
S. ORGANIC PHOSPHATE (ppm P)			0.003
S. ORGANIC CARBON (ppm)			7.7
T. KJELDAHL NITROGEN (ppm)			0.50
AMMONIA (ppm N)			0.11



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PARAMETERS	SAMPLE NO. W - 10	
CALCIUM (ppm)		38.9
MAGNESIUM (ppm)		15.3
CHLORIDE (ppm)		1.04
SULFATE (ppm)		12.0
T. ALKALINITY (ppm as CaCO ₃)		145
pH		8.14
CONDUCTANCE (umhos/cm)		294
COLOUR (pt. CO units)		< 5
TURBIDITY (JTU)		.35
T. DISSOLVED SOLIDS (mg/L)		200.
T. SUSPENDED SOLIDS (mg/L)		2.4
ACIDITY (ppm)		< 1.0
NITRATE-NITRITE (ppm N)		.255
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.014
ARSENIC (ppm)	< 0.0002	IONIC < 0.0002
CADMIUM (ppm)	< 0.001	< 0.001
COPPER (ppm)	0.003	0.001
IRON (ppm)	0.27	< 0.01
CHROMIUM (ppm)	< 0.001	< 0.001
MANGANESE (ppm)	0.02	< 0.01
ZINC (ppm)	0.051	0.012
LEAD (ppm)	0.010	< 0.002
BARIUM (ppm)	0.2	0.2
NICKEL (ppm)	< 0.001	< 0.001
MERCURY (ppm)	0.00018	0.00010
T. HARDNESS (ppm as CaCO ₃)		160.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.003
S. ORGANIC PHOSPHATE (ppm P)		< 0.003
S. ORGANIC CARBON (ppm)		1.0
T. KJELDAHL NITROGEN (ppm)		0.36
AMMONIA (ppm N)		< 0.01



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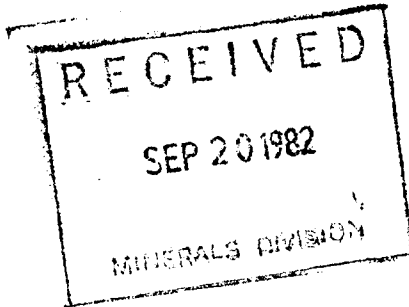
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PARAMETERS	SAMPLE NO. W - 12		
CALCIUM (ppm)			42.3
MAGNESIUM (ppm)			15.9
CHLORIDE (ppm)			8.70
SULFATE (ppm)			16.0
T. ALKALINITY (ppm as CaCO ₃)			151
pH			7.95
CONDUCTANCE (umhos/cm)			345
COLOUR (pt.CO units)			<5
TURBIDITY (JTU)			.9
T. DISSOLVED SOLIDS (mg/L)			235.
T. SUSPENDED SOLIDS (mg/L)			4.4
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			16.7
TOTAL PHOSPHOROUS (ppm P)	TOTAL		0.006
ARSENIC (ppm)			< 0.0002
CADMIUM (ppm)	< 0.001		< 0.001
COPPER (ppm)	0.002		< 0.001
IRON (ppm)	0.04		< 0.01
CHROMIUM (ppm)	0.002		< 0.001
MANGANESE (ppm)	0.01		< 0.01
ZINC (ppm)	0.040		0.004
LEAD (ppm)	< 0.002		< 0.002
BARIUM (ppm)	0.02	<i>+SP checked by Chemex</i>	0.2
NICKEL (ppm)	0.004		< 0.001
MERCURY (ppm)	< 0.00010		< 0.00010
T. HARDNESS (ppm as CaCO ₃)			171.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.004
S. ORGANIC PHOSPHATE (ppm ⁴ P)			< 0.003
S. ORGANIC CARBON (ppm)			3.5
T. KJELDAHL NITROGEN (ppm)			0.30
AMMONIA (ppm N)			0.03



Calgary, Alberta

Glenn Brown
Aberford Resources Ltd.,
4th Floor,
500 - 4th Avenue S.W.,
Calgary, Alberta



Dear Glenn:

I hope that this letter will clarify some of the problems we encountered in the environmental water samples.

1. The Barium analysis submitted to you Dec. 21, 1981 PROTECT 0411-5-6070 are very suspectible, the values are extremely high. I would suggest that you eliminate these from your data base. We were having problems with the Barium A.A. lamp at the time, however it was not realized immediately. Please accept my apologies for any inconvenience this may have caused. We will credit the cost of these ZZ analyses to your next invoice. The data sent to you March 11, is correct in consideration that the methodology in use at that time had a detection limit of .1 ppm Barium and a standard diviation of ± 0.1 ppm using direct aspiration atomic absorption and a nitrous oxide acetylene flame. The data enclosed submitted to you April 30th has been re-run using our recently acquired Varian GTA-95 graphite tube furnace atomizer. The procedure is far superior to previous methodology offering better detection limits and reproducibility. It is the objective of Chemex to provide accurate and realible analytical data to our clients.

- Also permits better alumina analysis

Thank you for pointing out your concerns, we are confident that our recent instrument acquisition was negated previous problems.

Yours truly,

CHEMEX LABS (ALBERTA) LTD.,

Don LaBerge
Manager Analytical Services

DL/tr



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PARAMETERS	SAMPLE NO. I - 4	
CALCIUM (ppm)		40.5
MAGNESIUM (ppm)		12.1
CHLORIDE (ppm)		0.3
SULFATE (ppm)		20.0
T. ALKALINITY (ppm as CaCO ₃)		120
pH		8.01
CONDUCTANCE (umhos/cm)		247
COLOUR (pt. CO units)		< 5
TURBIDITY (JTU)		4.8
T. DISSOLVED SOLIDS (mg/L)		165.
T. SUSPENDED SOLIDS (mg/L)		10.8
ACIDITY (ppm)		< 1.0
NITRATE-NITRITE (ppm N)		64.
TOTAL PHOSPHOROUS (ppm P)		0.006
ARSENIC (ppm)	TOTAL	IONIC
CADMIUM (ppm)	0.0004	0.0004
COPPER (ppm)	< 0.001	< 0.001
IRON (ppm)	0.005	0.002
CHROMIUM (ppm)	0.07	< 0.01
MANGANESE (ppm)	< 0.001	< 0.001
ZINC (ppm)	< 0.01	< 0.01
LEAD (ppm)	0.047	0.007
BIARIUM (ppm)	0.011	< 0.002
NICKEL (ppm)	.23	0.03
MERCURY (ppm)	0.001	< 0.001
T. HARDNESS (ppm as CaCO ₃)	0.00016	0.00016
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		151.
S. ORGANIC PHOSPHATE (ppm P)		0.004
S. ORGANIC CARBON (ppm)		< 0.003
T. KJELDAHL NITROGEN (ppm)		1.1
AMMONIA (ppm N)		0.56
		< 0.01



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PARAMETERS	SAMPLE NO. I - 6	
CALCIUM (ppm)	50.0	
MAGNESIUM (ppm)	14.8	
CHLORIDE (ppm)	0.3	
SULFATE (ppm)	20.7	
T. ALKALINITY (ppm as CaCO ₃)	133	
pH	7.64	
CONDUCTANCE (umhos/cm)	326	
COLOUR pt.CO units)	< 5	
TURBIDITY (JTU)	2.8	
T. DISSOLVED SOLIDS (mg/L)	220.	
T. SUSPENDED SOLIDS (mg/L)	7.6	
ACIDITY (ppm)	< 1.0	
NITRATE-NITRITE (ppm N)	.48	
TOTAL PHOSPHOROUS (ppm P)	0.013	
ARSENIC (ppm)	TOTAL 0.0004	IONIC 0.0002
CADMIUM (ppm)	< 0.001	< 0.001
COPPER (ppm)	0.003	0.001
IRON (ppm)	0.17	< 0.01
CHROMIUM (ppm)	< 0.001	< 0.001
MANGANESE (ppm)	< 0.01	< 0.01
ZINC (ppm)	0.031	0.006
LEAD (ppm)	0.002	< 0.002
BARIUM (ppm)	.13	.05
NICKEL (ppm)	0.003	0.002
MERCURY (ppm)	0.00024	0.00024
T. HARDNESS (ppm as CaCO ₃)	186.	
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)	< 0.003	
S. ORGANIC PHOSPHATE (ppm ₄ P)	< 0.003	
S. ORGANIC CARBON (ppm)	1.2	
T. KJELDAHL NITROGEN (ppm)	0.20	
AMMONIA (ppm N)	< 0.01	



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PARAMETERS	SAMPLE NO. I - 8		
CALCIUM (ppm)		43.2	
MAGNESIUM (ppm)		12.4	
CHLORIDE (ppm)		0.25	
SULFATE (ppm)		16.8	
T. ALKALINITY (ppm as CaCO ₃)		118	
pH		7.83	
CONDUCTANCE (umhos/cm)		5522	
COLOUR (pt.CO units)		< 5	
TURBIDITY (JTU)		.24	
T. DISSOLVED SOLIDS (mg/L)		3600.	
T. SUSPENDED SOLIDS (mg/L)		.4	
ACIDITY (ppm)		< 1.0	
NITRATE-NITRITE (ppm N)		8.5	
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.003	IONIC
ARSENIC (ppm)	0.0002		< 0.0002
CADMIUM (ppm)	< 0.001		< 0.001
COPPER (ppm)	0.002		0.001
IRON (ppm)	0.02		< 0.01
CHROMIUM (ppm)	< 0.001		< 0.001
MANGANESE (ppm)	< 0.01		< 0.01
ZINC (ppm)	0.011		0.011
LEAD (ppm)	0.011		0.011
BARIUM (ppm)	.07		0.03
NICKEL (ppm)	0.001		< 0.001
MERCURY (ppm)	0.00018		0.00010
T. HARDNESS (ppm as CaCO ₃)		159	
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.003	
S. ORGANIC PHOSPHATE (ppm P)		< 0.003	
S. ORGANIC CARBON (ppm)		1.4	
T. KJELDAHL NITROGEN (ppm)		0.40	
AMMONIA (ppm N)		< 0.01	

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PARAMETERS	SAMPLE I - 11	
CALCIUM (ppm)		47.3
MAGNESIUM (ppm)		13.3
CHLORIDE (ppm)		0.32
SULFATE (ppm)		15.3
T. ALKALINITY (ppm as CaCO ₃)		150
pH		7.87
CONDUCTANCE (umhos/cm)		314
COLOUR pt. CO units)		<5
TURBIDITY (JTU)		.22
T. DISSOLVED SOLIDS (mg/L)		210.
T. SUSPENDED SOLIDS (mg/L)		1.6
ACIDITY (ppm)		<1.0
NITRATE-NITRITE (ppm N)		.345
TOTAL PHOSPHOROUS (ppm P)	TOTAL	<0.003
ARSENIC (ppm)	0.0002	IONIC <0.0002
CADMIUM (ppm)	<0.001	<0.001
COPPER (ppm)	0.002	<0.001
IRON (ppm)	0.07	<0.01
CHROMIUM (ppm)	<0.001	<0.001
MANGANESE (ppm)	<0.01	<0.01
ZINC (ppm)	0.057	0.007
LEAD (ppm)	<0.002	<0.002
BARIUM (ppm)	.11	0.03
NICKEL (ppm)	<0.001	<0.001
MERCURY (ppm)	<0.00010	<0.00010
T. HARDNESS (ppm as CaCO ₃)		173.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		<0.003
S. ORGANIC PHOSPHATE (ppm P)		0.003
S. ORGANIC CARBON (ppm)		1.2
T. KJELDAHL NITROGEN (ppm)		0.24
AMMONIA (ppm N)		0.01



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PARAMETERS	SAMPLE NO. I - 14		
CALCIUM (ppm)			36.2
MAGNESIUM (ppm)			15.7
CHLORIDE (ppm)			1.90
SULFATE (ppm)			10.3
T. ALKALINITY (ppm as CaCO ₃)			140
pH			7.97
CONDUCTANCE (umhos/cm)			285
COLOUR pt.CO units)			< 5
TURBIDITY (JTU)			.72
T. DISSOLVED SOLIDS (mg/L)			185.
T. SUSPENDED SOLIDS (mg/L)			6.4
ACIDITY (ppm)			< 1.0
NITRATE-NITRITE (ppm N)			5.0
TOTAL PHOSPHOROUS (ppm P)	TOTAL		0.007
ARSENIC (ppm)		IONIC	0.0002
CADMIUM (ppm)	0.0003		< 0.001
COPPER (ppm)	< 0.001		< 0.001
IRON (ppm)	0.003		< 0.01
CHROMIUM (ppm)	0.22		< 0.001
MANGANESE (ppm)	0.001		< 0.01
ZINC (ppm)	< 0.01		0.007
LEAD (ppm)	0.045		< 0.002
BARIUM (ppm)	0.011		.02
NICKEL (ppm)	.06		< 0.001
MERCURY (ppm)	< 0.001		< 0.00010
T. HARDNESS (ppm as CaCO ₃)			0.00011
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			155.
S. ORGANIC PHOSPHATE (ppm P)			< 0.003
S. ORGANIC CARBON (ppm)			< 0.003
T. KJELDAHL NITROGEN (ppm)			0.8
AMMONIA (ppm N)			0.15
			< 0.01



