

RESULTS OF ANALYSIS - Water

Sample ID	Reserve Well	Ta'an Horse Cr. Well
Sample Date	Ta'an	03 03 13
ALS ID	03 03 13	03 03 13
	1	2

Physical Tests

Colour	(CU)	<5	<5
Conductivity	(uS/cm)	277	1360
Total Dissolved Solids		146	982
Hardness	CaCO3	131	528
pH		8.12	7.78
Turbidity	(NTU)	0.1	213

Dissolved Anions

Alkalinity-Total		CaCO3	114	74
Chloride	Cl		5.8	9.0
Fluoride	F		0.09	0.36
Sulphate	SO4		11	645

Nutrients

Nitrate Nitrogen		N	1.6	<0.1
Nitrite Nitrogen		N	0.3	<0.1

Total Metals

Aluminum	T-Al	<0.01	<0.02
Antimony	T-Sb	<0.0005	<0.001
Arsenic	T-As	0.002	<0.002
Barium	T-Ba	0.03	<0.04
Boron	T-B	<0.1	<0.2
Cadmium	T-Cd	<0.0002	<0.0004
Calcium	T-Ca	38.8	106
Chromium	T-Cr	<0.002	<0.004
Copper	T-Cu	<0.01	<0.02
Iron	T-Fe	<0.03	11.3
Lead	T-Pb	<0.001	0.002
Magnesium	T-Mg	8.2	63.8
Manganese	T-Mn	0.064	0.258
Mercury	T-Hg	<0.0002	<0.0002
Potassium	T-K	1.6	1.1
Selenium	T-Se	0.001	<0.002
Sodium	T-Na	3	99
Uranium	T-U	0.0023	<0.0002
Zinc	T-Zn	<0.05	<0.1

Results are expressed as milligrams per litre except for pH, Colour (CU), Conductivity (umhos/cm), and Turbidity (NTU).
 < = Less than the detection limit indicated.



Appendix 1 - REGULATORY CRITERIA

Health Canada

Summary of Guidelines for Canadian Drinking Water Quality,
April 2002.
All limits are Maximum Acceptable Concentration (MAC) unless
otherwise indicated.
Limits expressed as milligrams per litre except pH, Turbidity,
Colour, and Coliform Bacteria.

		Lower Limit	Upper Limit		Notes
Physical Tests					
Colour	(CU)	-	15	CU	1
Total Dissolved Solids		-	500	mg/L	1
Hardness	CaCO ₃	-	-		2
pH		6.5	8.5		1
Turbidity	(NTU)	-	5	NTU	1, 3
Dissolved Anions					
Chloride	Cl	-	250	mg/L	1
Fluoride	F	-	1.5	mg/L	
Sulphate	SO ₄	-	500	mg/L	1, 4
Nutrients					
Nitrate Nitrogen	N	-	10	mg/L	
Nitrite Nitrogen	N	-	1	mg/L	
Total Metals					
Antimony	T-Sb	-	0.006	mg/L	5, 6
Arsenic	T-As	-	0.025	mg/L	5
Barium	T-Ba	-	1	mg/L	
Boron	T-B	-	5	mg/L	5
Cadmium	T-Cd	-	0.005	mg/L	
Chromium	T-Cr	-	0.05	mg/L	
Copper	T-Cu	-	1	mg/L	1, 7
Iron	T-Fe	-	0.3	mg/L	1
Lead	T-Pb	-	0.01	mg/L	7, 6
Manganese	T-Mn	-	0.05	mg/L	1
Mercury	T-Hg	-	0.001	mg/L	
Selenium	T-Se	-	0.01	mg/L	
Sodium	T-Na	-	200	mg/L	1
Uranium	T-U	-	0.02	mg/L	5
Zinc	T-Zn	-	5	mg/L	1, 7

- 1 Aesthetic Objective (AO) (taste, odour, appearance, etc.)
- 2 Maximum not established, levels > 200 mg/L are considered poor but may be tolerated.
- 3 1 NTU maximum allowed for water entering distribution systems.
- 4 There may be a laxative effect in some individuals when sulphate levels exceed 500 mg/L.
- 5 Interim Maximum Acceptable Concentration (IMAC)
- 6 First drawn water may be high, flush system before sampling.
- 7 At point of consumption.

Appendix 2 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

Colour in Water

This analysis is carried out using procedures adapted from APHA Method 2120 "Color". Colour (true colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method.

Recommended Holding Time:

Sample: 2 days

Reference: APHA

For more detail see ALS Environmental "Collection & Sampling Guide"

Conductivity in Water

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

Recommended Holding Time:

Sample: 28 days

Reference: APHA

For more detail see ALS Environmental "Collection & Sampling Guide"

Solids in Water

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) and total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius, TSS is determined by drying the filter at 104 degrees celsius. Total solids are determined by evaporating a sample to dryness at 104 degrees celsius. Fixed and volatile solids are determined by igniting a dried sample residue at 550 degrees celsius.

Recommended Holding Time:

Sample: 7 days

Reference: APHA

For more detail see ALS Environmental "Collection & Sampling Guide"

Conventional Parameters in Water

These analyses are carried out in accordance with procedures described in "Methods for Chemical Analysis of Water and Wastes" (USEPA), "Manual for the Chemical Analysis of Water, Wastewaters, Sediments and Biological Tissues" (BCMOE), and/or "Standard Methods for the Examination of Water and Wastewater" (APHA). Further details are available on request.



pH in Water

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

Recommended Holding Time:

Sample: 2 hours

Reference: APHA

For more detail see ALS Environmental "Collection & Sampling Guide"

Turbidity of Water

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

Recommended Holding Time:

Sample: 2 days

Reference: APHA

For more detail see ALS Environmental "Collection & Sampling Guide"

Alkalinity in Water by Colourimetry

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

Recommended Holding Time:

Sample: 14 days

Reference: APHA

For more detail see ALS Environmental "Collection & Sampling Guide"

Dissolved Anions in Water by Ion Chromatography

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions are determined by filtering the sample through a 0.45 micron membrane filter and injecting the filtrate onto a Dionex IonPac AG17 anion exchange column with a hydroxide eluent stream. Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

Recommended Holding Time:

Sample: 28 days (bromide, chloride, fluoride, sulphate)

Sample: 2 days (nitrate, nitrite)

Reference: APHA and EPA

For more detail see ALS Environmental "Collection & Sampling Guide"



Metals in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotplate or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by atomic absorption/emission spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Recommended Holding Time:

Sample: 6 months
Reference: EPA
For more detail see: ALS "Collection & Sampling Guide"

Mercury in Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorption and/or fluorescence spectrophotometry (EPA Method 7470A/7471A/245.7).

Recommended Holding Time:

Sample: 28 days
Reference: EPA
For more detail see ALS Environmental "Collection & Sampling Guide"

Alkalinity in Water by Titration

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

Recommended Holding Time:

Sample: 14 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

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Appendix 2 - METHODOLOGY - Continued



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