APPENDIX B METADATA OVERVIEW

Folders created to house each of the data files
Preliminary work to tests formulas, review data, and test pilot plot
data provided for EnviroInsite ; added features to the databases as we progressed (like removing blanks, etc)
data for Statistical Analysis

11-002		11-002 Folders	Type	Files	Links	Description
1			xlsx	Metadata Documentation		
			xlsx	Preliminary Notes		
2		_MoE_Ambient Data (orig)	xlsx	**EagleRock1(1)**		MoE_Ambient Data - original file
			xlsx	**GrandForks1(1)**		MoE_Ambient Data - original file
			xlsx	**Oliver1(1)**		MoE_Ambient Data - original file
			xlsx	**Osoyoos1(1)**		MoE_Ambient Data - original file
			xlsx	20100913 EagleRock1(1)_orig		MoE_Ambient Data (original file) renamed to highlight its original save date
			xlsx	20100913 GrandForks1(1)_orig		MoE_Ambient Data (original file) renamed to highlight its original save date
			xlsx	20100913 Oliver1(1)_orig		MoE_Ambient Data (original file) renamed to highlight its original save date
			xlsx	20100913 Osoyoos1(1)_orig		MoE_Ambient Data (original file) renamed to highlight its original save date
3		EagleRock	xlsx	20100913 EagleRock1(1)_orig		MoE_Ambient Data (original file) renamed to highlight its original save date
			xlsx	20110118 EagleRock1(2)		preliminary analysis of data to testing out various formulas & conditional formatting
			xlsx	20110213 EagleRock1(1)		preliminary file used in initial pilot plot
			xlsx	20110214 TEST Eagle Rock EI database (13 feb_am_12) blj BB		1st table for EnviroInsite software (manually prepared)
			xlsx	20110318 Part2 EagleRock chem obs transfer file		2nd table for EnviroInsite software (additional parameters added)
			maccdb	20110318 Part2 Project 11-002_EagleRock		database to create 2nd table for EnviroInsite software (additional parameters added)
			xlsx	20110320 eaglerock obs transfer file		1st table for EnviroInsite software (using database)
			maccdb	20110220 Project 11-002_EagleRock		database to create 1st table for EnviroInsite software
			xlsx	20110328 EagleRock - stats of chemistry		statistical analysis with charts & pivot tables
4		GrandForks	xlsx	20100913 GrandForks1(1)_orig		MoE_Ambient Data (original file) renamed to highlight its original save date
			xlsx	20110118 GrandForks1(2)		preliminary analysis of data to testing out various formulas & conditional formatting
			xlsx	20110222 grand forks chem obs transfer file		1st table for EnviroInsite software
			maccdb	20110222 Project 11-002_GrandForks		database to create 1st table for EnviroInsite software
			xlsx	20110317 GrandForks1(3)		sample file prepared for the first review
			xlsx	20110318 Part2 GrandForks chem obs transfer file		2nd table for EnviroInsite software (additional parameters added)
			maccdb	20110318 Part2 Project 11-002_GrandForks		database to create 2nd table for EnviroInsite software (additional parameters added)
			xlsx	20110328 GrandForks - stats of chemistry		statistical analysis with charts & pivot tables
5		Oliver	xlsx	20100913 Oliver1(1)_orig		MoE_Ambient Data (original file) renamed to highlight its original save date
			xlsx	20110118 Oliver1(2)		preliminary analysis of data to testing out various formulas & conditional formatting
			xlsx	20110220 oliver chem obs transfer file_NO3 error		1st table for EnviroInsite software (but ignore NO3 values)
			maccdb	20110220 Project 11-002_Oliver_NO3 error		database to create 1st table for EnviroInsite software (but ignore NO3 value)
			maccdb	20110220 Project 11-002_Oliver_NO3 correction		database to create 1st table for EnviroInsite software (corrected for NO3)
			xlsx	20110318 Part2 Oliver chem obs transfer file		2nd table for EnviroInsite software (additional parameters added)
			maccdb	20110318 Part2 Project 11-002_Oliver		database to create 2nd table for EnviroInsite software (additional parameters added)
			xlsx	20110328 Oliver - stats of chemistry		statistical analysis with charts & pivot tables
6		Osoyoos	xlsx	20100913 Osoyoos1(1)_orig		MoE_Ambient Data (original file) renamed to highlight its original save date
			xlsx	20110118 Osoyoos1(2)		preliminary analysis of data to testing out various formulas & conditional formatting
			xlsx	20110224 osoyoos chem obs transfer file		1st table for EnviroInsite software
			maccdb	20110224 Project 11-002_Osoyoos		database to create 1st table for EnviroInsite software
			xlsx	20110318 Part2 osoyoos chem obs transfer file		2nd table for EnviroInsite software (additional parameters added)
			maccdb	20110318 Part2 Project 11-002_Osoyoos		database to create 2nd table for EnviroInsite software (additional parameters added)
			xlsx	20110328 Osoyoos - stats of chemistry		statistical analysis with charts & pivot tables
	6.1	Mon Feb 14 - prelim work	xlsx	for pina (2)		prelim EnviroInsite file (version 2)
			xlsx	for pina (3)		prelim EnviroInsite file (version 3)