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PARAMETERS	SAMPLE NO. L - 1	
CALCIUM (ppm)		10.6
MAGNESIUM (ppm)		3.29
CHLORIDE (ppm)		0.35
SULFATE (ppm)		2.8
T. ALKALINITY (ppm as CaCO ₃)		34.4
pH		6.92
CONDUCTANCE (umhos/cm)		74
COLOUR pt.CO units)		50
TURBIDITY (JTU)		.45
T. DISSOLVED SOLIDS (mg/L)		52.
T. SUSPENDED SOLIDS (mg/L)		2
ACIDITY (ppm)		< 1.0
NITRATE-NITRITE (ppm N)		.139
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.006
ARSENIC (ppm)	0.0003	IONIC < 0.0002
CADMIUM (ppm)	< 0.001	< 0.001
COPPER (ppm)	0.006	0.003
IRON (ppm)	0.13	0.13
CHROMIUM (ppm)	0.001	< 0.001
MANGANESE (ppm)	< 0.01	< 0.01
ZINC (ppm)	0.061	0.061
LEAD (ppm)	0.042	< 0.002
BARIUM (ppm)	.06	< 0.01
NICKEL (ppm)	0.004	0.004
MERCURY (ppm)	0.00032	0.00018
T. HARDNESS (ppm as CaCO ₃)		40.0
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.003
S. ORGANIC PHOSPHATE (ppm P)		< 0.003
S. ORGANIC CARBON (ppm)		12.3
T. KJELDAHL NITROGEN (ppm)		0.50
AMMONIA (ppm N)		< 0.01



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PARAMETERS	SAMPLE NO. L - 2		
CALCIUM (ppm)			10.8
MAGNESIUM (ppm)			3.94
CHLORIDE (ppm)			0.70
SULFATE (ppm)			2.8
T. ALKALINITY (ppm as CaCO ₃)			39.2
pH			6.88
CONDUCTANCE (umhos/cm)			73
COLOUR (pt. CO units)			60
TURBIDITY (JTU)			.50
T. DISSOLVED SOLIDS (mg/L)			55.
T. SUSPENDED SOLIDS (mg/L)			2.4
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			.5
TOTAL PHOSPHOROUS (ppm P)	TOTAL		0.008
ARSENIC (ppm)	0.0003		IONIC < 0.0002
CADMIUM (ppm)	< 0.001		< 0.001
COPPER (ppm)	0.003		0.001
IRON (ppm)	0.17		0.17
CHROMIUM (ppm)	< 0.001		< 0.001
MANGANESE (ppm)	0.02		< 0.01
ZINC (ppm)	0.101		0.008
LEAD (ppm)	0.028		< 0.002
BARIUM (ppm)	.06		.05
NICKEL (ppm)	< 0.001		< 0.001
MERCURY (ppm)	0.00025		0.00012
T. HARDNESS (ppm as CaCO ₃)			43.2
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.003
S. ORGANIC PHOSPHATE (ppm P)			< 0.003
S. ORGANIC CARBON (ppm)			17.5
T. KJELDAHL NITROGEN (ppm)			0.69
AMMONIA (ppm N)			0.17



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PARAMETERS	SAMPLE NO. L - 3	
CALCIUM (ppm)	31.1	
MAGNESIUM (ppm)	8.96	
CHLORIDE (ppm)	3.38	
SULFATE (ppm)	3.7	
T. ALKALINITY (ppm as CaCO ₃)	105	
pH	7.12	
CONDUCTANCE (umhos/cm)	210	
COLOUR (pt. CO units)	70	
TURBIDITY (JTU)	1.6	
T. DISSOLVED SOLIDS (mg/L)	140.	
T. SUSPENDED SOLIDS (mg/L)	< .4	
ACIDITY (ppm)	< 1.0	
NITRATE-NITRITE (ppm N)	.46	
TOTAL PHOSPHOROUS (ppm P)	0.010	IONIC
ARSENIC (ppm)	0.0005	0.0005
CADMIUM (ppm)	< 0.001	< 0.001
COPPER (ppm)	0.003	0.002
IRON (ppm)	0.97	0.53
CHROMIUM (ppm)	< 0.001	< 0.001
MANGANESE (ppm)	0.14	0.14
ZINC (ppm)	0.085	0.023
LEAD (ppm)	< 0.002	< 0.002
BARIUM (ppm)	.17	.03
NICKEL (ppm)	0.002	0.001
MERCURY (ppm)	0.00020	0.00020
T. HARDNESS (ppm as CaCO ₃)	115.	
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)	0.004	
S. ORGANIC PHOSPHATE (ppm P)	< 0.003	
S. ORGANIC CARBON (ppm)	14.4	
T. KJELDAHL NITROGEN (ppm)	0.58	
AMMONIA (ppm N)	< 0.01	



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ATTENTION: Glenn Brown

Pan Ocean

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PARAMETERS	SAMPLE NO. L - 4		
CALCIUM (ppm)			11.5
MAGNESIUM (ppm)			3.86
CHLORIDE (ppm)			1.10
SULFATE (ppm)			13.8
T. ALKALINITY (ppm as CaCO ₃)			32.8
pH			6.10
CONDUCTANCE (umhos/cm)			79
COLOUR (pt.CO units)			250.
TURBIDITY (JTU)			110.
T. DISSOLVED SOLIDS (mg/L)			55.
T. SUSPENDED SOLIDS (mg/L)			52.
ACIDITY (ppm)			< 1.0
NITRATE-NITRITE (ppm N)			5.0
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.049	IONIC
ARSENIC (ppm)	0.0014		0.0010
CADMIUM (ppm)	0.002		0.002
COPPER (ppm)	0.006		0.005
IRON (ppm)	8.82		4.92
CHROMIUM (ppm)	< 0.001		< 0.001
MANGANESE (ppm)	0.43		0.07
ZINC (ppm)	0.041		0.025
LEAD (ppm)	0.010		< 0.002
BARIUM (ppm)	.11		.04
NICKEL (ppm)	0.013		0.013
MERCURY (ppm)	0.00054		< 0.00010
T. HARDNESS (ppm as CaCO ₃)			44.6
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.012
S. ORGANIC PHOSPHATE (ppm P)			0.003
S. ORGANIC CARBON (ppm)			32.7
T. KJELDAHL NITROGEN (ppm)			4.10
AMMONIA (ppm N)			0.09



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PARAMETERS	SAMPLE NO S - 2	
CALCIUM (ppm)		42.5
MAGNESIUM (ppm)		12.3
CHLORIDE (ppm)		0.35
SULFATE (ppm)		14.8
T. ALKALINITY (ppm as CaCO ₃)		135
pH		8.03
CONDUCTANCE (umhos/cm)		280
COLOUR (pt. CO units)		5
TURBIDITY (JTU)		.4
T. DISSOLVED SOLIDS (mg/L)		182.
T. SUSPENDED SOLIDS (mg/L)		<.4
ACIDITY (ppm)		<1.0
NITRATE-NITRITE (ppm N)		11.5
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.003
ARSENIC (ppm)	0.0002	IONIC <0.0002
CADMIUM (ppm)	<0.001	<0.001
COPPER (ppm)	0.002	<0.001
IRON (ppm)	0.09	<0.01
CHROMIUM (ppm)	<0.001	<0.001
MANGANESE (ppm)	0.01	<0.01
ZINC (ppm)	0.026	0.007
LEAD (ppm)	0.020	<0.002
BARIUM (ppm)	.11	.03
NICKEL (ppm)	<0.001	<0.001
MERCURY (ppm)	0.00010	<0.00010
T. HARDNESS (ppm as CaCO ₃)		157.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.003
S. ORGANIC PHOSPHATE (ppm P)		<0.003
S. ORGANIC CARBON (ppm)		1.7
T. KJELDAHL NITROGEN (ppm)		0.12
AMMONIA (ppm N)		<0.01



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PARAMETERS	SAMPLE NO. S - 3	
CALCIUM (ppm)		41.2
MAGNESIUM (ppm)		13.3
CHLORIDE (ppm)		0.32
SULFATE (ppm)		12.6
T. ALKALINITY (ppm as CaCO ₃)		140
pH		8.09
CONDUCTANCE (umhos/cm)		281
COLOUR (pt.CO units)		< 5
TURBIDITY (JTU)		2.8
T. DISSOLVED SOLIDS (mg/L)		190.
T. SUSPENDED SOLIDS (mg/L)		8
ACIDITY (ppm)		<1.0
NITRATE-NITRITE (ppm N)		10.9
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.011
ARSENIC (ppm)	TOTAL	<0.0002
CADMIUM (ppm)	TOTAL	<0.001
COPPER (ppm)	TOTAL	<0.001
IRON (ppm)	TOTAL	<0.01
CHROMIUM (ppm)	TOTAL	<0.001
MANGANESE (ppm)	TOTAL	<0.01
ZINC (ppm)	TOTAL	0.005
LEAD (ppm)	TOTAL	<0.002
BARIUM (ppm)	TOTAL	.05
NICKEL (ppm)	TOTAL	<0.001
MERCURY (ppm)	TOTAL	<0.00010
T. HARDNESS (ppm as CaCO ₃)		158.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.003
S. ORGANIC PHOSPHATE (ppm ⁴ P)		< 0.003
S. ORGANIC CARBON (ppm)		2.1
T. KJELDAHL NITROGEN (ppm)		0.20
AMMONIA (ppm N)		0.02

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PARAMETERS	SAMPLE NO. W-1
CALCIUM (ppm)	36.2
MAGNESIUM (ppm)	14.1
CHLORIDE (ppm)	1.60
SULFATE (ppm)	9.5
T. ALKALINITY (ppm as CaCO ₃)	133
pH	7.90
CONDUCTANCE (umhos/cm)	265
COLOUR pt.CO units)	< 5
TURBIDITY (JTU)	1.5
T. DISSOLVED SOLIDS (mg/L)	180.
T. SUSPENDED SOLIDS (mg/L)	8
ACIDITY (ppm)	< 1.0
NITRATE-NITRITE (ppm N)	.51
TOTAL PHOSPHOROUS (ppm P)	0.007
ARSENIC (ppm)	TOTAL 0.0003 IONIC 0.0002
CADMIUM (ppm)	< 0.001 < 0.001
COPPER (ppm)	0.002 < 0.001
IRON (ppm)	0.04 < 0.01
CHROMIUM (ppm)	< 0.001 < 0.001
MANGANESE (ppm)	< 0.01 < 0.01
ZINC (ppm)	0.016 0.005
LEAD (ppm)	0.016 < 0.002
BARIUM (ppm)	.09 .01
NICKEL (ppm)	< 0.001 < 0.001
MERCURY (ppm)	< 0.00010 < 0.00010
T. HARDNESS (ppm as CaCO ₃)	148.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)	0.003
S. ORGANIC PHOSPHATE (ppm ⁴ P)	< 0.003
S. ORGANIC CARBON (ppm)	0.6
T. KJELDAHL NITROGEN (ppm)	0.39
AMMONIA (ppm N)	0.03

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PARAMETERS	SAMPLE NO. W - 4	
CALCIUM (ppm)	34.9	
MAGNESIUM (ppm)	16.0	
CHLORIDE (ppm)	1.32	
SULFATE (ppm)	12.0	
T. ALKALINITY (ppm as CaCO ₃)	129	
pH	8.09	
CONDUCTANCE (umhos/cm)	267	
COLOUR pt.CO units)	< 5	
TURBIDITY (JTU)	.15	
T DISSOLVED SOLIDS (mg/L)	180.	
T SUSPENDED SOLIDS (mg/L)	2	
ACIDITY (ppm)	< 1.0	
NITRATE-NITRITE (ppm N)	.55	
TOTAL PHOSPHOROUS (ppm P)	TOTAL	< 0.003
ARSENIC (ppm)	< 0.0002	IONIC
CADMIUM (ppm)	< 0.001	< 0.0002
COPPER (ppm)	0.029	< 0.001
IRON (ppm)	< 0.01	< 0.01
CHROMIUM (ppm)	< 0.001	< 0.001
MANGANESE (ppm)	< 0.01	< 0.01
ZINC (ppm)	0.055	0.003
LEAD (ppm)	0.016	< 0.002
BARIUM (ppm)	.07	0.02
NICKEL (ppm)	< 0.001	< 0.001
MERCURY (ppm)	< 0.00010	< 0.00010
T. HARDNESS (ppm as CaCO ₃)	153.	
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)	< 0.003	
S. ORGANIC PHOSPHATE (ppm P)	< 0.003	
S. ORGANIC CARBON (ppm)	2.5	
T. KJELDAHL NITROGEN (ppm)	0.20	
AMMONIA (ppm N)	< 0.01	

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PARAMETERS	SAMPLE NO. W - 8	
CALCIUM (ppm)		39.3
MAGNESIUM (ppm)		16.3
CHLORIDE (ppm)		1.52
SULFATE (ppm)		12.3
T. ALKALINITY (ppm as CaCO ₃)		143
pH		8.06
CONDUCTANCE (umhos/cm)		290
COLOUR (pt. CO units)		< 5
TURBIDITY (JTU)		.70
T. DISSOLVED SOLIDS (mg/L)		195.
T. SUSPENDED SOLIDS (mg/L)		3.2
ACIDITY (ppm)		< 1.0
NITRATE-NITRITE (ppm N)		31.5
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.009
ARSENIC (ppm)	< 0.0002	IONIC < 0.0002
CADMIUM (ppm)	< 0.001	< 0.001
COPPER (ppm)	0.002	< 0.001
IRON (ppm)	0.05	< 0.01
CHROMIUM (ppm)	< 0.001	< 0.001
MANGANESE (ppm)	< 0.01	< 0.01
ZINC (ppm)	0.058	0.003
LEAD (ppm)	< 0.002	< 0.002
BARIUM (ppm)	.16	.03
NICKEL (ppm)	< 0.001	< 0.001
MERCURY (ppm)	0.00024	0.00018
T. HARDNESS (ppm as CaCO ₃)		165.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.007
S. ORGANIC PHOSPHATE (ppm P)		0.003
S. ORGANIC CARBON (ppm)		7.7
T. KJELDAHL NITROGEN (ppm)		0.50
AMMONIA (ppm N)		0.11



