What the RMN QC package does (& doesn't do!)

The automated QC scripts **generate QC reports for temperature, pressure and sensor depth** which we will describe in detail in ensuing slides.

They do **NOT** -

- **Automatically 'fix' the data**. You still have to go through the process of interpreting the QC reports and -
  - Checking flagged data
  - Doing visual checks on the time series plots
  - Deciding if and how to make corrections
- **Catch everything**. There may be instances where the tests miss data points that should be flagged (we would love to get your feedback when this happens! we are still learning ourselves & want to keep improving the scripts).

Tips

Start by skimming through the QC Word document.

- Are there problems? If so, what kind, and what parameters do they affect?

- Then open the .csv file.
- Reformat the file so that it is easier to navigate (unfortunately we can't get .csv files to retain this formatting each time you open them)
  - **Format – Autofit Column Width**
  - **Alignment - center the column entries**
  - **Freeze top row**
  - **Filter**
- Filter for the flagged values. Evaluate whether changes should be made.
- Document changes (we are currently considering a couple different options for this; one is a field/data processing form – see handout – that gets submitted to the continuous data coordinator after each download).
- Records of any changes will also be visible in the QC .csv file, in the Comments field(s)

QC tests

- **Unrealistic values** (‘Gross range’)
  - Entries are flagged if values are above or below upper and lower limits
- **Spikes**
  - Entries are flagged if adjacent points change by more than ‘x’ amount
- **Rate of change** (RoC)
  - Entries are flagged if the RoC exceeds a given threshold (e.g., ≥ 3 st dev within 25 hrs)
- **Flat line**
  - Entries are flagged if a certain # of consecutive measurements are within a certain amount of each other (e.g., >10 consecutive temperature measurements are within 0.01 degrees C of one another)

Flags

Flags are assigned to each data point (a single measured parameter at a unique point in time)

- **P** = Pass,
- **S** = Suspect,
- **F** = Fail,
- **X** = No Data or Not Applicable (NA).

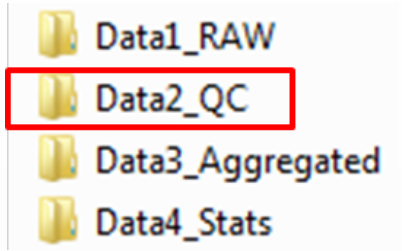
Fail - extreme, unrealistic
- Example - water temp values flagged ‘F’ if ≥ 30 or ≤ -2

Suspect - highly unlikely, but not as extreme as above
- Example - water temp values flagged ‘S’ if ≥ 25 or ≤ -1

Thresholds

Table 1. Updated thresholds (7/31/2017) based on evaluation of continuous air temperature, water temperature, air pressure, water pressure and sensor depth data that have been collected at freshwater, high quality wadeable RMN stream sites in the eastern US. Most of the data are being recorded at 30-minute intervals by Onset HOBO U20 Water Level Data Loggers.

Test	Water Temp		Air Temp		Sensor depth		Water Pressure		Air (Barometric) Pressure	
	Fail	Suspect	Fail	Suspect	Fail	Suspect	Fail	Suspect	Fail	Suspect
Gross	>30°C or <-2°C	>25°C or <-0.1°C	>38°C or <-25°C	>35°C or <-23°C	>6 ft or <-1 ft	>6 ft or <-1 ft	>17 psi or <13 psi	>16.8 psi or <13.5 psi	>15 psi or <13 psi	>14.8 psi or <13.5 psi
Spike	≥1.5°C (±)	≥1.0°C (±)	≥10°C (±)	≥8°C (±)	≥5 ft (±)	≥3 ft (±)	≥0.7 psi (±)	≥0.5 psi (±)	≥0.25 psi (±)	≥0.15 psi (±)
Rate of Change	NA	≥3 stdev within 25 hrs	NA	≥3 stdev within 25 hrs	NA	≥3 stdev within 25 hrs	NA	≥3 stdev within 25 hrs	NA	≥3 stdev within 25 hrs
Flat Line	>30 consecutive measurements within 0.01 units of one another	>20 consecutive measurements within 0.01 units of one another	>15 consecutive measurements within 0.01 units of one another	>10 consecutive measurements within 0.01 units of one another	>60 consecutive measurements within 0 units of one another	>20 consecutive measurements within 0 units of one another	>15 consecutive measurements within 0.001 units of one another	>10 consecutive measurements within 0.001 units of one another	>15 consecutive measurements within 0.001 units of one another	>10 consecutive measurements within 0.001 units of one another