11-002		11-002 Folders	Type	Files	Links	Description
			xlsx	Osoyoos1(1)		MoE_Ambient Data - original file
			maccdb	Project 11-002_Osoyoos_Feb14		database design for EnviroInsite parameter value table
7		Other Data	xlsx	11-002 Macros		macros used to update well id during statistical analysis
			xlsx	background for each network site		background for each network
			xlsx	Stats Summary	y	links to "20110328 ... stats of chemistry" files
			xlsx	Well Exceedence - Range - ge 1		data set to provide # wells where parameter value is greater than or equal to 1 x GCDWQ
			xlsx	Well Exceedence - Range - ge 2		data set to provide # wells where parameter value is greater than or equal to 2 x GCDWQ
			xlsx	Well Exceedence - Range - gt 4		data set to provide # wells where parameter value is greater than 4 x GCDWQ
			xlsx	Well Exceedence	y	links to the 3 exceedence tables
			xlsx	Well tag changes		update to the well tag numbers provided for GrandForks & Osoyoos
	7.1	to pina sunday aft re modify ei files				
			maccdb	Check Changes		macro for QA/QC validation of transformation edit changes (osoyoos already completed)
			xlsx	EAGLE ROCK EI Input (26 Mar 2011)		modified "constituents" (post transformation for outliers)
			xlsx	EAGLE ROCK EI Input (26 Mar 2011)_orig		all "constituents" (pre transformation for outliers)
			xlsx	GRAND FORKS EI Input (26 Mar 2011)		modified "constituents" (post transformation for outliers)
			xlsx	GRAND FORKS EI Input (26 Mar 2011)_orig		all "constituents" (pre transformation for outliers)
			xlsx	OLIVER FINAL EI Input (26 Mar 2011)		modified "constituents" (post transformation for outliers)
			xlsx	OLIVER FINAL EI Input (26 Mar 2011)_orig		all "constituents" (pre transformation for outliers)
			xlsx	transformation table (FINAL 27 march 4_30pm)		modified outlier list
			xlsx	transformation table (FINAL 27 march 4_30pm)_orig - Copy		original outlier list
	7.2	Stat Sources	xlsx	epa students test table from App A		Studentized Range Test Table
			pdf	g9s-final		Data Quality Assessment:Statistical Methods forPractitionersEPA QA/G-9S
			pdf	GCDWQ_Dec2010		Guidelines
			xlsx	Geomean Error		analysis of geomean error fix (temp solution / modification)
			pdf	http___www.learningdomain.com_MULTIVARIATE_Module4Norm2		Resource note from the internet
			xlsx	Stats Test		Notes on various tests for Distribution testing & for Outlier Testing
			xlsx	template for stats of chemistry		initial setup but not final
8		Report Files	jpg	EagleRock-FE-Outlier		sample parameter distribution chart for the report
			jpg	Oliver-HCO3_MultiModal		sample parameter distribution chart for the report
			jpg	Osoyoos-Fl-Normal		statistical results provided for the report
			xlsx	Tables		sample parameter distribution chart for the report

Analysis

1 adjust range in columns ...
2 Add / Adjust conditional formating: BOLD RED font, if value exceeds GCDWQ

Graph considerations

- use interval = (av-min)/10
- used min as guideline for starting value
- then adjusted to better fit data
- check cnts
- interval should contain 1st element.
- check fit of graph red line with bar
- starting value / detection limit

Raw Chemistry Data

1 Some sites had more parameters than others.
Columns were inserted for the missing parameters in order to have all data consistent amongst the sites.
These columns are highlighted in green.
2 Inserted row 1 , 3 & 4
3 Inserted Col B (Well)
4 Added conditional formating: BOLD RED font, if value exceeds GCDWQ

RCD

1 copy of "Raw Chemistry data" only showing the columns of the parameters we are analyzing

GCDWQ Note, Col A & D was developed from all the original Raw chemistry data. Col B is per guidelines.

1 copied values from Raw Chemistry Data (lines 1 to 3) starting in col H
2 Section starting in Column O must have zeros for "false" otherwise there is problem with the data.

Parameter Review

For the parameter, where applicable, needed to decide whether to use Total or Dissolved values.
In general, want consistent comparsion amongst the sites.

Process for other sites once workbook was created

1 Brought in the Raw Chemistry Data for this site & labelled worksheet TEMP
2 Copied row 1 from "Raw Chemistry Data" worksheet into Row 1 of the TEMP worksheet (replacing the first header line which just says which site it is)
3 In TEMP, added columns missing, highlighted them in GREEN & put in their appropriate labels
4 In worksheet " Parameter Summary - all sites", documented columns added & checked to make sure they weren't any that we were measuring
5 Added 2 rows to TEMP per "Raw Chemistry Data" documentation above (rows 3 & 4) ; such that rows 1 to 4 contain the same type of information in both worksheets
6 Copied the first 3 rows & pasted values only, transpose into column O of GCDWQ.
The table in Column O MUST HAVE Zero values in "false" section otherwise some data is NOT in same format as other sites
7 Last Column of data worksheet "Dissolved : Chloride / Fluoride", put in formula to calculate ratio & formated it
Copied formula from "Raw Chemistry Data", & then checkled it (making sure picking up correct columns)

8 Copied the TEMP worksheet & pasted it into the "Raw Chemistry data"
9 Checked formulas in the "Analysis" worksheet (make sure range of values is okay).
10 When all is good, deleted TEMP worksheet.
11 Changed title in "Analysis" worksheet
12 Verfied conditional formating for entire worksheet "Raw Chemistry data"
13 Verfied conditional formating for entire worksheet "Analysis"
14 Make RCD worksheet
1 RCD is copy of "Raw Chemistry Data" but only for parameters we are measuring. (Just easier, less error prone if all in one spreadsheet & use this to get data).
15 For a particular parameter, in a temp worksheet,
(a) Data copied, (b) rows 3 & 4 deleted (c) sorted by values (d) copied results into the parameter worksheet
Pivot table created or updated to make all values picked up
Graph data source was adjusted to pick up range of new data

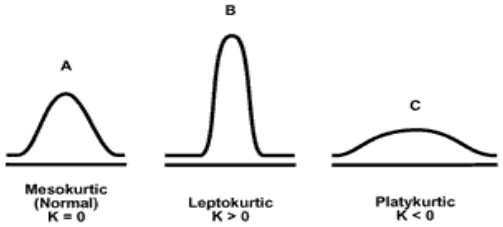
GLOBAL

Differences only work if we remove empty cells

1 put formulas in other workbooks
2 join all wells together for one site <= yes
3 compare each site against each other <= no
4 combine all sites together <== may not be of value (same issue as when comparing sites)
5 bring in other formulas

DETAILS within one workbook

Copy Alkalinity worksheet (which was the first worksheet created) & rename to new parameter
In a temporary worksheet, copy the parameters values, sort increasing order, format according to that required (starting in Col A) of the new worksheet
Copy into worksheet
edit parameter name & guide in G1 &2
adjust chart & pivot table data source range
format values to desired decimal places
determine axis values for charts
format axis values
analyalsis chart - labels, etc



FORMULAS

1 Range of deviations from the mean for specified probabilities of an observation falling within the range

% falling within the Range	SD factor + -
50%	0.6745
68.26%	1
95%	1.96
99%	2.576

(mean +- .6745sd) means 50% chance the true value of the mean lies within this range.