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PARAMETERS	SAMPLE NO. W - 10	
CALCIUM (ppm)		38.9
MAGNESIUM (ppm)		15.3
CHLORIDE (ppm)		1.04
SULFATE (ppm)		12.0
T. ALKALINITY (ppm as CaCO ₃)		145
pH		8.14
CONDUCTANCE (umhos/cm)		294
COLOUR (pt. CO units)		< 5
TURBIDITY (JTU)		.35
T. DISSOLVED SOLIDS (mg/L)		200.
T. SUSPENDED SOLIDS (mg/L)		2.4
ACIDITY (ppm)		< 1.0
NITRATE-NITRITE (ppm N)		.255
TOTAL PHOSPHOROUS (ppm P)	TOTAL	0.014
ARSENIC (ppm)	< 0.0002	IONIC < 0.0002
CADMIUM (ppm)	< 0.001	< 0.001
COPPER (ppm)	0.003	0.001
IRON (ppm)	0.27	< 0.01
CHROMIUM (ppm)	< 0.001	< 0.001
MANGANESE (ppm)	0.02	< 0.01
ZINC (ppm)	0.051	0.012
LEAD (ppm)	0.010	< 0.002
BARIUM (ppm)	.17	.06
NICKEL (ppm)	< 0.001	< 0.001
MERCURY (ppm)	0.00018	0.00010
T. HARDNESS (ppm as CaCO ₃)		160.
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.003
S. ORGANIC PHOSPHATE (ppm P)		< 0.003
S. ORGANIC CARBON (ppm)		1.0
T. KJELDAHL NITROGEN (ppm)		0.36
AMMONIA (ppm N)		< 0.01



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PARAMETERS	SAMPLE NO. W - 12		
CALCIUM (ppm)			42.3
MAGNESIUM (ppm)			15.9
CHLORIDE (ppm)			8.70
SULFATE (ppm)			16.0
T. ALKALINITY (ppm as CaCO ₃)			151
pH			7.95
CONDUCTANCE (umhos/cm)			345
COLOUR (pt. CO units)			<5
TURBIDITY (JTU)			.9
T. DISSOLVED SOLIDS (mg/L)			235.
T. SUSPENDED SOLIDS (mg/L)			4.4
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			16.7
TOTAL PHOSPHOROUS (ppm P)	TOTAL		0.006
ARSENIC (ppm)		0.0002	< 0.0002
CADMIUM (ppm)		<0.001	<0.001
COPPER (ppm)		0.002	<0.001
IRON (ppm)		0.04	<0.01
CHROMIUM (ppm)		0.002	<0.001
MANGANESE (ppm)		0.01	<0.01
ZINC (ppm)		0.040	0.004
LEAD (ppm)		<0.002	<0.002
BARIUM (ppm)		.14	0.03
NICKEL (ppm)		0.004	<0.001
MERCURY (ppm)		<0.00010	<0.00010
T. HARDNESS (ppm as CaCO ₃)			171.
S. REACTIVE PHOSPHATE (OPO) (ppm P)			0.004
S. ORGANIC PHOSPHATE (ppm P)			<0.003
S. ORGANIC CARBON (ppm)			3.5
T. KJELDAHL NITROGEN (ppm)			0.30
AMMONIA (ppm N)			0.03



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WATER ANALYSIS

PROJECT NO. **82 0036 5 2157**

PARAMETERS	SAMPLE NO. I - 2		
CALCIUM (ppm)			13.7
MAGNESIUM (ppm)			3.9
CHLORIDE (ppm)			0.60
SULFATE (ppm)			6.1
T. ALKALINITY (ppm as CaCO ₃)			43.2
pH			7.65
CONDUCTANCE (umhos/cm)			93.0
COLOUR pt.CO units)			25
TURBIDITY (JTU)			1.2
T. DISSOLVED SOLIDS (mg/L)			65.
T. SUSPENDED SOLIDS (mg/L)			0.8
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			0.007
TOTAL PHOSPHOROUS (ppm P)			0.016
ARSENIC (ppm)	DISS		TOTAL
CADMIUM (ppm)	0.0003		0.0006
COPPER (ppm)	<0.001		<0.001
IRON (ppm)	0.002		0.003
CHROMIUM (ppm)	0.08		0.08
MANGANESE (ppm)	<0.001		<0.001
ZINC (ppm)	<0.01		<0.01
LEAD (ppm)	0.005		0.028
BARIUM (ppm)	<0.002		0.11
NICKEL (ppm)	0.04		0.05
MERCURY (ppm)	<0.001		<0.001
	<0.00010		<0.00010
T. HARDNESS (ppm as CaCO ₃)			48.2
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			<0.003
S. ORGANIC PHOSPHATE (ppm P)			0.009
S. ORGANIC CARBON (ppm)			9.7
T. KJELDAHL NITROGEN (ppm)			0.58
AMMONIA (ppm N)			0.03

** Aluminium added, see following data sheet.*



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PARAMETERS	SAMPLE I4
CALCIUM (ppm)	23.0
MAGNESIUM (ppm)	7.8
CHLORIDE (ppm)	0.58
SULFATE (ppm)	9.4
T. ALKALINITY (ppm as CaCO ₃)	96
pH	7.95
CONDUCTANCE (umhos/cm)	171.
COLOUR pt.CO units)	15
TURBIDITY (JTU)	0.7
T. DISSOLVED SOLIDS (mg/L)	125.
T. SUSPENDED SOLIDS (mg/L)	<0.4
ACIDITY (ppm)	<1.0
NITRATE-NITRITE (ppm N)	.015
TOTAL PHOSPHOROUS (ppm P)	0.007
ARSENIC (ppm)	0.0003
CADMIUM (ppm)	<0.001
COPPER (ppm)	0.001
IRON (ppm)	0.04
CHROMIUM (ppm)	<0.001
MANGANESE (ppm)	<0.01
ZINC (ppm)	<0.001
LEAD (ppm)	0.004
BARIUM (ppm)	0.04
NICKEL (ppm)	<0.001
MERCURY (ppm)	<0.00010
E. HARDNESS (ppm as CaCO ₃)	89.5
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)	<0.003
S. ORGANIC PHOSPHATE (ppm P)	0.004
S. ORGANIC CARBON (ppm)	7.8
T. KJELDAHL NITROGEN (ppm)	0.33
AMMONIA (ppm N)	0.02



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PARAMETERS	SAMPLE I6
CALCIUM (ppm)	18.1
MAGNESIUM (ppm)	6.6
CHLORIDE (ppm)	0.42
SULFATE (ppm)	5.3
T. ALKALINITY (ppm as CaCO ₃)	48
pH	7.65
CONDUCTANCE (umhos/cm)	97.5
COLOUR (pt. CO units)	30.
TURBIDITY (JTU)	0.7
T. DISSOLVED SOLIDS (mg/L)	67.
T. SUSPENDED SOLIDS (mg/L)	<0.4
ACIDITY (ppm)	<1.0
NITRATE-NITRITE (ppm N)	<.003
TOTAL PHOSPHOROUS (ppm P)	DISS 0.015
ARSENIC (ppm)	TOTAL 0.0009
CADMIUM (ppm)	<0.0002
COPPER (ppm)	<0.001
IRON (ppm)	0.002
CHROMIUM (ppm)	0.027
MANGANESE (ppm)	0.08
ZINC (ppm)	0.17
LEAD (ppm)	<0.001
BARIUM (ppm)	<0.01
NICKEL (ppm)	<0.01
MERCURY (ppm)	<0.001
E. HARDNESS (ppm as CaCO ₃)	0.03
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)	0.003
S. ORGANIC PHOSPHATE (ppm P)	0.006
S. ORGANIC CARBON (ppm)	0.10
T. KJELDAHL NITROGEN (ppm)	0.04
AMMONIA (ppm N)	0.04



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PARAMETERS	SAMPLE I8		
CALCIUM (ppm)			16.5
MAGNESIUM (ppm)			4.0
CHLORIDE (ppm)			0.82
SULFATE (ppm)			5.2
T. ALKALINITY (ppm as CaCO ₃)			47
pH			7.65
CONDUCTANCE (umhos/cm)			98.6
COLOUR (pt. CO units)			70.
TURBIDITY (JTU)			0.8
T. DISSOLVED SOLIDS (mg/L)			66.
T. SUSPENDED SOLIDS (mg/L)			<0.4
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			<.003
TOTAL PHOSPHOROUS (ppm P)	DISS	0.020	TOTAL
ARSENIC (ppm)	<0.0002		0.0007
CADMIUM (ppm)	<0.001		<0.001
COPPER (ppm)	<0.001		0.003
IRON (ppm)	0.20		0.22
CHROMIUM (ppm)	<0.001		<0.001
MANGANESE (ppm)	0.01		0.01
ZINC (ppm)	0.002		0.023
LEAD (ppm)	0.003		0.11
BARIUM (ppm)	0.04		0.05
NICKEL (ppm)	<0.001		0.001
MERCURY (ppm)	<0.00010		0.00014
T. HARDNESS (ppm as CaCO ₃)			57.7
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.004
S. ORGANIC PHOSPHATE (ppm P)			.009
S. ORGANIC CARBON (ppm)			14.0
T. KJELDAHL NITROGEN (ppm)			0.53
AMMONIA (ppm N)			0.02



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PARAMETERS	SAMPLE I11		
CALCIUM (ppm)			25.8
MAGNESIUM (ppm)			7.0
CHLORIDE (ppm)			0.58
SULFATE (ppm)			9.4
T. ALKALINITY (ppm as CaCO ₃)			85.6
pH			7.95
CONDUCTANCE (umhos/cm)			173.
COLOUR pt.CO units)			25.
TURBIDITY (JTU)			0.4
T. DISSOLVED SOLIDS (mg/L)			115.
T. SUSPENDED SOLIDS (mg/L)			<0.4
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			.040
TOTAL PHOSPHOROUS (ppm P)			0.011
ARSENIC (ppm)	DISS		TOTAL 0.0002
CADMIUM (ppm)			0.001
COPPER (ppm)			0.004
IRON (ppm)			0.17
CHROMIUM (ppm)			0.003
MANGANESE (ppm)			0.01
ZINC (ppm)			0.019
LEAD (ppm)			0.11
BARIUM (ppm)			0.06
NICKEL (ppm)			0.001
MERCURY (ppm)			<0.00010
T. HARDNESS (ppm as CaCO ₃)			93.2
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			<0.003
S. ORGANIC PHOSPHATE (ppm P)			0.008
S. ORGANIC CARBON (ppm)			7.7
T. KJELDAHL NITROGEN (ppm)			0.30
AMMONIA (ppm N)			0.02



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PARAMETERS	SAMPLE I14		
CALCIUM (ppm)			19.3
MAGNESIUM (ppm)			7.1
CHLORIDE (ppm)			2.05
SULFATE (ppm)			6.3
T. ALKALINITY (ppm as CaCO ₃)			72
pH			7.80
CONDUCTANCE (umhos/cm)			151.
COLOUR (pt.CO units)			25
TURBIDITY (JTU)			2.5
T. DISSOLVED SOLIDS (mg/L)			105.
T. SUSPENDED SOLIDS (mg/L)			1.2
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			<.003
TOTAL PHOSPHOROUS (ppm P)	DISS		0.056
ARSENIC (ppm)		<0.0002	TOTAL 0.0005
CADMIUM (ppm)		<0.001	<0.001
COPPER (ppm)		0.001	0.003
IRON (ppm)		0.09	0.34
CHROMIUM (ppm)		<0.001	<0.001
MANGANESE (ppm)		0.01	0.01
ZINC (ppm)		0.005	0.017
LEAD (ppm)		0.007	0.093
BARIUM (ppm)		0.08	0.08
NICKEL (ppm)		<0.001	0.001
MERCURY (ppm)		<0.000010	<0.00010
E. HARDNESS (ppm as CaCO ₃)			77.4
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.003
S. ORGANIC PHOSPHATE (ppm P)			.021
S. ORGANIC CARBON (ppm)			17.2
T. KJELDAHL NITROGEN (ppm)			0.50
AMMONIA (ppm N)			<.01



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PARAMETERS	SAMPLE I17		
CALCIUM	(ppm)		25.3
MAGNESIUM	(ppm)		9.1
CHLORIDE	(ppm)		0.80
SULFATE	(ppm)		7.5
T. ALKALINITY	(ppm as CaCO ₃)		93.6
pH			7.95
CONDUCTANCE	(umhos/cm)		183.
COLOUR	pt.CO units)		25.
TURBIDITY	(JTU)		0.6
T. DISSOLVED SOLIDS	(mg/L)		125.
T. SUSPENDED SOLIDS	(mg/L)		<0.4
ACIDITY	(ppm)		<1.0
NITRATE-NITRITE	(ppm N)		.069
TOTAL PHOSPHOROUS	(ppm P)	DISS	0.015
ARSENIC	(ppm)	<0.0002	TOTAL 0.0010
CADMIUM	(ppm)	<0.001	<0.001
COPPER	(ppm)	<0.001	0.002
IRON	(ppm)	0.06	0.23
CHROMIUM	(ppm)	<0.001	<0.001
MANGANESE	(ppm)	<0.01	0.01
ZINC	(ppm)	0.005	0.018
LEAD	(ppm)	<0.002	0.11
BARIUM	(ppm)	0.09	0.10
NICKEL	(ppm)	<0.001	0.002
MERCURY	(ppm)	<0.00010	<0.00010
T. HARDNESS	(ppm as CaCO ₃)		100.6
S. REACTIVE PHOSPHATE	(OPO ₄) (ppm P)		<0.003
S. ORGANIC PHOSPHATE	(ppm P)		0.007
S. ORGANIC CARBON	(ppm)		7.7
T. KJELDAHL NITROGEN	(ppm)		0.32
AMMONIA	(ppm N)		0.02