QC reports

2 documents

QC report (Word document)

.csv file

Data Quality Control Report

Report Date: 2016-02-05

DATA FILE INFORMATION

Filename: QC_test1_Aw_20130725_20131015.csv

SiteID: test1

Period of Record, Requested: 2013-07-25 to 2013-10-15

Period of Record, Actual: 2013-07-25 to 2013-10-15

Recording Interval: 30 minutes

Data Type: Aw

Parameters Included: Water.Temp.C, Air.Temp.C, Water.BP.psi, Air.BP.psi, Water.Level.ft,

DATA SUMMARY, OVERALL

Month and Day versus number of records.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
8	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
9	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
10	48	48	48	48	48	48	48	48	48	48	48	48	49	48	21

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
7	0	0	0	0	0	0	0	0	0	27	48	48	48	48	48	48

QC_test2_Aw_20130426_20130725.csv - Excel

SiteID	Date	Time	Date.Time	Water.Temp.C	Air.Temp.C	Water.BP.psi	Air.BP.psi	Water.Level.ft	Water.LoggerID	Water.RowID	Flag.Date.Time	Flag.Water.Temp.C	Flag.Air.Temp.C	Flag.Water.BP.p
Test2	4/26/2013	10:30:00	4/26/2013 10:30	10.063	15.282	14.8024	14.3638	0.985	NA	1		P	P	P
Test2	4/26/2013	11:00:00	4/26/2013 11:00	10.357	14.134	14.7461	14.3644	0.854	NA	2		P	P	P
Test2	4/26/2013	11:30:00	4/26/2013 11:30	10.748	14.23	14.7428	14.3603	0.855	NA	3		P	P	P
Test2	4/26/2013	12:00:00	4/26/2013 12:00	11.139	15.473	14.7441	14.3627	0.853	NA	4		P	P	P
Test2	4/26/2013	12:30:00	4/26/2013 12:30	11.528	17.284	14.7431	14.3612	0.854	NA	5		P	P	P
Test2	4/26/2013	13:00:00	4/26/2013 13:00	11.916	18.806	14.7421	14.3628	0.848	NA	6		P	P	P
Test2	4/26/2013	13:30:00	4/26/2013 13:30	12.207	19.662	14.7453	14.3629	0.855	NA	7		P	P	P
Test2	4/26/2013	14:00:00	4/26/2013 14:00	12.594	20.424	14.7351	14.3537	0.853	NA	8		P	P	P
Test2	4/26/2013	14:30:00	4/26/2013 14:30	12.883	20.71	14.7315	14.3484	0.857	NA	9		P	P	P
Test2	4/26/2013	15:00:00	4/26/2013 15:00	13.173	20.901	14.7234	14.3426	0.852	NA	10		P	P	P
Test2	4/26/2013	15:30:00	4/26/2013 15:30	13.365	20.805	14.7171	14.3331	0.859	NA	11		P	P	P
Test2	4/26/2013	16:00:00	4/26/2013 16:00	13.558	21.091	14.7109	14.3302	0.852	NA	12		P	P	P
Test2	4/26/2013	16:30:00	4/26/2013 16:30	13.654	21.569	14.702	14.3215	0.851	NA	13		P	P	P
Test2	4/26/2013	17:00:00	4/26/2013 17:00	13.75	21.282	14.6978	14.3152	0.856	NA	14		P	P	P
Test2	4/26/2013	17:30:00	4/26/2013 17:30	13.846	21.473	14.6913	14.3164	0.838	NA	15		P	P	P