2 Kurtosis http://www.xycoon.com/nonnormality.htm

It can be proved that a normally distributed variable has a kurtosis of 3. **<=== In EXCEL, kurtosis = 0 for normal distribution**

Therefore a distribution can be called "leptokurtic" if the measure is larger than 3 and "platykurtic" if it is smaller than 3.

The coefficient of kurtosis should only be used with care !

In the statistics literature there have been given many examples where this measure for kurtosis fails (for small samples).

Also, it is possible for a variable to have a kurtosis of 3, without being normally distributed.

http://www.learningdomain.com/MULTIVARIATE/Module4Norm2.html

LEGEND to look at

SCOPE	1	Preliminary Examination to Identify Parameters increasing with Time or funky that require closer attention.
	2	Compare one well with another
OUTLINE	1	Examine each well independently to identify if data is credible
		For ex, are values increasing with time or funky that they require closer attention
DATA INTEGRITY	1	Inserted columns that were missing such each site has the same number of chemical observatiions.
		Inserted columns highlighted in green
	2	Inserted row to indicate Column number
	3	Added extra column to calculate: Dissolved : Floride / Chloride
	4	"Column Checks", examined each column label to make sure all have the same ordering
Questions	1	Truncate values so all using same significant figures?
	ANS	Yes we will figure that out later. Note, significant figures shown for a unique parameter vary, because depends on tool used when measured.
		1. Should we limit sig figs depending on chemical measured?
		2. Remi left note for himself re asking lab about sig figs Lab detection limit not known
	2	Does type of Sample have any bearing?
	ANS	Leave in "replicate" (ie use them)
	3	Why are some of the observations are empty?
	ANS	They only had enough funds to cover a specific tests.
	4	Would we need to examine the interrelationships between the parameters?
	ANS	Some of them we will. Remi will advise which ones.
	5	Would we need to examine the interrelationships between the wells (overall)
	ANS	Yes.
		1. Would location of wells be a factor & if yes, can it be accounted for using a factor?
Look At		Outliers
		Differences
		Linear Regression
		Sample size variability (ie apply wgt)?
		Read Report to determine Scope
		Provide definitions - blanks ignored unless otherwise stated

	NOTE: Blanks ignored from all calculations unless otherwise stated	
Measures	**Measurement**	**Definitions**
	min	lowest value
	mean	average of all values
	median	middle value where 50% higher & 50 % lower
	max	highest value
	mode	most frequently occurring
	variance (clustering)	St dev = sqroot of var clustering in % obs within mean + - stdev
	outliers	% obs outside mean + - stdev
	coefficient of variation	standard deviation / mean the higher the
	difference tests - problem as data has incontinuous sampling	
	Normality Test	what % do we use for st dev
	Histogram width	
Remi	Correlation	
Remi	Box Plots	
Remi	Bartlett Test for homogeneity of variance	
Remi	acge.... Geomchemistry uses?	
Remi	Lee/Lopaka morsel 2005 statistics?	

Parameter Consistency Review

Value	Parameter	New Label	Col#	Total (T) & Dissolved (D) both exist?	Right one chosen? EagleRock	GrandForks	Oliver	Osoyoos
Alkalinity Total 4.5 (mg/L)	Alkalinity	Alkalinity	9					
Ammonia - Dissolved (mg/L)	Ammonia	NH4	11	y	Y	Y	Y	Y
Arsenic - Total (mg/L)	Arsenic	AS	14	y	Y	Y	Y	Y
Bicarbonate (mg/L)	Bicarbonate	HCO3	23					
Calcium - Total (mg/L)	Calcium	CA	26	y	Y	Y	Y	Y
Chloride - Dissolved (mg/L)	Chloride	CL	31					
Iron - Total (mg/L)	Iron	FE	40	y	Y	Y	Y	Y
Fluoride - Dissolved (mg/L)	Fluoride	FL	41	y	Y	Y	Y	Y
Hardness - Total (mg/L)	Hardness	Hardness	44	y	y	Y	Y	Y
Potassium - Total (mg/L)	Potassium	K	46	y	Y	Y	Y	Y
Magnesium - Total (mg/L)	Magnesium	MG	49	y	Y	Y	Y	Y
Manganese - Total (mg/L)	Manganese	Mn	51	y	Y	Y	Y	Y
Sodium - Total (mg/L)	Sodium	NA	57	y	y	Y	Y	?
Nitrite Nitrogen - Dissolved (mg/L)	Nitrite	NO2	64	y	y	Y	Y	Y
Nitrogen - Total (mg/L)	Nitrate	NO3	66					
Total Dissolved Solids (mg/L)	TDS	TDS	73					
Conductivity (uS/cm)	Conductance	Conductance	85					
Sulfate - Dissolved (mg/L)	Sulphate	SO4	88	Y	Y	Y	Y	Y
Uranium - Total (mg/L)	Uranium	U	98					
pH (pH units)	pH	pH	105					
Dissolved : Chloride / Fluoride	Cl-Fl ratio	CL/FL	106	d/d?	Y	Y	Y	Y

Make sure we are not measuring any of these.

Missing Parameters that were added.