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PARAMETERS	SAMPLE L1		
CALCIUM (ppm)			9.7
MAGNESIUM (ppm)			3.5
CHLORIDE (ppm)			0.25
SULFATE (ppm)			2.0
T. ALKALINITY (ppm as CaCO ₃)			33.6
pH			7.03
CONDUCTANCE (umhos/cm)			62.0
COLOUR pt.CO units)			25.
TURBIDITY (JTU)			0.5
T. DISSOLVED SOLIDS (mg/L)			40.
T. SUSPENDED SOLIDS (mg/L)			<0.4
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			.116
TOTAL PHOSPHOROUS (ppm P)	DISS		0.011
		TOTAL	
ARSENIC (ppm)	<0.0002		0.0010
CADMIUM (ppm)	<0.001		<0.001
COPPER (ppm)	<0.001		0.004
IRON (ppm)	0.16		0.28
CHROMIUM (ppm)	<0.001		<0.001
MANGANESE (ppm)	<0.01		0.01
ZINC (ppm)	<0.001		0.022
LEAD (ppm)	<0.002		0.12
BARIUM (ppm)	0.02		0.04
NICKEL (ppm)	<0.001		0.004
MERCURY (ppm)	<0.00010		<0.00010
T. HARDNESS (ppm as CaCO ₃)			38.6
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.004
S. ORGANIC PHOSPHATE (ppm P)			0.008
S. ORGANIC CARBON (ppm)			14.5
T. KJELDAHL NITROGEN (ppm)			0.43
AMMONIA (ppm N)			0.06



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PARAMETERS	SAMPLE L2		
CALCIUM (ppm)			7.0
MAGNESIUM (ppm)			2.5
CHLORIDE (ppm)			0.20
SULFATE (ppm)			2.0
T. ALKALINITY (ppm as CaCO ₃)			24
pH			6.95
CONDUCTANCE (umhos/cm)			49.2
COLOUR pt.CO units)			35.
TURBIDITY (JTU)			0.7
T. DISSOLVED SOLIDS (mg/L)			35.
T. SUSPENDED SOLIDS (mg/L)			<0.4
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			.022
TOTAL PHOSPHOROUS (ppm P)	DISS		0.005
ARSENIC (ppm)			TOTAL 0.0006
CADMIUM (ppm)	<0.0002		<0.001
COPPER (ppm)	<0.001		0.003
IRON (ppm)	0.36		0.40
CHROMIUM (ppm)	<0.001		<0.001
MANGANESE (ppm)	0.02		0.04
ZINC (ppm)	0.001		0.026
LEAD (ppm)	0.004		0.088
BARIUM (ppm)	0.02		0.03
NICKEL (ppm)	<0.001		0.003
MERCURY (ppm)	<0.00010		<0.00010
T. HARDNESS (ppm as CaCO ₃)			27.8
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.003
S. ORGANIC PHOSPHATE (ppm P)			.003
S. ORGANIC CARBON (ppm)			12.5
T. KJELDAHL NITROGEN (ppm)			0.70
AMMONIA (ppm N)			0.13



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PARAMETERS		SAMPLE L3	
CALCIUM	(ppm)	15.7	
MAGNESIUM	(ppm)	4.4	
CHLORIDE	(ppm)	2.10	
SULFATE	(ppm)	2.4	
T. ALKALINITY	(ppm as CaCO ₃)	54	
pH		7.20	
CONDUCTANCE	(umhos/cm)	85.5	
COLOUR	pt. CO units)	50.	
TURBIDITY	(JTU)	1.2	
T. DISSOLVED SOLIDS	(mg/L)	60.	
T. SUSPENDED SOLIDS	(mg/L)	.8	
ACIDITY	(ppm)	<1.0	
NITRATE-NITRITE	(ppm N)	.038	
TOTAL PHOSPHOROUS	(ppm P)	DISS 0.017	TOTAL
ARSENIC	(ppm)	<0.0002	0.0012
CADMIUM	(ppm)	<0.001	<0.001
COPPER	(ppm)	0.002	0.005
IRON	(ppm)	0.18	0.42
CHROMIUM	(ppm)	<0.001	<0.001
MANGANESE	(ppm)	0.03	0.05
ZINC	(ppm)	0.002	0.033
LEAD	(ppm)	0.008	0.10
BARIUM	(ppm)	0.04	0.07
NICKEL	(ppm)	<0.001	0.002
MERCURY	(ppm)	0.00012	0.00012
T. HARDNESS	(ppm as CaCO ₃)	57.3	
S. REACTIVE PHOSPHATE	(OPO ₄) (ppm P)	0.004	
S. ORGANIC PHOSPHATE	(ppm P)	0.009	
S. ORGANIC CARBON	(ppm)	13.8	
T. KJELDAHL NITROGEN	(ppm)	0.52	
AMMONIA	(ppm N)	0.05	



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PARAMETERS	SAMPLE L4		
CALCIUM (ppm)			2.2
MAGNESIUM (ppm)			0.83
CHLORIDE (ppm)			0.18
SULFATE (ppm)			1.4
T. ALKALINITY (ppm as CaCO ₃)			6.4
pH			6.35
CONDUCTANCE (umhos/cm)			19.2
COLOUR (pt. CO units)			5.
TURBIDITY (JTU)			1.9
T. DISSOLVED SOLIDS (mg/L)			15.
T. SUSPENDED SOLIDS (mg/L)			1.2
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			.072
TOTAL PHOSPHOROUS (ppm P)	DISS		0.064
ARSENIC (ppm)		<0.0002	TOTAL 0.0007
CADMIUM (ppm)		<0.001	<0.001
COPPER (ppm)		0.002	0.005
IRON (ppm)		1.03	1.12
CHROMIUM (ppm)		<0.001	<0.001
MANGANESE (ppm)		0.10	0.10
ZINC (ppm)		0.002	0.027
LEAD (ppm)		<0.002	0.10
BARIUM (ppm)		0.06	0.06
NICKEL (ppm)		0.002	0.003
MERCURY (ppm)		0.00012	0.00016
T. HARDNESS (ppm as CaCO ₃)			8.9
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			0.005
S. ORGANIC PHOSPHATE (ppm P)			.030
S. ORGANIC CARBON (ppm)			15.3
T. KJELDAHL NITROGEN (ppm)			0.40
AMMONIA (ppm N)			0.03

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PARAMETERS		SAMPLE P1	
CALCIUM	(ppm)	24.4	
MAGNESIUM	(ppm)	8.0	
CHLORIDE	(ppm)	1.48	
SULFATE	(ppm)	16.8	
T. ALKALINITY	(ppm as CaCO ₃)	77.6	
pH		7.95	
CONDUCTANCE	(umhos/cm)	171.	
COLOUR	pt. CO units)	40.	
TURBIDITY	(JTU)	37.	
T. DISSOLVED SOLIDS	(mg/L)	115.	
T. SUSPENDED SOLIDS	(mg/L)	54.0	
ACIDITY	(ppm)	<1.0	
NITRATE-NITRITE	(ppm N)	.003	
TOTAL PHOSPHOROUS	(ppm P)	DISS 0.35	TOTAL
ARSENIC	(ppm)	<0.0002	0.0021
CADMIUM	(ppm)	<0.001	0.001
COPPER	(ppm)	0.001	0.010
IRON	(ppm)	0.18	1.89
CHROMIUM	(ppm)	<0.001	0.002
MANGANESE	(ppm)	0.01	0.04
ZINC	(ppm)	0.004	0.056
LEAD	(ppm)	0.003	0.12
BARIUM	(ppm)	0.08	0.11
NICKEL	(ppm)	0.002	0.004
MERCURY	(ppm)	<0.00010	<0.00010
T. HARDNESS	(ppm as CaCO ₃)	93.8	
S. REACTIVE PHOSPHATE	(OPO ₄) (ppm P)	0.022	
S. ORGANIC PHOSPHATE	(ppm ⁴ P)	.113	
S. ORGANIC CARBON	(ppm)	10.8	
T. KJELDAHL NITROGEN	(ppm)	0.90	
AMMONIA	(ppm N)	0.03	



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PARAMETERS	SAMPLE S1		
CALCIUM (ppm)			12.4
MAGNESIUM (ppm)			3.1
CHLORIDE (ppm)			0.74
SULFATE (ppm)			8.5
T. ALKALINITY (ppm as CaCO ₃)			38.4
pH			7.35
CONDUCTANCE (umhos/cm)			82.4
COLOUR (pt. CO units)			25.
TURBIDITY (JTU)			0.8
T. DISSOLVED SOLIDS (mg/L)			57.
T. SUSPENDED SOLIDS (mg/L)			<0.4
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			.003
TOTAL PHOSPHOROUS (ppm P)	DISS	0.027	TOTAL
ARSENIC (ppm)	<0.0002		0.0005
CADMIUM (ppm)	<0.001		<0.001
COPPER (ppm)	<0.001		0.008
IRON (ppm)	0.14		0.26
CHROMIUM (ppm)	<0.001		0.002
MANGANESE (ppm)	0.05		0.05
ZINC (ppm)	0.005		0.024
LEAD (ppm)	<0.002		0.080
BARIIUM (ppm)	0.02		0.05
NICKEL (ppm)	<0.001		0.002
MERCURY (ppm)	<0.00010		<0.00010
T. HARDNESS (ppm as CaCO ₃)		33.6	
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.005	
S. ORGANIC PHOSPHATE (ppm P)		.013	
S. ORGANIC CARBON (ppm)		23.2	
T. KJELDAHL NITROGEN (ppm)		0.65	
AMMONIA (ppm N)		0.13	



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PARAMETERS	SAMPLE S2
CALCIUM (ppm)	20.6
MAGNESIUM (ppm)	4.4
CHLORIDE (ppm)	0.52
SULFATE (ppm)	8.5
T. ALKALINITY (ppm as CaCO ₃)	62.4
pH	7.80
CONDUCTANCE (umhos/cm)	132.
COLOUR (pt. CO units)	25.
TURBIDITY (JTU)	0.9
T. DISSOLVED SOLIDS (mg/L)	80.
T. SUSPENDED SOLIDS (mg/L)	<0.4
ACIDITY (ppm)	<1.0
NITRATE-NITRITE (ppm N)	.004
TOTAL PHOSPHOROUS (ppm P)	DISS 0.042 TOTAL
ARSENIC (ppm)	<0.0002 0.0008
CADMIUM (ppm)	<0.001 <0.001
COPPER (ppm)	0.001 0.005
IRON (ppm)	0.11 0.21
CHROMIUM (ppm)	<0.001 <0.001
MANGANESE (ppm)	0.02 0.02
ZINC (ppm)	0.002 0.025
LEAD (ppm)	<0.002 0.080
BARIUM (ppm)	0.04 0.06
NICKEL (ppm)	<0.001 <0.001
MERCURY (ppm)	<0.00010 <0.00010
T. HARDNESS (ppm as CaCO ₃)	69.5
S. REACTIVE PHOSPHATE (OPO) (ppm P)	0.003
S. ORGANIC PHOSPHATE (ppm P)	.019
S. ORGANIC CARBON (ppm)	8.3
T. KJELDAHL NITROGEN (ppm)	0.53
AMMONIA (ppm N)	0.13



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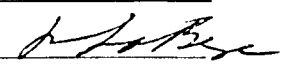
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PARAMETERS	SAMPLE S3		
CALCIUM (ppm)			35.4
MAGNESIUM (ppm)			10.4
CHLORIDE (ppm)			1.75
SULFATE (ppm)			12.2
T. ALKALINITY (ppm as CaCO ₃)			116
pH			8.19
CONDUCTANCE (umhos/cm)			225.
COLOUR (pt.CO units)			20.
TURBIDITY (JTU)			0.2
T. DISSOLVED SOLIDS (mg/L)			150.
T. SUSPENDED SOLIDS (mg/L)			<0.4
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			.093
TOTAL PHOSPHOROUS (ppm P)	DISS	0.009	TOTAL
ARSENIC (ppm)	<0.0002		0.0011
CADMIUM (ppm)	<0.001		<0.001
COPPER (ppm)	<0.001		0.005
IRON (ppm)	0.05		0.27
CHROMIUM (ppm)	<0.001		0.006
MANGANESE (ppm)	0.02		0.02
ZINC (ppm)	0.001		0.027
LEAD (ppm)	0.003		0.11
BARIUM (ppm)	0.09		0.09
NICKEL (ppm)	<0.001		<0.001
MERCURY (ppm)	0.00014		0.00014
T. HARDNESS (ppm as CaCO ₃)			131.2
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)			<0.003
S. ORGANIC PHOSPHATE (ppm P)			.006
S. ORGANIC CARBON (ppm)			3.2
T. KJELDAHL NITROGEN (ppm)			0.25
AMMONIA (ppm N)			0.15



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WATER ANALYSIS

PROJECT NO. 82 0036 5 2157

PARAMETERS	SAMPLE W1
CALCIUM (ppm)	20.7
MAGNESIUM (ppm)	10.8
CHLORIDE (ppm)	1.05
SULFATE (ppm)	10.0
T. ALKALINITY (ppm as CaCO ₃)	89.6
pH	8.19
CONDUCTANCE (umhos/cm)	173.
COLOUR (pt. CO units)	10.
TURBIDITY (JTU)	1.1
T. DISSOLVED SOLIDS (mg/L)	115.
T. SUSPENDED SOLIDS (mg/L)	0.8
ACIDITY (ppm)	<1.0
NITRATE-NITRITE (ppm N)	.069
TOTAL PHOSPHOROUS (ppm P)	DISS 0.016
ARSENIC (ppm)	<0.0002
CADMIUM (ppm)	<0.001
COPPER (ppm)	0.002
IRON (ppm)	0.04
CHROMIUM (ppm)	<0.001
MANGANESE (ppm)	<0.01
ZINC (ppm)	0.003
LEAD (ppm)	0.011
BARIUM (ppm)	0.06
NICKEL (ppm)	<0.001
MERCURY (ppm)	<0.00010
T. HARDNESS (ppm as CaCO ₃)	96.2
S. REACTIVE PHOSPHATE (OPO ₃) (ppm P)	<0.003
S. ORGANIC PHOSPHATE (ppm ⁴ P)	.011
S. ORGANIC CARBON (ppm)	2.4
T. KJELDAHL NITROGEN (ppm)	0.33
AMMONIA (ppm N)	0.02

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DATE **JUNE 30, 1982**

WATER ANALYSIS

PROJECT NO. **82 0036 5 2157**

PARAMETERS	SAMPLE W4
CALCIUM (ppm)	22.3
MAGNESIUM (ppm)	10.0
CHLORIDE (ppm)	1.02
SULFATE (ppm)	9.4
T. ALKALINITY (ppm as CaCO ₃)	89.6
pH	8.19
CONDUCTANCE (umhos/cm)	17.7
COLOUR pt.CO units)	15.
TURBIDITY (JTU)	18.
T. DISSOLVED SOLIDS (mg/L)	120.
T. SUSPENDED SOLIDS (mg/L)	15.4
ACIDITY (ppm)	<1.0
NITRATE-NITRITE (ppm N)	.062
TOTAL PHOSPHOROUS (ppm P)	DISS 0.120 TOTAL
ARSENIC (ppm)	<0.0002 0.0008
CADMIUM (ppm)	<0.001 <0.001
COPPER (ppm)	0.001 0.003
IRON (ppm)	0.04 0.51
CHROMIUM (ppm)	<0.001 <0.001
MANGANESE (ppm)	<0.01 0.02
ZINC (ppm)	0.004 0.020
LEAD (ppm)	<0.002 0.098
BARIUM (ppm)	0.07 0.08
NICKEL (ppm)	<0.001 0.001
MERCURY (ppm)	<0.0001 <0.00010
T. HARDNESS (ppm as CaCO ₃)	96.9
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)	0.011
S. ORGANIC PHOSPHATE (ppm ⁴ P)	.036
S. ORGANIC CARBON (ppm)	3.7
T. KJELDAHL NITROGEN (ppm)	0.40
AMMONIA (ppm N)	0.03



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82 0036 5 2157

PROJECT NO.

PARAMETERS	SAMPLE W8	
CALCIUM (ppm)	24.7	
MAGNESIUM (ppm)	10.1	
CHLORIDE (ppm)	0.90	
SULFATE (ppm)	9.4	
T. ALKALINITY (ppm as CaCO ₃)	96	
pH	8.14	
CONDUCTANCE (umhos/cm)	184.	
COLOUR (pt. CO units)	20.	
TURBIDITY (JTU)	11.	
T. DISSOLVED SOLIDS (mg/L)	120.	
T. SUSPENDED SOLIDS (mg/L)	6.7	
ACIDITY (ppm)	<1.0	
NITRATE-NITRITE (ppm N)	.070	
TOTAL PHOSPHOROUS (ppm P)	DISS 0.089	
ARSENIC (ppm)	<0.0002	TOTAL 0.0009
CADMIUM (ppm)	<0.001	<0.001
COPPER (ppm)	0.003	0.003
IRON (ppm)	0.03	0.46
CHROMIUM (ppm)	<0.001	<0.001
MANGANESE (ppm)	0.01	0.03
ZINC (ppm)	<0.001	0.019
LEAD (ppm)	<0.002	0.096
BARIUM (ppm)	0.08	0.10
NICKEL (ppm)	0.001	0.001
MERCURY (ppm)	0.00010	0.00010
T. HARDNESS (ppm as CaCO ₃)	103.3	
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)	0.004	
S. ORGANIC PHOSPHATE (ppm ⁴ P)	.030	
S. ORGANIC CARBON (ppm)	3.5	
T. KJELDAHL NITROGEN (ppm)	0.50	
AMMONIA (ppm N)	0.03	



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PROJECT NO. 82 0036 5 2157

PARAMETERS	SAMPLE W10
CALCIUM (ppm)	25.0
MAGNESIUM (ppm)	9.5
CHLORIDE (ppm)	1.00
SULFATE (ppm)	18.0
T. ALKALINITY (ppm as CaCO ₃)	88
pH	8.07
CONDUCTANCE (umhos/cm)	193.
COLOUR (pt.CO units)	20
TURBIDITY (JTU)	19.
T. DISSOLVED SOLIDS (mg/L)	125.
T. SUSPENDED SOLIDS (mg/L)	16.
ACIDITY (ppm)	<1.0
NITRATE-NITRITE (ppm N)	.021
TOTAL PHOSPHOROUS (ppm P)	DISS 0.134 TOTAL
ARSENIC (ppm)	<0.0002 0.0007
CADMIUM (ppm)	<0.001 <0.001
COPPER (ppm)	0.006 0.045
IRON (ppm)	0.15 0.85
CHROMIUM (ppm)	<0.001 <0.001
MANGANESE (ppm)	0.03 0.04
ZINC (ppm)	0.005 0.022
LEAD (ppm)	<0.002 0.084
BARIUM (ppm)	0.09 0.10
NICKEL (ppm)	0.001 0.002
MERCURY (ppm)	<0.00010 <0.00010
T. HARDNESS (ppm as CaCO ₃)	101.5
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)	0.008
S. ORGANIC PHOSPHATE (ppm P)	.028
S. ORGANIC CARBON (ppm)	5.4
T. KJELDAHL NITROGEN (ppm)	0.40
AMMONIA (ppm N)	0.04



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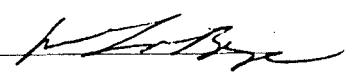
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PROJECT NO. **82 0036 5 2157**

PARAMETERS	SAMPLE W12		
CALCIUM (ppm)			26.5
MAGNESIUM (ppm)			9.5
CHLORIDE (ppm)			1.15
SULFATE (ppm)			21.2
T. ALKALINITY (ppm as CaCO ₃)			88.8
pH			8.09
CONDUCTANCE (umhos/cm)			194.
COLOUR (pt. CO units)			15.
TURBIDITY (JTU)			34.
T. DISSOLVED SOLIDS (mg/L)			130.
T. SUSPENDED SOLIDS (mg/L)			28.
ACIDITY (ppm)			<1.0
NITRATE-NITRITE (ppm N)			.010
TOTAL PHOSPHOROUS (ppm P)	DISS	0.174	TOTAL
ARSENIC (ppm)	<0.0002		0.0018
CADMIUM (ppm)	<0.001		<0.001
COPPER (ppm)	<0.001		0.007
IRON (ppm)	0.09		1.31
CHROMIUM (ppm)	<0.001		<0.001
MANGANESE (ppm)	0.02		0.04
ZINC (ppm)	<0.001		0.029
LEAD (ppm)	<0.002		0.090
BARIUM (ppm)	0.09		0.12
NICKEL (ppm)	0.001		0.003
MERCURY (ppm)	<0.00010		<0.00010
T. HARDNESS (ppm as CaCO ₃)		105.3	
S. REACTIVE PHOSPHATE (OPO ₄) (ppm P)		0.014	
S. ORGANIC PHOSPHATE (ppm ⁴ P)		.033	
S. ORGANIC CARBON (ppm)		5.5	
T. KJELDAHL NITROGEN (ppm)		0.86	
AMMONIA (ppm N)		0.31	



ANALYSIS OF MAY 82 samples

ATTN: GLENN BROWN

ABERFORD RESOURCES LTD.

WATER ANALYSIS - ALUMINUM

JULY 23/82



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PAN OCEAN

DATE JULY 23/82

BONNET PLUME PROJECT

PROJECT NO. 82-411-5-2323

Analysis of MAY 82 samples

SAMPLE #	TOTAL	DISSOLVED
I-2	0.05	0.03
I-4	0.07	0.03
I-6	0.04	0.02
I-8	0.03	0.02
I-11	0.05	0.03
I-14	0.03	0.02
I-17	0.06	0.02
L-1	0.05	0.02
L-2	0.03	0.01
L-3	0.05	0.03
L-4	0.06	0.03
P-1	0.15	0.15
S-1	0.04	0.02
S-2	0.06	0.01
S-3	0.07	<.01
W-1	0.13	0.02
W-4	0.10	0.02
W-8	0.08	<.01
W-10	0.12	<.01
W-12	0.14	<.01



Certified by *J. To Beuf*

Aug. 82

ATTN: GLENN BROWN
ABERFORD RESOURCES LTD.
BONNETT PLUME REC'D AUG. 24
SEPTEMBER 29, 1982



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PAN OCEAN
 BONNETT PLUME PROJECT
 REC'D: AUG. 24, 1982

DATE **SEPT. 29, 1982**

PROJECT NO. **82-36-5-2493**

PARAMETERS	#W1		#W4		#W8	
CALCIUM (PPM)	17.3		14.5		16.7	
MAGNESIUM (PPM)	12.3		11.7		11.6	
CHLORIDE (PPM)	1.15		1.05		0.95	
SULPHATE (PPM)	11.0		11.0		10.7	
T. ALKALINITY (PPM AS CaCO3)	84.8		77.6		80.8	
PH	8.30		8.36		8.19	
CONDUCTANCE (UMHOS/CM)	188		193		187	
COLOUR (PTCO UNITS)	0		0		0	
TURBIDITY (JTU)	5.4		5.2		13	
TOTAL DISSOLVED SOLIDS (MG/L)	125.		127.		120.	
TOTAL SUSPENDED SOLIDS (MG/L)	<1.0		<1.0		44.	
ACIDITY (PPM AS CaCO3)	<1.		<1.		<1.	
NITRATE-NITRITE (PPM N)	0.101		0.10		0.110	
TOTAL PHOSPHORUS (PPM P)	<0.003		0.003		0.003	
ARSENIC (PPM)	(T)0.0003(D)0.0002	(T)0.0002(D)0.0002	(T)0.0004(D)0.0003			
CADMIUM (PPM)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
COPPER (PPM)	0.004	<0.001	0.004	0.001	0.002	<0.001
IRON (PPM)	<.01	<.01	0.02	<.01	0.09	<.01
CHROMIUM (PPM)	<.01	<.01	<.01	<.01	<.01	<.01
MANGANESE (PPM)	0.01	<.01	0.02	<.01	0.07	<.01
ZINC (PPM)	0.022	<0.001	0.021	<0.001	0.012	0.001
LEAD (PPM)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
BARIUM (PPM)	0.05	0.02	0.12	0.11	0.14	0.13
NICKEL (PPM)	<0.001	<0.001	0.003	<0.001	<0.001	<0.001
MERCURY (PPM)	<0.00010	<0.00010	0.00040	<0.00010	0.00013	<0.00010
ALUMINUM (PPM)	0.11	0.04	0.04	0.04	0.22	0.03
S. REACTIVE PHOSPHATE (PPM P)	<0.003		<0.003		<0.003	
S. ORGANIC PHOSPHATE (PPM P)	*		*		*	
S. ORGANIC CARBON (PPM)	<.2		.2		.7	
T. KJELDAHL NITROGEN (PPM P)	0.13		0.15		0.20	
AMMONIA (PPM N)	0.11		<.01		<.01	

* ANALYSIS WAS NOT DONE IMMEDIATELY MAKING RESULT QUESTIONABLE



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PAN OCEAN
 BONNETT PLUME PROJECT
 REC'D: AUG. 24, 1982

DATE SEPT. 29, 1982

PROJECT NO. 82-36-5-2493

PARAMETERS	#W10	#W12
CALCIUM (PPM)	18.3	20.0
MAGNESIUM (PPM)	10.3	10.9
CHLORIDE (PPM)	0.8	1.1
SULPHATE (PPM)	14.3	14.9
T. ALKALINITY (PPM AS CaCO ₃)	75.2	87.2
PH	8.27	8.29
CONDUCTANCE (UMHOS/CM)	180	219
COLOUR (PTCO UNITS)	5	10
TURBIDITY (JTU)	10	36
TOTAL DISSOLVED SOLIDS (MG/L)	118.	145.
TOTAL SUSPENDED SOLIDS (MG/L)	<1.0	78.
ACIDITY (PPM AS CaCO ₃)	<1.	<1
NITRATE-NITRITE (PPM N)	0.090	0.094
TOTAL PHOSPHORUS (PPM P)	0.007	0.028
ARSENIC (PPM)	(T)0.0002 (D)<0.0002	(T)0.0002 (D)0.0002
CADMIUM (PPM)	<0.001 <0.001	<.001 <.001
COPPER (PPM)	0.004 <0.001	0.001 <.001
IRON (PPM)	0.36 <.01	0.02 <.01
CHROMIUM (PPM)	<.01 <.01	<.01 <.01
MANGANESE (PPM)	0.06 0.06	0.03 <.01
ZINC (PPM)	0.014 <0.001	0.005 <.001
LEAD (PPM)	<0.002 <0.002	<0.002 <.002
BARIUM (PPM)	0.12 0.12	0.14 0.14
NICKEL (PPM)	<0.001 <0.001	<0.001 <0.001
MERCURY (PPM)	0.00042 <0.00010	0.00015 <0.00010
ALUMINUM (PPM)	0.33 0.06	0.19 0.04
S. REACTIVE PHOSPHATE (PPM P)	<0.003	0.003
S. ORGANIC PHOSPHATE (PPM P)	*	*
S. ORGANIC CARBON (PPM)	1.8	1.7
T. KJELDAHL NITROGEN (PPM P)	0.125	0.25
AMMONIA (PPM N)	<.01	<.01

* ANALYSIS WAS NOT DONE IMMEDIATELY MAKING RESULT QUESTIONABLE



CERTIFIED BY

Ron Derry

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 BONNETT PLUME PROJECT
 REC'D: AUG. 24, 1982