Check for Consistent Columns in Each Water Quality Workbook

EagleRock	EagleRock	105	Oliver	Oliver	105
Col 1	EMS ID	TRUE	Col 1	EMS ID	TRUE
Col 2	SAMPLE DATE	TRUE	Col 2	SAMPLE DATE	TRUE
Col 3	TYPE OF SAMPLE	TRUE	Col 3	TYPE OF SAMPLE	TRUE
Col 4	Silver - Dissolved (mg/L)	TRUE	Col 4	Silver - Dissolved (mg/L)	TRUE
Col 5	Silver - Total (mg/L)	TRUE	Col 5	Silver - Total (mg/L)	TRUE
Col 6	Aluminum - Dissolved (mg/L)	TRUE	Col 6	Aluminum - Dissolved (mg/L)	TRUE
Col 7	Aluminum - Total (mg/L)	TRUE	Col 7	Aluminum - Total (mg/L)	TRUE
Col 8	Alkalinity Total 4.5 (mg/L)	TRUE	Col 8	Alkalinity Total 4.5 (mg/L)	TRUE
Col 9	Alkalinity pH 8.3 (mg/L)	TRUE	Col 9	Alkalinity pH 8.3 (mg/L)	TRUE
Col 10	Ammonia - Dissolved (mg/L)	TRUE	Col 10	Ammonia - Dissolved (mg/L)	TRUE
Col 11	Ammonia - Total (mg/L)	TRUE	Col 11	Ammonia - Total (mg/L)	TRUE
Col 12	Arsenic - Dissolved (mg/L)	TRUE	Col 12	Arsenic - Dissolved (mg/L)	TRUE
Col 13	Arsenic - Total (mg/L)	TRUE	Col 13	Arsenic - Total (mg/L)	TRUE
Col 14	Boron - Dissolved (mg/L)	TRUE	Col 14	Boron - Dissolved (mg/L)	TRUE
Col 15	Boron - Total (mg/L)	TRUE	Col 15	Boron - Total (mg/L)	TRUE
Col 16	Barium - Dissolved (mg/L)	TRUE	Col 16	Barium - Dissolved (mg/L)	TRUE
Col 17	Barium - Total (mg/L)	TRUE	Col 17	Barium - Total (mg/L)	TRUE
Col 18	Beryllium - Dissolved (mg/L)	TRUE	Col 18	Beryllium - Dissolved (mg/L)	TRUE
Col 19	Beryllium - Total (mg/L)	TRUE	Col 19	Beryllium - Total (mg/L)	TRUE
Col 20	Bismuth - Dissolved (mg/L)	TRUE	Col 20	Bismuth - Dissolved (mg/L)	TRUE
Col 21	Bismuth - Total (mg/L)	TRUE	Col 21	Bismuth - Total (mg/L)	TRUE
Col 22	Bicarbonate (mg/L)	TRUE	Col 22	Bicarbonate (mg/L)	TRUE
Col 23	Bromide Dissolved (mg/L)	TRUE	Col 23	Bromide Dissolved (mg/L)	TRUE
Col 24	Calcium - Dissolved (mg/L)	TRUE	Col 24	Calcium - Dissolved (mg/L)	TRUE
Col 25	Calcium - Total (mg/L)	TRUE	Col 25	Calcium - Total (mg/L)	TRUE
Col 26	Carbon Total Organic (mg/L)	TRUE	Col 26	Carbon Total Organic (mg/L)	TRUE
Col 27	Carbon - Total (mg/L)	TRUE	Col 27	Carbon - Total (mg/L)	TRUE
Col 28	Cadmium - Dissolved (mg/L)	TRUE	Col 28	Cadmium - Dissolved (mg/L)	TRUE
Col 29	Cadmium - Total (mg/L)	TRUE	Col 29	Cadmium - Total (mg/L)	TRUE
Col 30	Chloride - Dissolved (mg/L)	TRUE	Col 30	Chloride - Dissolved (mg/L)	TRUE
Col 31	Cobalt - Dissolved (mg/L)	TRUE	Col 31	Cobalt - Dissolved (mg/L)	TRUE
Col 32	Cobalt - Total (mg/L)	TRUE	Col 32	Cobalt - Total (mg/L)	TRUE
Col 33	Chromium - Dissolved (mg/L)	TRUE	Col 33	Chromium - Dissolved (mg/L)	TRUE