DATE **SEPT. 29, 1982**
 PROJECT NO. **82-36-5-2493**

PARAMETERS	#S1	#S2	#S3
CALCIUM (PPM)	22.0	21.9	22.0
MAGNESIUM (PPM)	8.8	7.9	11.5
CHLORIDE (PPM)	0.15	0.10	0.15
SULPHATE (PPM)	12.5	14.1	11.2
T. ALKALINITY (PPM AS CaCO3)	80.8	75.2	94.4
PH	8.24	8.20	8.20
CONDUCTANCE (UMHOS/CM)	204	198	222
COLOUR (PTCO UNITS)	10	0	0
TURBIDITY (JTU)	0.34	2.0	0.54
TOTAL DISSOLVED SOLIDS (MG/L)	135.	130.	150.
TOTAL SUSPENDED SOLIDS (MG/L)	<1.0	<1.0	<1.0
ACIDITY (PPM AS CaCO3)	<1	<1	<1
NITRATE-NITRITE (PPM N)	0.078	0.147	0.085
TOTAL PHOSPHORUS (PPM P)	0.004	0.003 (T)	<0.003
ARSENIC (PPM)	(T)0.0002 (D)0.0002	(T)0.0002 (D)<0.0002	0.0003(D)<0.0002
CADMIUM (PPM)	<0.001	<0.001	<0.001
COPPER (PPM)	0.005	<0.001	0.003
IRON (PPM)	0.05	<.01	0.04
CHROMIUM (PPM)	<.01	<.01	<.01
MANGANESE (PPM)	0.01	<.01	0.05
ZINC (PPM)	0.012	<0.001	0.016
LEAD (PPM)	<0.002	<0.002	<0.002
BARIUM (PPM)	0.10	0.07	0.11
NICKEL (PPM)	<0.001	<0.001	<0.001
MERCURY (PPM)	<0.00010	<0.00010	0.00014
ALUMINUM (PPM)	0.05	0.05	0.25
S. REACTIVE PHOSPHATE (PPM P)	<0.003	<0.003	<0.003
S. ORGANIC PHOSPHATE (PPM P)	*	*	*
S. ORGANIC CARBON (PPM)	3.2	1.0	0.9
T. KJELDAHL NITROGEN (PPM P)	0.35	0.13	0.10
AMMONIA (PPM N)	<.01	<.01	<.01

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 BONNETT PLUME PROJECT
 REC'D: AUG. 24, 1982

DATE **SEPT. 29, 1982**

PROJECT NO. **82-36-5-2493**

PARAMETERS	#L1	#L2	#L3
CALCIUM (PPM)	5.4	5.0	12.7
MAGNESIUM (PPM)	1.8	1.8	3.5
CHLORIDE (PPM)	0.20	0.20	0.90
SULPHATE (PPM)	2.3	2.3	2.9
T. ALKALINITY (PPM AS CaCO3)	20	20	47.2
PH	7.36	7.40	8.48
CONDUCTANCE (UMHOS/CM)	43	47	110
COLOUR (PTCO UNITS)	40	50	60
TURBIDITY (JTU)	0.38	0.17	0.39
TOTAL DISSOLVED SOLIDS (MG/L)	30.	32.	75.
TOTAL SUSPENDED SOLIDS (MG/L)	<1.0	<1.0	<1.0
ACIDITY (PPM AS CaC93)	1	1	<1
NITRATE-NITRITE (PPM N)	0.004	<.003	<.003
TOTAL PHOSPHORUS (PPM P)	0.011	0.010	(T) 0.014 (D)
ARSENIC (PPM)	(T) <0.0002 (D) <0.0002	(T) <0.0002 (D) <0.0002	0.0003 0.0002
CADMIUM (PPM)	<0.001 <0.001	<0.001 <0.001	<0.001 <0.001
COPPER (PPM)	0.003 0.001	0.012 0.001	0.005 <0.001
IRON (PPM)	0.13 <.01	<.01 <.01	0.34 .04
CHROMIUM (PPM)	<.01 <.01	<.01 <.01	0.04 <.01
MANGANESE (PPM)	<.01 <.01	0.01 <.01	0.06 0.05
ZINC (PPM)	0.012 0.002	0.014 0.006	0.026 0.009
LEAD (PPM)	<0.002 <0.002	<0.002 <0.002	<0.002 <0.002
BARIUM (PPM)	0.03 0.02	0.02 0.01	0.12 0.09
NICKEL (PPM)	<0.001 <0.001	<.001 <0.001	0.006 <0.001
MERCURY (PPM)	0.0032 <0.00010	0.00010 <0.00010	0.00028 0.00023
ALUMINUM (PPM)	0.25 0.04	0.08 0.08	0.24 0.10
S. REACTIVE PHOSPHATE (PPM P)	0.004	0.004	0.004
S. ORGANIC PHOSPHATE (PPM P)	*	*	*
S. ORGANIC CARBON (PPM)	9.5	9.5	11.0
T. KJELDAHL NITROGEN (PPM P)	0.50	0.50	0.85
AMMONIA (PPM N)	<.01	0.02	0.02

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PAN OCEAN
 BONNETT PLUME PROJECT
 REC'D: AUG. 24, 1982

DATE **SEPT. 29, 1982**

PROJECT NO. **82-36-5-2493**

PARAMETERS	#L4	
CALCIUM (PPM)	2.9	
MAGNESIUM (PPM)	0.8	
CHLORIDE (PPM)	0.25	
SULPHATE (PPM)	2.5	
T. ALKALINITY (PPM AS CaCO3)	9.6	
PH	6.93	
CONDUCTANCE (UMHOS/CM)	24	
COLOUR (PTCO UNITS)	50	
TURBIDITY (JTU)	1.2	
TOTAL DISSOLVED SOLIDS (MG/L)	18.	
TOTAL SUSPENDED SOLIDS (MG/L)	<1.0	
ACIDITY (PPM AS CaCO3)	2	
NITRATE-NITRITE (PPM N)	<.003	
TOTAL PHOSPHORUS (PPM P)	0.015	
ARSENIC (PPM)	(T) 0.0002	(D) 0.0002
CADMIUM (PPM)	<0.001	<0.001
COPPER (PPM)	0.001	0.001
IRON (PPM)	0.91	.05
CHROMIUM (PPM)	0.04	<.01
MANGANESE (PPM)	0.07	<.01
ZINC (PPM)	0.016	0.016
LEAD (PPM)	<0.002	<0.002
BARIUM (PPM)	0.09	0.08
NICKEL (PPM)	<0.001	<0.001
MERCURY (PPM)	0.00041	0.00040
ALUMINUM (PPM)	0.40	0.10
S. REACTIVE PHOSPHATE (PPM P)	0.003	
S. ORGANIC PHOSPHATE (PPM P)	*	
S. ORGANIC CARBON (PPM)	11.7	
T. KJELDAHL NITROGEN (PPM P)	0.83	
AMMONIA (PPM N)	<.01	

* ANALYSIS WAS NOT DONE IMMEDIATELY MAKING RESULT QUESTIONABLE



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PAN OCEAN
 BONNETT PLUME PROJECT
 REC'D: AUG. 24, 1982

DATE **SEPT. 29, 1982**

PROJECT NO. **82-36-5-2493**

PARAMETERS	#12	#14	#16
CALCIUM (PPM)	16.5	24.7	21.0
MAGNESIUM (PPM)	12.1	12.8	12.0
CHLORIDE (PPM)	0.25	0.20	0.20
SULPHATE (PPM)	17.9	17.0	15.9
T. ALKALINITY (PPM AS CaCO ₃)	56	94.4	84.8
PH	8.35	8.08	8.16
CONDUCTANCE (UMHOS/CM)	178	237	217
COLOUR (PTCO UNITS)	0	0	0
TURBIDITY (JTU)	2.4	2.8	3.6
TOTAL DISSOLVED SOLIDS (MG/L)	120.	158.	145.
TOTAL SUSPENDED SOLIDS (MG/L)	<1.0	<1.0	<1.0
ACIDITY (PPM AS CaCO ₃)	<1	<1	<1
NITRATE-NITRITE (PPM N)	0.102	0.125	0.109
TOTAL PHOSPHORUS (PPM P)	<0.003	<0.003	(T) <0.003
ARSENIC (PPM)	(T)0.0007(D)<0.0002	(T)<0.0002(D)<0.0002	<0.0002(D)<0.0002
CADMIUM (PPM)	<0.001 <0.001	<0.001 <0.001	<0.001 <0.001
COPPER (PPM)	0.004 <0.001	0.005 0.002	0.005 <0.001
IRON (PPM)	<.01 <.01	<.01 <.01	0.01 <.01
CHROMIUM (PPM)	<.01 <.01	0.03 <.01	<.01 <.01
MANGANESE (PPM)	<.01 <.01	<.01 <.01	<.01 <.01
ZINC (PPM)	0.010 0.003	0.007 <0.001	0.007 <0.001
LEAD (PPM)	<0.002 <0.002	<0.002 <0.002	<0.002 <0.002
BARIUM (PPM)	0.11 0.08	0.11 0.08	0.10 0.08
NICKEL (PPM)	<0.001 <0.001	<0.001 <0.001	<0.001 <0.001
MERCURY (PPM)	0.00012 <0.00010	0.00037 <0.00010	0.00046 <0.00010
ALUMINUM (PPM)	0.34 0.01	0.48 0.01	0.45 0.02
S. REACTIVE PHOSPHATE (PPM P)	<0.003	<0.003	<0.003
S. ORGANIC PHOSPHATE (PPM P)	*	*	*
S. ORGANIC CARBON (PPM)	.4	.6	.7
T. KJELDAHL NITROGEN (PPM P)	0.20	0.18	0.23
AMMONIA (PPM N)	<.01	<.01	0.02

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PAN OCEAN
 BONNETT PLUME PROJECT
 REC'D: AUG. 24, 1982

DATE SEPT. 29, 1982

PROJECT NO. 82-36-5-2493

PARAMETERS	#I8	#I11	#I14
CALCIUM (PPM)	18.8	22.3	18.5
MAGNESIUM (PPM)	10.3	9.8	11.6
CHLORIDE (PPM)	0.25	0.15	0.55
SULPHATE (PPM)	15.3	13.9	11.4
T. ALKALINITY (PPM AS CaCO ₃)	79.2	81.6	84.8
PH	7.50	8.13	8.23
CONDUCTANCE (UMHOS/CM)	203	201	199
COLOUR (PTCO UNITS)	5	5	5
TURBIDITY (JTU)	2.8	6.9	8.0
TOTAL DISSOLVED SOLIDS (MG/L)	130.	125.	130.
TOTAL SUSPENDED SOLIDS (MG/L)	<1.0	<1.0	<1.0
ACIDITY (PPM AS CaCO ₃)	1.	<1	<1
NITRATE-NITRITE (PPM N)	0.098	0.108	0.112
TOTAL PHOSPHORUS (PPM P)	<0.003	<0.003 (T)	0.003
ARSENIC (PPM)	(T) 0.0002 (D)<0.0002	(T)0.0005 (D)<0.0002	0.0004(D)0.0003
CADMIUM (PPM)	<0.001 <0.001	<0.001 <0.001	<0.001 <0.001
COPPER (PPM)	0.002 <0.001	0.005 0.003	0.005 <0.001
IRON (PPM)	<.01 <.01	0.04 <.01	<.01 <.01
CHROMIUM (PPM)	<.01 <.01	<.01 <.01	<.01 <.01
MANGANESE (PPM)	<.01 <.01	<.01 <.01	<.01 <.01
ZINC (PPM)	0.003 0.004	0.009 0.002	0.010 0.022
LEAD (PPM)	<0.002 <0.002	<0.002 <0.002	<0.002 <0.002
BARIUM (PPM)	0.11 0.11	0.12 0.08	0.13 0.13
NICKEL (PPM)	<0.001 <0.001	<0.001 <0.001	<0.001 <0.001
MERCURY (PPM)	0.00017 <0.00010	0.00032 <0.00010	0.00038 <0.00010
ALUMINUM (PPM)	0.22 0.04	0.28 0.16	0.31 0.02
S. REACTIVE PHOSPHATE (PPM P)	<0.003	<0.003	<0.003
S. ORGANIC PHOSPHATE (PPM P)	*	*	*
S. ORGANIC CARBON (PPM)	1.0	1.4	1.7
T. KJELDAHL NITROGEN (PPM P)	0.45	0.20	0.15
AMMONIA (PPM N)	<.01	<.01	<.01

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PAN OCEAN
 BONNETT PLUME PROJECT
 REC'D: AUG. 24, 1982

DATE **SEPT. 29, 1982**

PROJECT NO. **82-36-5-2493**

PARAMETERS	#I17	#P
CALCIUM (PPM)	18.1	23.6
MAGNESIUM (PPM)	11.4	13.7
CHLORIDE (PPM)	0.50	1.3
SULPHATE (PPM)	9.6	25.3
T. ALKALINITY (PPM AS CaCO3)	8.00	87.2
PH	8.22	8.26
CONDUCTANCE (UMHDS/CM)	186	229
COLOUR (PTCO UNITS)	5	10
TURBIDITY (JTU)	8.2	34
TOTAL DISSOLVED SOLIDS (MG/L)	123.	155.
TOTAL SUSPENDED SOLIDS (MG/L)	<1.0	102
ACIDITY (PPM AS CaCO3)	<1	<1
NITRATE-NITRITE (PPM N)	0.118	0.79
TOTAL PHOSPHORUS (PPM P)	<0.003	0.023
ARSENIC (PPM)	(T) <0.0002(D) <0.0002	(T) 0.0005(D) 0.0003
CADMIUM (PPM)	<0.001 <0.001	<0.001 <0.001
COPPER (PPM)	0.004 0.001	0.010 0.001
IRON (PPM)	0.06 <.01	.65 <.01
CHROMIUM (PPM)	<.01 <.01	<.01 <.01
MANGANESE (PPM)	<.01 <.01	<.01 <.01
ZINC (PPM)	0.012 <0.001	0.016 0.003
LEAD (PPM)	<0.002 <0.002	<0.002 <0.002
BARIUM (PPM)	0.14 0.12	0.17 0.13
NICKEL (PPM)	<0.001 <0.001	0.003 <0.001
MERCURY (PPM)	0.00042 <0.00010	0.00080 0.00012
ALUMINUM (PPM)	0.35 <.01	0.54 0.03
S. REACTIVE PHOSPHATE (PPM P)	<0.003	<0.003
S. ORGANIC PHOSPHATE (PPM P)	*	*
S. ORGANIC CARBON (PPM)	1.5	2.0
T. KJELDAHL NITROGEN (PPM P)	0.10	.70
AMMONIA (PPM N)	<.01	<.01

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Randerson?