Col 34	Chromium - Total (mg/L)	TRUE	Col 34	Chromium - Total (mg/L)	TRUE
Col 35	Copper - Dissolved (mg/L)	TRUE	Col 35	Copper - Dissolved (mg/L)	TRUE
Col 36	Copper - Total (mg/L)	TRUE	Col 36	Copper - Total (mg/L)	TRUE
Col 37	Dissolved Oxygen (mg/L)	TRUE	Col 37	Dissolved Oxygen (mg/L)	TRUE
Col 38	Iron - Dissolved (mg/L)	TRUE	Col 38	Iron - Dissolved (mg/L)	TRUE
Col 39	Iron - Total (mg/L)	TRUE	Col 39	Iron - Total (mg/L)	TRUE
Col 40	Fluoride - Dissolved (mg/L)	TRUE	Col 40	Fluoride - Dissolved (mg/L)	TRUE
Col 41	Fluoride - Total (mg/L)	TRUE	Col 41	Fluoride - Total (mg/L)	TRUE
Col 42	Hardness Total - Dissolved (mg/L)	TRUE	Col 42	Hardness Total - Dissolved (mg/L)	TRUE
Col 43	Hardness - Total (mg/L)	TRUE	Col 43	Hardness - Total (mg/L)	TRUE
Col 44	Potassium - Dissolved (mg/L)	TRUE	Col 44	Potassium - Dissolved (mg/L)	TRUE
Col 45	Potassium - Total (mg/L)	TRUE	Col 45	Potassium - Total (mg/L)	TRUE
Col 46	Lithium - Total (mg/L)	TRUE	Col 46	Lithium - Total (mg/L)	TRUE
Col 47	Magnesium - Dissolved (mg/L)	TRUE	Col 47	Magnesium - Dissolved (mg/L)	TRUE
Col 48	Magnesium - Total (mg/L)	TRUE	Col 48	Magnesium - Total (mg/L)	TRUE
Col 49	Manganese - Dissolved (mg/L)	TRUE	Col 49	Manganese - Dissolved (mg/L)	TRUE
Col 50	Manganese - Total (mg/L)	TRUE	Col 50	Manganese - Total (mg/L)	TRUE
Col 51	Molybdenum - Dissolved (mg/L)	TRUE	Col 51	Molybdenum - Dissolved (mg/L)	TRUE
Col 52	Molybdenum - Total (mg/L)	TRUE	Col 52	Molybdenum - Total (mg/L)	TRUE
Col 53	Kjeldahl Nitrogen - Total (mg/L)	TRUE	Col 53	Kjeldahl Nitrogen - Total (mg/L)	TRUE
Col 54	Nitrite + Nitrate (mg/L)	TRUE	Col 54	Nitrite + Nitrate (mg/L)	TRUE
Col 55	Sodium - Dissolved (mg/L)	TRUE	Col 55	Sodium - Dissolved (mg/L)	TRUE
Col 56	Sodium - Total (mg/L)	TRUE	Col 56	Sodium - Total (mg/L)	TRUE
Col 57	Nickel - Dissolved (mg/L)	TRUE	Col 57	Nickel - Dissolved (mg/L)	TRUE
Col 58	Nickel - Total (mg/L)	TRUE	Col 58	Nickel - Total (mg/L)	TRUE
Col 59	Nitrate Nitrogen - Dissolved (mg/L)	TRUE	Col 59	Nitrate Nitrogen - Dissolved (mg/L)	TRUE
Col 60	Nitrate + Nitrite Nitrogen - Dissolved (mg/L)	TRUE	Col 60	Nitrate + Nitrite Nitrogen - Dissolved (mg/L)	TRUE
Col 61	Nitrite Nitrogen - Total (mg/L)	TRUE	Col 61	Nitrite Nitrogen - Total (mg/L)	TRUE
Col 62	Kjeldahl Nitrogen - Total Dissolved (mg/L)	TRUE	Col 62	Kjeldahl Nitrogen - Total Dissolved (mg/L)	TRUE
Col 63	Nitrite Nitrogen - Dissolved (mg/L)	TRUE	Col 63	Nitrite Nitrogen - Dissolved (mg/L)	TRUE

Check for Consistent Columns in Each Water Quality Workbook

EagleRock	EagleRock	105	Oliver	Oliver	105
Col 64	Nitrogen Organic-Total (mg/L)	TRUE	Col 64	Nitrogen Organic-Total (mg/L)	TRUE
Col 65	Nitrogen - Total (mg/L)	TRUE	Col 65	Nitrogen - Total (mg/L)	TRUE
Col 66	Nitrogen - Total Dissolved (mg/L)	TRUE	Col 66	Nitrogen - Total Dissolved (mg/L)	TRUE
Col 67	Ortho-Phosphate Dissolved (mg/L)	TRUE	Col 67	Ortho-Phosphate Dissolved (mg/L)	TRUE
Col 68	Phosphorus - Total (mg/L)	TRUE	Col 68	Phosphorus - Total (mg/L)	TRUE
Col 69	Phosphorus Tot. Dissolved (mg/L)	TRUE	Col 69	Phosphorus Tot. Dissolved (mg/L)	TRUE
Col 70	Lead - Dissolved (mg/L)	TRUE	Col 70	Lead - Dissolved (mg/L)	TRUE
Col 71	Lead - Total (mg/L)	TRUE	Col 71	Lead - Total (mg/L)	TRUE
Col 72	Total Dissolved Solids (mg/L)	TRUE	Col 72	Total Dissolved Solids (mg/L)	TRUE
Col 73	Sulfur - Dissolved (mg/L)	TRUE	Col 73	Sulfur - Dissolved (mg/L)	TRUE
Col 74	Sulfur - Total (mg/L)	TRUE	Col 74	Sulfur - Total (mg/L)	TRUE
Col 75	Niobium - Dissolved (mg/L)	TRUE	Col 75	Niobium - Dissolved (mg/L)	TRUE
Col 76	Niobium - Total (mg/L)	TRUE	Col 76	Niobium - Total (mg/L)	TRUE
Col 77	Selenium - Dissolved (mg/L)	TRUE	Col 77	Selenium - Dissolved (mg/L)	TRUE
Col 78	Selenium - Total (mg/L)	TRUE	Col 78	Selenium - Total (mg/L)	TRUE
Col 79	Silicon - Dissolved(mg/L)	TRUE	Col 79	Silicon - Dissolved(mg/L)	TRUE
Col 80	Silicon - Total (mg/L)	TRUE	Col 80	Silicon - Total (mg/L)	TRUE
Col 81	Silica - Dissolved (mg/L)	TRUE	Col 81	Silica - Dissolved (mg/L)	TRUE
Col 82	Tin - Dissolved (mg/L)	TRUE	Col 82	Tin - Dissolved (mg/L)	TRUE
Col 83	Tin - Total (mg/L)	TRUE	Col 83	Tin - Total (mg/L)	TRUE
Col 84	Conductivity (uS/cm)	TRUE	Col 84	Conductivity (uS/cm)	TRUE
Col 85	Strontium - Dissolved (mg/L)	TRUE	Col 85	Strontium - Dissolved (mg/L)	TRUE
Col 86	Strontium - Total (mg/L)	TRUE	Col 86	Strontium - Total (mg/L)	TRUE
Col 87	Sulfate - Dissolved (mg/L)	TRUE	Col 87	Sulfate - Dissolved (mg/L)	TRUE
Col 88	Sulfate Total (mg/L)	TRUE	Col 88	Sulfate Total (mg/L)	TRUE
Col 89	Tellurium - Dissolved (mg/L)	TRUE	Col 89	Tellurium - Dissolved (mg/L)	TRUE
Col 90	Tellurium - Total (mg/L)	TRUE	Col 90	Tellurium - Total (mg/L)	TRUE
Col 91	Temperature (degrees Celsius)	TRUE	Col 91	Temperature (degrees Celsius)	TRUE
Col 92	Titanium - Dissolved (mg/L)	TRUE	Col 92	Titanium - Dissolved (mg/L)	TRUE
Col 93	Titanium - Total (mg/L)	TRUE	Col 93	Titanium - Total (mg/L)	TRUE
Col 94	Thallium - Dissolved (mg/L)	TRUE	Col 94	Thallium - Dissolved (mg/L)	TRUE
Col 95	Thallium - Total (mg/L)	TRUE	Col 95	Thallium - Total (mg/L)	TRUE
Col 96	Turbidit (NTU)	TRUE	Col 96	Turbidit (NTU)	TRUE
Col 97	Uranium - Total (mg/L)	TRUE	Col 97	Uranium - Total (mg/L)	TRUE
Col 98	Vanadium - Dissolved (mg/L)	TRUE	Col 98	Vanadium - Dissolved (mg/L)	TRUE
Col 99	Vanadium - Total (mg/L)	TRUE	Col 99	Vanadium - Total (mg/L)	TRUE
Col 100	Zinc - Dissolved (mg/L)	TRUE	Col 100	Zinc - Dissolved (mg/L)	TRUE
Col 101	Zinc - Total (mg/L)	TRUE	Col 101	Zinc - Total (mg/L)	TRUE
Col 102	Zirconium - Dissolved (mg/L)	TRUE	Col 102	Zirconium - Dissolved (mg/L)	TRUE
Col 103	Zirconium - Total (mg/L)	TRUE	Col 103	Zirconium - Total (mg/L)	TRUE
Col 104	pH (pH units)	TRUE	Col 104	pH (pH units)	TRUE
Col 105	Dissolved : Floride / Chloride	TRUE	Col 105	Dissolved : Floride / Chloride	TRUE