Oct. 82

ATTN: GLENN BROWN
ABERFORD RESOURCES LTD.
BONNETT PLUME PROJECT
NOVEMBER 10, 1982

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PAN OCEAN
 BONNETT PLUME PROJECT
 REC'D: OCT. 5/82
 SAMPLED BY: GLEN BROWN, ABERFORD RESOURCES

DATE NOV. 10/82
 PROJECT NO. 82-36-5-2739

PARAMETERS	I-2		I-4		I-6	
CALCIUM (PPM)	34.1		35.0		40.3	
MAGNESIUM (PPM)	19.0		15.2		13.5	
CHLORIDE (PPM)	0.2		0.15		<0.1	
SULPHATE (PPM)	16.7		17.9		17.2	
T. ALKALINITY (PPM AS CaCO ₃)	101.		116.		126	
PH	8.08		8.08		8.14	
CONDUCTANCE (UMHOS/CM)	220		247		250	
COLOUR (PTCO UNITS)	10		10		10	
TURBIDITY (JTU)	2.1		.21		.20	
TOTAL DISSOLVED SOLIDS (MG/L)	130		150		150	
TOTAL SUSPENDED SOLIDS (MG/L)	8.0		2.0		2.0	
ACIDITY (PPM AS CaCO ₃)	<.4		<.4		<.4	
NITRATE-NITRITE (PPM N)	.156		.158		.155	
TOTAL PHOSPHORUS (PPM P)	<0.003		<0.003		<0.003	
ARSENIC (PPM)	T) <0.0002	D) <0.0002	T) <0.0002	D) <0.0002	T) <0.0002	D) <0.0002
CADMIUM (PPM)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
COPPER (PPM)	0.003	<0.001	0.002	<0.001	0.003	<0.001
IRON (PPM)	0.19	<.01	0.06	<.01	0.57	<.01
CHROMIUM (PPM)	<0.01	<.01	<0.01	<.01	<0.01	<.01
MANGANESE (PPM)	0.04	<.01	0.01	<.01	<.01	<.01
ZINC (PPM)	0.028	0.010	0.023	0.009	0.025	0.003
LEAD (PPM)	<0.002	<0.002	<0.002	<0.002	0.005	<0.002
BARIUM (PPM)	0.09	0.08	0.07	0.07	0.12	0.10
NICKEL (PPM)	0.006	<0.001	0.006	<0.001	0.004	0.003
MERCURY (PPM)	<0.00010	<0.00010	<0.00010	<0.00010	0.00011	<0.00010
T. HARDNESS AS CaCO ₃ (PPM)	163.5		150.1		156.3	
S. REACTIVE PHOSPHATE (OPO ₄)	<0.003		<0.003		<0.003	
S. ORGANIC PHOSPHATE (PPM P)	<0.003		<0.003		<0.003	
S. ORGANIC CARBON (PPM)	0.6		0.5		0.6	
T. KJELDAHL NITROGEN (PPM)	.16		.20		.24	
AMMONIA (PPM N)	.06		.04		.05	
ALUMINUM	0.48	.02	.44	<.01	0.48	<.01

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DATE NOV. 10/82

PROJECT NO. 82-36-5-2739

PARAMETERS	I-8		I-11	
CALCIUM (PPM)	40.0		38.0	
MAGNESIUM (PPM)	13.0		13.0	
CHLORIDE (PPM)	0.5		0.2	
SULPHATE (PPM)	15.4		14.2	
T. ALKALINITY (PPM AS CaCO ₃)	128		123.	
PH	8.17		7.92	
CONDUCTANCE (UMHOS/CM)	248		252	
COLOUR (PTCO UNITS)	10		10	
TURBIDITY (JTU)	.21		15.0	
TOTAL DISSOLVED SOLIDS (MG/L)	150		150	
TOTAL SUSPENDED SOLIDS (MG/L)	2.0		14.0	
ACIDITY (PPM AS CaCO ₃)	<.4		<.4	
NITRATE-NITRITE (PPM N)	.136		.152	
TOTAL PHOSPHORUS (PPM P)	<0.003		<0.003	
ARSENIC (PPM)	(T) <0.0002	(D) <0.0002	(T) <0.0002	(D) <0.0002
CADMIUM (PPM)	<0.001		<0.001	
COPPER (PPM)	0.002		0.004	
IRON (PPM)	0.10		0.16	
CHROMIUM (PPM)	<0.01		<0.01	
MANGANESE (PPM)	<.01		<.01	
ZINC (PPM)	0.013		0.029	
LEAD (PPM)	0.003		0.003	
BARIUM (PPM)	0.08		0.09	
NICKEL (PPM)	0.004		0.005	
MERCURY (PPM)	0.00015		0.00014	
T. HARDNESS AS CaCO ₃ (PPM)	153.5		148.5	
S. REACTIVE PHOSPHATE (OPO ₄)	<0.003		<0.003	
S. ORGANIC PHOSPHATE (PPM P)	<0.003		<0.003	
S. ORGANIC CARBON (PPM)	1.6		1.4	
T. KJELDAHL NITROGEN (PPM)	.24		.20	
AMMONIA (PPM N)	.01		.02	
ALUMINUM	0.54		0.44	



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DATE NOV. 10/82
 PROJECT NO. 82-36-5-2739

PARAMETERS	I-14		I-17	
CALCIUM (PPM)	34.4		36.9	
MAGNESIUM (PPM)	15.5		12.8	
CHLORIDE (PPM)	0.8		0.6	
SULPHATE (PPM)	11.3		10.0	
T. ALKALINITY (PPM AS CaCO ₃)	122.		136.	
PH	8.25		8.05	
CONDUCTANCE (UMHOS/CM)	254		260	
COLOUR (PTCO UNITS)	10		10	
TURBIDITY (JTU)	4.0		6.0	
TOTAL DISSOLVED SOLIDS (MG/L)	160		160	
TOTAL SUSPENDED SOLIDS (MG/L)	4.0		8.0	
ACIDITY (PPM AS CaCO ₃)	<.4		<.4	
NITRATE-NITRITE (PPM N)	.140		.164	
TOTAL PHOSPHORUS (PPM P)	<0.003		<0.003	
ARSENIC (PPM)	(T) <0.002	(D) <0.0002	(T) <0.0002	(D) <0.0002
CADMIUM (PPM)	<0.001		<0.001	
COPPER (PPM)	0.002		0.002	
IRON (PPM)	0.10		0.12	
CHROMIUM (PPM)	<0.01		<0.01	
MANGANESE (PPM)	<.01		<.01	
ZINC (PPM)	0.013		0.19	
LEAD (PPM)	<0.002		<0.002	
BARIUM (PPM)	0.14		0.13	
NICKEL (PPM)	0.004		0.003	
MERCURY (PPM)	0.00010		0.00014	
T. HARDNESS AS CaCO ₃ (PPM)	149.8		144.9	
S. REACTIVE PHOSPHATE (OP ₄)	<0.003		<0.003	
S. ORGANIC PHOSPHATE (PPM P)	<0.003		<0.003	
S. ORGANIC CARBON (PPM)	1.1		1.2	
T. KJELDAHL NITROGEN (PPM)	.20		.16	
AMMONIA (PPM N)	.04		.02	
ALUMINUM	0.60	.05	0.50	.05



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DATE NOV. 10/82

PROJECT NO. 82-36-5-2739

PARAMETERS	P		L-1	
CALCIUM (PPM)	39.6		6.9	
MAGNESIUM (PPM)	12.6		2.5	
CHLORIDE (PPM)	1.8		0.15	
SULPHATE (PPM)	38.5		2.4	
T. ALKALINITY (PPM AS CaCO ₃)	126.		26.4	
PH	8.00		7.33	
CONDUCTANCE (UMHOS/CM)	310		58.	
COLOUR (PTCO UNITS)	10		60	
TURBIDITY (JTU)	1.8		5.0	
TOTAL DISSOLVED SOLIDS (MG/L)	200		40	
TOTAL SUSPENDED SOLIDS (MG/L)	2.0		8.0	
ACIDITY (PPM AS CaCO ₃)	<.4		0.8	
NITRATE-NITRITE (PPM N)	.094		.019	
TOTAL PHOSPHORUS (PPM P)	0.003		0.005	
ARSENIC (PPM)	(T) 0.0002	(D) <0.0002	(T) <0.0002	(D) <0.0002
CADMIUM (PPM)	<0.001		<0.001	
COPPER (PPM)	0.002		0.003	
IRON (PPM)	0.16		0.22	
CHROMIUM (PPM)	<0.01		<0.01	
MANGANESE (PPM)	<.01		<.01	
ZINC (PPM)	0.023		0.017	
LEAD (PPM)	<0.002		<0.002	
BARIUM (PPM)	0.12		0.01	
NICKEL (PPM)	0.005		0.007	
MERCURY (PPM)	0.00013		0.00020	
T. HARDNESS AS CaCO ₃ (PPM)	150.9		27.55	
S. REACTIVE PHOSPHATE (OP ₄)	<0.003		0.003	
S. ORGANIC PHOSPHATE (PPM P)	<0.003		0.004	
S. ORGANIC CARBON (PPM)	1.8		9.6	
T. KJELDAHL NITROGEN (PPM)	.16		.44	
AMMONIA (PPM N)	<.01		.03	
ALUMINUM	0.45	.07	0.56	0.48

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 PROJECT NO. **82-36-5-2739**

PARAMETERS	L-2		L-3	
CALCIUM (PPM)	5.7		13.3	
MAGNESIUM (PPM)	2.2		4.5	
CHLORIDE (PPM)	0.10		0.88	
SULPHATE (PPM)	2.3		3.0	
T. ALKALINITY (PPM AS CaCO ₃)	20.8		48.8	
PH	7.07		7.31	
CONDUCTANCE (UMHOS/CM)	45.		100.	
COLOUR (PTCO UNITS)	60		75	
TURBIDITY (JTU)	4.0		2.0	
TOTAL DISSOLVED SOLIDS (MG/L)	30		60	
TOTAL SUSPENDED SOLIDS (MG/L)	12.0		16.0	
CIDITY (PPM AS CaCO ₃)	1.2		1.2	
NITRATE-NITRITE (PPM N)	<.003		.004	
TOTAL PHOSPHORUS (PPM P)	0.005		0.010	
ARSENIC (PPM)	(T) <.0002	(D) <.0002	(T) 0.0002	(D) <.0002
CADMIUM (PPM)	<.001		<.001	
COPPER (PPM)	0.002		<.001	
IRON (PPM)	0.13		.02	
CHROMIUM (PPM)	<.01		<.01	
MANGANESE (PPM)	<.01		<.01	
ZINC (PPM)	0.018		0.004	
LEAD (PPM)	<.002		<.002	
BARIUM (PPM)	0.02		<.01	
NICKEL (PPM)	0.005		<.001	
MERCURY (PPM)	0.00015		<.00010	
T. HARDNESS AS CaCO ₃ (PPM)	23.3		51.75	
S. REACTIVE PHOSPHATE (OPO ₄)	0.003		0.003	
S. ORGANIC PHOSPHATE (PPM P)	0.004		0.005	
S. ORGANIC CARBON (PPM)	10.0		12.0	
T. KJELDAHL NITROGEN (PPM)	.52		.52	
AMMONIA (PPM N)	.02		.02	
ALUMINUM	0.64	0.50	0.56	.07



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BONNETT PLUME PROJECT
REC'D: OCT. 5/82

DATE NOV. 10/82

PROJECT NO. 82-36-5-2739

PARAMETERS	L-4	
CALCIUM (PPM)	3.6	
MAGNESIUM (PPM)	1.4	
CHLORIDE (PPM)	0.15	
SULPHATE (PPM)	2.0	
T. ALKALINITY (PPM AS CaCO ₃)	9.6	
PH	6.46	
CONDUCTANCE (UMHOS/CM)	24.	
COLOUR (PTCO UNITS)	80	
TURBIDITY (JTU)	2.0	
TOTAL DISSOLVED SOLIDS (MG/L)	20	
TOTAL SUSPENDED SOLIDS (MG/L)	2.0	
ACIDITY (PPM AS CaCO ₃)	1.6	
NITRATE-NITRITE (PPM N)	.003	
TOTAL PHOSPHORUS (PPM P)	0.017	
ARSENIC (PPM)	(T) <0.0002	(D) <0.0002
CADMIUM (PPM)	<0.001	<0.001
COPPER (PPM)	0.002	0.001
IRON (PPM)	0.66	.05
CHROMIUM (PPM)	<0.01	<.01
MANGANESE (PPM)	<.01	<.01
ZINC (PPM)	0.014	0.006
LEAD (PPM)	<0.002	<0.002
BARIUM (PPM)	0.07	<.01
NICKEL (PPM)	0.010	<0.001
MERCURY (PPM)	0.00018	<0.00010
T. HARDNESS AS CaCO ₃ (PPM)	14.8	
S. REACTIVE PHOSPHATE (OP ₄)	0.005	
S. ORGANIC PHOSPHATE (PPM P)	0.008	
S. ORGANIC CARBON (PPM)	12.7	
T. KJELDAHL NITROGEN (PPM)	.54	
AMMONIA (PPM N)	.02	
ALUMINUM	0.68	0.55



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PAN OCEAN
 BONNETT PLUME PROJECT
 REC'D: OCT. 5/82