Check for Consistent Columns in Each Water Quality Workbook

GrandForks	GrandForks	105	Osoyoos	Osoyoos
Col 1	EMS ID	TRUE	Col 1	EMS ID
Col 2	SAMPLE DATE	TRUE	Col 2	SAMPLE DATE
Col 3	TYPE OF SAMPLE	TRUE	Col 3	TYPE OF SAMPLE
Col 4	Silver - Dissolved (mg/L)	TRUE	Col 4	Silver - Dissolved (mg/L)
Col 5	Silver - Total (mg/L)	TRUE	Col 5	Silver - Total (mg/L)
Col 6	Aluminum - Dissolved (mg/L)	TRUE	Col 6	Aluminum - Dissolved (mg/L)
Col 7	Aluminum - Total (mg/L)	TRUE	Col 7	Aluminum - Total (mg/L)
Col 8	Alkalinity Total 4.5 (mg/L)	TRUE	Col 8	Alkalinity Total 4.5 (mg/L)
Col 9	Alkalinity pH 8.3 (mg/L)	TRUE	Col 9	Alkalinity pH 8.3 (mg/L)
Col 10	Ammonia - Dissolved (mg/L)	TRUE	Col 10	Ammonia - Dissolved (mg/L)
Col 11	Ammonia - Total (mg/L)	TRUE	Col 11	Ammonia - Total (mg/L)
Col 12	Arsenic - Dissolved (mg/L)	TRUE	Col 12	Arsenic - Dissolved (mg/L)
Col 13	Arsenic - Total (mg/L)	TRUE	Col 13	Arsenic - Total (mg/L)
Col 14	Boron - Dissolved (mg/L)	TRUE	Col 14	Boron - Dissolved (mg/L)
Col 15	Boron - Total (mg/L)	TRUE	Col 15	Boron - Total (mg/L)
Col 16	Barium - Dissolved (mg/L)	TRUE	Col 16	Barium - Dissolved (mg/L)
Col 17	Barium - Total (mg/L)	TRUE	Col 17	Barium - Total (mg/L)
Col 18	Beryllium - Dissolved (mg/L)	TRUE	Col 18	Beryllium - Dissolved (mg/L)
Col 19	Beryllium - Total (mg/L)	TRUE	Col 19	Beryllium - Total (mg/L)
Col 20	Bismuth - Dissolved (mg/L)	TRUE	Col 20	Bismuth - Dissolved (mg/L)
Col 21	Bismuth - Total (mg/L)	TRUE	Col 21	Bismuth - Total (mg/L)
Col 22	Bicarbonate (mg/L)	TRUE	Col 22	Bicarbonate (mg/L)
Col 23	Bromide Dissolved (mg/L)	TRUE	Col 23	Bromide Dissolved (mg/L)
Col 24	Calcium - Dissolved (mg/L)	TRUE	Col 24	Calcium - Dissolved (mg/L)
Col 25	Calcium - Total (mg/L)	TRUE	Col 25	Calcium - Total (mg/L)
Col 26	Carbon Total Organic (mg/L)	TRUE	Col 26	Carbon Total Organic (mg/L)
Col 27	Carbon - Total (mg/L)	TRUE	Col 27	Carbon - Total (mg/L)
Col 28	Cadmium - Dissolved (mg/L)	TRUE	Col 28	Cadmium - Dissolved (mg/L)
Col 29	Cadmium - Total (mg/L)	TRUE	Col 29	Cadmium - Total (mg/L)
Col 30	Chloride - Dissolved (mg/L)	TRUE	Col 30	Chloride - Dissolved (mg/L)
Col 31	Cobalt - Dissolved (mg/L)	TRUE	Col 31	Cobalt - Dissolved (mg/L)
Col 32	Cobalt - Total (mg/L)	TRUE	Col 32	Cobalt - Total (mg/L)
Col 33	Chromium - Dissolved (mg/L)	TRUE	Col 33	Chromium - Dissolved (mg/L)
Col 34	Chromium - Total (mg/L)	TRUE	Col 34	Chromium - Total (mg/L)
Col 35	Copper - Dissolved (mg/L)	TRUE	Col 35	Copper - Dissolved (mg/L)
Col 36	Copper - Total (mg/L)	TRUE	Col 36	Copper - Total (mg/L)
Col 37	Dissolved Oxygen (mg/L)	TRUE	Col 37	Dissolved Oxygen (mg/L)
Col 38	Iron - Dissolved (mg/L)	TRUE	Col 38	Iron - Dissolved (mg/L)
Col 39	Iron - Total (mg/L)	TRUE	Col 39	Iron - Total (mg/L)
Col 40	Fluoride - Dissolved (mg/L)	TRUE	Col 40	Fluoride - Dissolved (mg/L)
Col 41	Fluoride - Total (mg/L)	TRUE	Col 41	Fluoride - Total (mg/L)
Col 42	Hardness Total - Dissolved (mg/L)	TRUE	Col 42	Hardness Total - Dissolved (mg/L)
Col 43	Hardness - Total (mg/L)	TRUE	Col 43	Hardness - Total (mg/L)
Col 44	Potassium - Dissolved (mg/L)	TRUE	Col 44	Potassium - Dissolved (mg/L)
Col 45	Potassium - Total (mg/L)	TRUE	Col 45	Potassium - Total (mg/L)
Col 46	Lithium - Total (mg/L)	TRUE	Col 46	Lithium - Total (mg/L)
Col 47	Magnesium - Dissolved (mg/L)	TRUE	Col 47	Magnesium - Dissolved (mg/L)
Col 48	Magnesium - Total (mg/L)	TRUE	Col 48	Magnesium - Total (mg/L)
Col 49	Manganese - Dissolved (mg/L)	TRUE	Col 49	Manganese - Dissolved (mg/L)
Col 50	Manganese - Total (mg/L)	TRUE	Col 50	Manganese - Total (mg/L)
Col 51	Molybdenum - Dissolved (mg/L)	TRUE	Col 51	Molybdenum - Dissolved (mg/L)
Col 52	Molybdenum - Total (mg/L)	TRUE	Col 52	Molybdenum - Total (mg/L)
Col 53	Kjeldahl Nitrogen - Total (mg/L)	TRUE	Col 53	Kjeldahl Nitrogen - Total (mg/L)
Col 54	Nitrite + Nitrate (mg/L)	TRUE	Col 54	Nitrite + Nitrate (mg/L)
Col 55	Sodium - Dissolved (mg/L)	TRUE	Col 55	Sodium - Dissolved (mg/L)
Col 56	Sodium - Total (mg/L)	TRUE	Col 56	Sodium - Total (mg/L)
Col 57	Nickel - Dissolved (mg/L)	TRUE	Col 57	Nickel - Dissolved (mg/L)
Col 58	Nickel - Total (mg/L)	TRUE	Col 58	Nickel - Total (mg/L)
Col 59	Nitrate Nitrogen - Dissolved (mg/L)	TRUE	Col 59	Nitrate Nitrogen - Dissolved (mg/L)
Col 60	Nitrate + Nitrite Nitrogen - Dissolved (mg/L)	TRUE	Col 60	Nitrate + Nitrite Nitrogen - Dissolved (mg/L)
Col 61	Nitrite Nitrogen - Total (mg/L)	TRUE	Col 61	Nitrite Nitrogen - Total (mg/L)
Col 62	Kjeldahl Nitrogen - Total Dissolved (mg/L)	TRUE	Col 62	Kjeldahl Nitrogen - Total Dissolved (mg/L)
Col 63	Nitrite Nitrogen - Dissolved (mg/L)	TRUE	Col 63	Nitrite Nitrogen - Dissolved (mg/L)

Check for Consistent Columns in Each Water Quality Workbook

GrandForks	GrandForks	105	Osoyoos	Osoyoos
Col 64	Nitrogen Organic-Total (mg/L)	TRUE	Col 64	Nitrogen Organic-Total (mg/L)
Col 65	Nitrogen - Total (mg/L)	TRUE	Col 65	Nitrogen - Total (mg/L)
Col 66	Nitrogen - Total Dissolved (mg/L)	TRUE	Col 66	Nitrogen - Total Dissolved (mg/L)
Col 67	Ortho-Phosphate Dissolved (mg/L)	TRUE	Col 67	Ortho-Phosphate Dissolved (mg/L)
Col 68	Phosphorus - Total (mg/L)	TRUE	Col 68	Phosphorus - Total (mg/L)
Col 69	Phosphorus Tot. Dissolved (mg/L)	TRUE	Col 69	Phosphorus Tot. Dissolved (mg/L)
Col 70	Lead - Dissolved (mg/L)	TRUE	Col 70	Lead - Dissolved (mg/L)
Col 71	Lead - Total (mg/L)	TRUE	Col 71	Lead - Total (mg/L)
Col 72	Total Dissolved Solids (mg/L)	TRUE	Col 72	Total Dissolved Solids (mg/L)
Col 73	Sulfur - Dissolved (mg/L)	TRUE	Col 73	Sulfur - Dissolved (mg/L)
Col 74	Sulfur - Total (mg/L)	TRUE	Col 74	Sulfur - Total (mg/L)
Col 75	Niobium - Dissolved (mg/L)	TRUE	Col 75	Niobium - Dissolved (mg/L)
Col 76	Niobium - Total (mg/L)	TRUE	Col 76	Niobium - Total (mg/L)
Col 77	Selenium - Dissolved (mg/L)	TRUE	Col 77	Selenium - Dissolved (mg/L)
Col 78	Selenium - Total (mg/L)	TRUE	Col 78	Selenium - Total (mg/L)
Col 79	Silicon - Dissolved(mg/L)	TRUE	Col 79	Silicon - Dissolved(mg/L)
Col 80	Silicon - Total (mg/L)	TRUE	Col 80	Silicon - Total (mg/L)
Col 81	Silica - Dissolved (mg/L)	TRUE	Col 81	Silica - Dissolved (mg/L)
Col 82	Tin - Dissolved (mg/L)	TRUE	Col 82	Tin - Dissolved (mg/L)
Col 83	Tin - Total (mg/L)	TRUE	Col 83	Tin - Total (mg/L)
Col 84	Conductivity (uS/cm)	TRUE	Col 84	Conductivity (uS/cm)
Col 85	Strontium - Dissolved (mg/L)	TRUE	Col 85	Strontium - Dissolved (mg/L)
Col 86	Strontium - Total (mg/L)	TRUE	Col 86	Strontium - Total (mg/L)
Col 87	Sulfate - Dissolved (mg/L)	TRUE	Col 87	Sulfate - Dissolved (mg/L)
Col 88	Sulfate Total (mg/L)	TRUE	Col 88	Sulfate Total (mg/L)
Col 89	Tellurium - Dissolved (mg/L)	TRUE	Col 89	Tellurium - Dissolved (mg/L)
Col 90	Tellurium - Total (mg/L)	TRUE	Col 90	Tellurium - Total (mg/L)
Col 91	Temperature (degrees Celsius)	TRUE	Col 91	Temperature (degrees Celsius)
Col 92	Titanium - Dissolved (mg/L)	TRUE	Col 92	Titanium - Dissolved (mg/L)
Col 93	Titanium - Total (mg/L)	TRUE	Col 93	Titanium - Total (mg/L)
Col 94	Thallium - Dissolved (mg/L)	TRUE	Col 94	Thallium - Dissolved (mg/L)
Col 95	Thallium - Total (mg/L)	TRUE	Col 95	Thallium - Total (mg/L)
Col 96	Turbidit (NTU)	TRUE	Col 96	Turbidit (NTU)
Col 97	Uranium - Total (mg/L)	TRUE	Col 97	Uranium - Total (mg/L)
Col 98	Vanadium - Dissolved (mg/L)	TRUE	Col 98	Vanadium - Dissolved (mg/L)
Col 99	Vanadium - Total (mg/L)	TRUE	Col 99	Vanadium - Total (mg/L)
Col 100	Zinc - Dissolved (mg/L)	TRUE	Col 100	Zinc - Dissolved (mg/L)
Col 101	Zinc - Total (mg/L)	TRUE	Col 101	Zinc - Total (mg/L)
Col 102	Zirconium - Dissolved (mg/L)	TRUE	Col 102	Zirconium - Dissolved (mg/L)
Col 103	Zirconium - Total (mg/L)	TRUE	Col 103	Zirconium - Total (mg/L)
Col 104	pH (pH units)	TRUE	Col 104	pH (pH units)
Col 105	Dissolved : Floride / Chloride	TRUE	Col 105	Dissolved : Floride / Chloride

Steps		Sources/Comments
1	**original source file**	No 1 - 20100913 GrandForks1(1)_orig
2	**initial data review**	No 2.1 - 20110118 GrandForks1(2)
	preliminary statistical review	No 2.2 - 20110317 GrandForks1(3)
3	**First round of assembling data for EInsite**	
	(database)	No 3 - 20110222 Project 11-002_GrandForks
	(excel)	No 3 - 20110222 grand forks chem obs transfer file
		Raw Chemistry Data : original source with extra column for Well ID
		RCD for access : "Raw Chemistry data" prepped for database import by removing first line & non data lines at end
		X Ref EMS + WTN : Remi's file (to cross ref EMS & WellTagNo)
		Observations wb for Einsite : upload from database file (initally blank ; copy of template tab from EI input file)
	Process	1. created "RCD for access" worksheet
		2. opened database & imported "RCD for access" worksheet as table "Raw Chemistry Data"
		3. created queries for each element in format per "Observations wb for Observations wb for Einsite" worksheet
		example query names : AS, CA, CL,...
		4. created "..Append.." queries and a "Make Table: OBS" macro to run all of these Append queries
		Each append query, runs the queries created in step 3 & appends results to table called "OBS"
		5. Ran macro & then output Table "Obs" was copied & pasted into Excel worksheet "Observations wb for Einsite" starting in cell A2
		6. "Observations wb for Einsite" worksheet Col C is formatted to date format Month DD, YYYY (i.e. exclude time component)

Steps	Sources/Comments

3 **Additional round of assembling data for EInsite**

(database) No 4 - 20110318 Part2 GrandForks chem obs transfer file

(excel) No 4 - 20110318 Part2 Project 11-002_GrandForks

Required to produce output for the remaining parameters & any other adjustments that were required

Process Similar to first round except for the following:

1. imported "Raw Chemistry Table" & one query from first database

2. used the one query as a template to create queries for the remaining parameters required for EInsite software (or for any others requiring adjustments

3. imported an append query & a make table macro from the first database.

4. created "..Append.." queries and a "Make Table: OBS" macro to run all of these Append queries for the remaining elements

5. Made a copy of the original "Raw Chemistry Table" & renamed it as "ORIG - Raw Chemistry Data" to archive

6.a Imported "Well Tag Changes" from Excel & made a table.

6.b Created update query "1 UPDATE Well Tag No - 18Mar2011" & ran it to update the "Raw Chemistry Table" with the well changes

7. Ran macro from step 4. to create Table "OBS"

8.a Imported "Constituent Changes" from Excel & made a table. (names that Remi preferred to use for the parameters rather than what was in source file)

8.b Created update query "3 UPDATE Constituent - 18Mar2011" & ran it to update the "OBS" with the constituent changes

9. created query "4 MK Obs for Excel - removing empty values" to create a new table "Obs - for Excel" that is Table OBS excluding the empty values

10. "Obs - for Excel" pasted into Excel worksheet "Obs wb for EInsite - Part2" starting in cell A2

11. "Obs wb for EInsite - Part2" worksheet Col C is formatted to date format Month DD, YYYY (i.e. exclude time component)