DATE NOV. 10/82

PROJECT NO. 82-36-5-2739

PARAMETERS	S-1		S-2	
CALCIUM (PPM)	36.9		38.4	
MAGNESIUM (PPM)	10.4		8.3	
CHLORIDE (PPM)	<0.1		<0.1	
SULPHATE (PPM)	15.9		15.6	
T. ALKALINITY (PPM AS CaCO ₃)	121.		119.	
PH	8.22		7.92	
CONDUCTANCE (UMHOS/CM)	253		252	
COLOUR (PTCO UNITS)	10		10	
TURBIDITY (JTU)	0.7		2.0	
TOTAL DISSOLVED SOLIDS (MG/L)	160		150	
TOTAL SUSPENDED SOLIDS (MG/L)	2.0		4.0	
ACIDITY (PPM AS CaCO ₃)	<.4		<.4	
NITRATE-NITRITE (PPM N)	.143		.194	
TOTAL PHOSPHORUS (PPM P)	0.003		<0.003	
ARSENIC (PPM) (T) <0.0002 (D) <0.0002	(T) <0.0002 (D) <0.0002		(T) <0.0002 (D) <0.0002	
CADMIUM (PPM)	<0.001 <0.001		<0.001 <0.001	
COPPER (PPM)	0.002 <0.001		0.002 0.001	
IRON (PPM)	0.151 <.01		0.21 <.01	
CHROMIUM (PPM)	<0.01 <.01		<0.01 <.01	
MANGANESE (PPM)	<.01 <.01		<.01 <.01	
ZINC (PPM)	0.023 0.004		0.024 0.004	
LEAD (PPM)	<0.002 <0.002		<0.002 <0.002	
BARIUM (PPM)	0.10 0.08		0.07 0.06	
NICKEL (PPM)	0.006 <0.001		0.009 <0.001	
MERCURY (PPM)	0.00011 <0.00010		0.00019 <0.00010	
T. HARDNESS AS CaCO ₃ (PPM)	135.05		130.2	
S. REACTIVE PHOSPHATE (OPO ₄)	<0.003		<0.003	
S. ORGANIC PHOSPHATE (PPM P)	<0.003		<0.003	
S. ORGANIC CARBON (PPM)	2.5		1.3	
T. KJELDAHL NITROGEN (PPM)	.24		.15	
AMMONIA (PPM N)	.08		.06	
ALUMINUM	0.60	0.48	0.44	0.20



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PAN OCEAN
 BONNETT PLUME PROJECT
 REC'D: OCT. 5/82

DATE NOV. 10/82

PROJECT NO. 82-36-5-2739

PARAMETERS	S-3		W-12	
CALCIUM (PPM)	37.5		34.2	
MAGNESIUM (PPM)	12.2		13.2	
CHLORIDE (PPM)	<0.1		0.9	
SULPHATE (PPM)	13.0		15.6	
T. ALKALINITY (PPM AS CaCO ₃)	132		96	
PH	8.01		7.99	
CONDUCTANCE (UMHOS/CM)	265		264	
COLOUR (PTCO UNITS)	10		10	
TURBIDITY (JTU)	8.0		1.6	
TOTAL DISSOLVED SOLIDS (MG/L)	160		160	
TOTAL SUSPENDED SOLIDS (MG/L)	36.0		12.0	
ACIDITY (PPM AS CaCO ₃)	<.4		<.4	
NITRATE-NITRITE (PPM N)	.176		.111	
TOTAL PHOSPHORUS (PPM P)	0.015		<0.003	
ARSENIC (PPM)	(T) 0.0003	(D) <0.0002	(T) 0.0002	(D) <0.0002
CADMIUM (PPM)	<0.001		<0.001	
COPPER (PPM)	0.002		<0.001	
IRON (PPM)	0.37		<.01	
CHROMIUM (PPM)	<0.01		<0.01	
MANGANESE (PPM)	<.01		<.01	
ZINC (PPM)	0.45		0.016	
LEAD (PPM)	<0.002		<0.002	
BARIUM (PPM)	0.10		0.15	
NICKEL (PPM)	0.007		<0.001	
MERCURY (PPM)	0.00014		<0.00010	
T. HARDNESS AS CaCO ₃ (PPM)	144.0		139.8	
S. REACTIVE PHOSPHATE (OP ₄)	<0.003		<0.003	
S. ORGANIC PHOSPHATE (PPM P)	0.008		<0.003	
S. ORGANIC CARBON (PPM)	1.1		1.4	
T. KJELDAHL NITROGEN (PPM)	.20		.16	
AMMONIA (PPM N)	.09		.05	
ALUMINUM	0.66	0.28	0.46	.03



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DATE NOV. 10/82
 PROJECT NO. 82-36-5-273

PARAMETERS	W-1		W-4	
CALCIUM (PPM)	29.1		29.7	
MAGNESIUM (PPM)	14.0		13.2	
CHLORIDE (PPM)	1.30		1.30	
SULPHATE (PPM)	14.5		12.0	
T. ALKALINITY (PPM AS CaCO ₃)	96.8		114.	
PH	7.93		8.06	
CONDUCTANCE (UMHOS/CM)	251		242	
COLOUR (PTCO UNITS)	10		10	
TURBIDITY (JTU)	0.2		0.3	
TOTAL DISSOLVED SOLIDS (MG/L)	150		150	
TOTAL SUSPENDED SOLIDS (MG/L)	10.0		4.0	
ACIDITY (PPM AS CaCO ₃)	<.4		<.4	
NITRATE-NITRITE (PPM N)	.118		.119	
TOTAL PHOSPHORUS (PPM P)	<0.003		<0.003	
ARSENIC (PPM)	(T) 0.0002	(D) <0.0002	(T) <0.0002	(D) <0.0002
CADMIUM (PPM)	<0.001		<0.001	
COPPER (PPM)	0.001		0.002	
IRON (PPM)	0.10		0.12	
CHROMIUM (PPM)	<0.01		<0.01	
MANGANESE (PPM)	<.01		<.01	
ZINC (PPM)	0.014		0.020	
LEAD (PPM)	<0.002		<0.002	
BARIUM (PPM)	0.09		0.12	
NICKEL (PPM)	0.008		0.002	
MERCURY (PPM)	0.00011		0.00022	
T. HARDNESS AS CaCO ₃ (PPM)	140.4		128.5	
S. REACTIVE PHOSPHATE (OPO ₄)	<0.003		<0.003	
S. ORGANIC PHOSPHATE (PPM P)	<0.003		<0.003	
S. ORGANIC CARBON (PPM)	0.7		0.8	
T. KJELDAHL NITROGEN (PPM)	.16		.12	
AMMONIA (PPM N)	.05		.03	
ALUMINUM	0.60	0.39	0.60	0.46



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DATE NOV. 10/82
 PROJECT NO. 82-36-5-273

PARAMETERS	W-8		W-10	
CALCIUM (PPM)	33.0		33.9	
MAGNESIUM (PPM)	13.6		13.7	
CHLORIDE (PPM)	0.70		0.80	
SULPHATE (PPM)	11.9		15.5	
T. ALKALINITY (PPM AS CaCO ₃)	124.		124.	
PH	8.13		8.04	
CONDUCTANCE (UMHOS/CM)	252		257	
COLOUR (PTCO UNITS)	10		10	
TURBIDITY (JTU)	0.6		0.7	
TOTAL DISSOLVED SOLIDS (MG/L)	140		160	
TOTAL SUSPENDED SOLIDS (MG/L)	16.0		6.0	
ACIDITY (PPM AS CaCO ₃)	<.4		<.4	
NITRATE-NITRITE (PPM N)	.127		.114	
TOTAL PHOSPHORUS (PPM P)	<0.003		<0.003	
ARSENIC (PPM)	(T) <0.0002	(D) <0.0002	(T) <0.0002	(D) <0.0002
CADMIUM (PPM)	<0.001		<0.001	
COPPER (PPM)	0.001		<0.001	
IRON (PPM)	0.20		<.01	
CHROMIUM (PPM)	<0.01		<.01	
MANGANESE (PPM)	<.01		<.01	
ZINC (PPM)	0.25		0.002	
LEAD (PPM)	<0.002		<0.002	
BARIUM (PPM)	0.12		0.12	
NICKEL (PPM)	0.12		0.14	
MERCURY (PPM)	0.004		<0.001	
	0.00014		<0.00010	
T. HARDNESS AS CaCO ₃ (PPM)	0.00014		<0.00010	
S. REACTIVE PHOSPHATE (OPO ₄)	138.5		141.2	
S. ORGANIC PHOSPHATE (PPM P)	<0.003		<0.003	
S. ORGANIC CARBON (PPM)	<0.003		<0.003	
T. KJELDAHL NITROGEN (PPM)	0.9		1.2	
AMMONIA (PPM N)	.20		.16	
ALUMINUM	.06		.03	
	0.60	0.59	0.68	.03



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A P P E N D I X I I

RESULTS OF FIELD MEASUREMENTS

Bonnet Plume

Field Measurements - Feb. 7-8, 1982

<u>Location</u>	<u>Dissolved Oxygen</u>	<u>Temperature</u>	<u>Comments</u>
L1	8.2	2.0	(at 2½ ft.)
L2	6.5	1.5	"
L3	1.5-2.5 (var'1)	0.5	"
L4	2.0 (var'1)	2.0	"
S3	12.0 (?)	-	
I4	12.8	1.0	
I6	13.0	0	
I8	11.3	1	
I14	12.4	0	Downstream of I14
I17	14.2	0	Surface flow
W-1	13.0	0	
W-4	13.0	0	
W-8	8.1	1.0	
W-10	10.0	0.0	
W-12	18.2	0	
P	10.2	0.2	

- air temperature ~ -6°C

- stream samples all taken in areas of open water

- lake samples through ~ 80 cm ice

April 12-13, 1982

Bonnet Plume

Field Measurements

Station	Water Temp.	Dissolved Oxygen	Field pH	Comments
L ₁	0.0	5.4	7.0	Ice Depth ≈ 60-80 cm
L ₂	0.5	7.6	7.0	
L ₃	0.0	1.6	7.20	Shallow spot, ice to bottom
L ₄	0.0	0.6	6.30	
S ₁	-	-	-	
S ₂	1.5	12.4	8.05	
S ₃	1.5	12.4	8.10	
I ₂	-	-	-	
I ₄	1.0	9.6	8.05	
I ₆	1.0	8.3	7.70	Downstream from S ₁
I ₈	1.0	12.2	8.00	
I ₁₁	1.0	11.0	7.90	
I ₁₄	0.0	9.5	8.00	
I ₁₇	-	-	-	
W ₁	2.5	11.2	7.95	
W ₄	1.0	11.6	8.05	
W ₈	0.5	11.6	7.95	
W ₁₀	0.5	12.8	8.00	
W ₁₂	0.5	12.0	7.85	
P	-	-	-	

Snow pH Measurements

Snow Depth ≈ 85 cm

Met. Station #1	5.50	Required 5 minutes for pH meter to stabilize
Met. Station #2	5.50	
Met. Station #3 top 50 cm.	5.55	
Met Station #3 bottom 15 cm. 2 mm ⁺ xtals	5.50	

Bonnet Plume

Field Measurements May 22-23, 1982

<u>Location</u>	<u>T (°C)</u>	<u>D.O. (ppm)</u>	<u>pH</u>
L ₁	2.0	3.1	7.15
L ₂	2.5	0.9	7.05
L ₃	2.0	1.0	7.50
L ₄	2.0	1.0	6.70
S ₁	0.0	12.8	7.15
S ₂	1.0	12.4	7.90
S ₃	4.5	11.5	8.05
I ₂	0.0	12.0	7.30
I ₄	2.0	11.2	7.90
I ₆	0.0	12.8	7.52
I ₈	0.0	12.4	7.85
I ₁₁	0.0	10.4	8.00
I ₁₄	0.0	12.2	7.95
I ₁₇	0.0	12.8	8.05
W ₁	2.0	11.8	8.10
W ₄	0.0	12.0	8.15
W ₈	0.0	12.2	8.00
W ₁₀	0.0	12.6	8.00
W ₁₂	0.0	12.2	7.95
P ₁	0.0	13.4	7.85

- air temp. \approx 0.0°
- Wind and Peel Rivers open - a couple of ice jams
- Illtyd open but several ice jams and associated flooding
- icings still frozen

BONNET PLUME FIELD MEASUREMENTS

August 7 - 8, Samples Measured August 11, 1982

<u>LOCATION</u>	<u>pH</u>
S1	8.2
S2	8.15
S3	8.10
W1	8.25
W4	8.30
W8	8.20
W10	8.10
W12	8.20
I2	8.20
I4	8.20
I6	8.20
I8	8.20
I11	8.20
I14	8.15
I17	8.30
L1	7.4
L2	7.6
L3	7.6
L4	6.95
P	8.15

BONNET PLUME FIELD MEASUREMENTS: October 1, 1982

<u>LOCATION</u>	<u>T</u>	<u>D.O.</u>	<u>T</u>	<u>S</u>	<u>C</u>	<u>pH</u>
I ₂	2.0	11.0	4.0	0.5	220	
I ₄	2.0	12.4	3.0	0.8	230	
I ₆	2.5	11.8	4.0	0.5	235	
I ₈	2.0	12.6	3.0	0.5	235	
I ₁₁	2.0	12.0	3.5	0.5	175	
I ₁₄	0.5	13.1	2.5	0.5	200	
I ₁₇	0.0	13.6	1.5	0.5	215	
W ₁						
W ₄	2.0	12.6	3.5	0.5	245	
W ₈	2.5	11.9	3.0	0.5	220	
W ₁₀	2.5	13.0	3.5	0.5	260	
W ₁₂	2.5	13.2	3.0	0.5	245	
P	1.5	13.8	3.5	0.5	275	
S ₁	0.5	13.4	1.2	0.5	215	
S ₂	1.0	13.0	1.5	0.5	230	
S ₃	1.0	13.2	2.0	0.5	230	
L ₁	3.0	9.4	9.0	0.5	65	
L ₂	1.0	13.0	6.0	0.5	60	
L ₃	2.5	10.2	4.5	0.5	110	
L ₄	2.0	10.6	3.0	0.5	35	