Test2	4/26/2013	18:00:00	4/26/2013 18:00	13.846	20.805	14.7051	14.3239	0.853	NA	16		P	P	P
Test2	4/26/2013	18:30:00	4/26/2013 18:30	13.846	19.758	14.7119	14.3294	0.856	NA	17		P	P	P
Test2	4/26/2013	19:00:00	4/26/2013 19:00	13.75	18.426	14.7368	14.3538	0.857	NA	18		P	P	P
Test2	4/26/2013	19:30:00	4/26/2013 19:30	13.75	17.665	14.7413	14.3564	0.861	NA	19		P	P	P
Test2	4/26/2013	20:00:00	4/26/2013 20:00	13.75	16.999	14.7392	14.3551	0.859	NA	20		P	P	P
Test2	4/26/2013	20:30:00	4/26/2013 20:30	13.654	15.951	14.7113	14.3289	0.856	NA	21		P	P	P
Test2	4/26/2013	21:00:00	4/26/2013 21:00	13.558	15.187	14.6812	14.2999	0.853	NA	22		P	P	P
Test2	4/26/2013	21:30:00	4/26/2013 21:30	13.558	14.325	14.6994	14.3178	0.854	NA	23		P	P	P
Test2	4/26/2013	22:00:00	4/26/2013 22:00	13.461	13.75	14.7174	14.3351	0.855	NA	24		P	P	P
Test2	4/26/2013	22:30:00	4/26/2013 22:30	13.365	13.173	14.7241	14.341	0.857	NA	25		P	P	P
Test2	4/26/2013	23:00:00	4/26/2013 23:00	13.269	12.594	14.7421	14.3606	0.853	NA	26		P	P	P
Test2	4/26/2013	23:30:00	4/26/2013 23:30	13.173	12.11	14.7416	14.3558	0.863	NA	27		P	P	P
Test2	4/27/2013	0:00:00	4/27/2013 0:00	13.173	11.819	14.7325	14.3452	0.867	NA	28		P	P	P
Test2	4/27/2013	0:30:00	4/27/2013 0:30	13.076	11.722	14.739	14.3515	0.867	NA	29		P	P	P
Test2	4/27/2013	1:00:00	4/27/2013 1:00	12.98	11.819	14.7457	14.3587	0.866	NA	30		P	P	P
Test2	4/27/2013	1:30:00	4/27/2013 1:30	12.98	11.819	14.7572	14.3656	0.877	NA	31		P	P	P
Test2	4/27/2013	2:00:00	4/27/2013 2:00	12.883	11.819	14.7637	14.37	0.881	NA	32		P	P	P
Test2	4/27/2013	2:30:00	4/27/2013 2:30	12.787	11.819	14.7541	14.3519	0.901	NA	33		P	S	P
Test2	4/27/2013	3:00:00	4/27/2013 3:00	12.787	11.722	14.7588	14.3447	0.928	NA	34		P	P	P
Test2	4/27/2013	3:30:00	4/27/2013 3:30	12.69	11.819	14.7447	14.3271	0.936	NA	35		P	P	P
Test2	4/27/2013	4:00:00	4/27/2013 4:00	12.69	11.722	14.7377	14.3175	0.943	NA	36		P	P	P
Test2	4/27/2013	4:30:00	4/27/2013 4:30	12.594	11.625	14.7718	14.3374	0.975	NA	37		P	P	P
Test2	4/27/2013	5:00:00	4/27/2013 5:00	12.594	11.625	14.7856	14.3351	1.012	NA	38		P	P	P

QC_test2_Aw_20130426_20130725

QC Word file

QC report (Word)

4 main components

1. **Data file information** (siteID, date range, parameters, recording interval)
2. **'Count' tables (# measurements/day)** so that you can find inconsistencies (too few measurements (=missing data) or too many measurements)
3. **Results from QC tests** - # of entries marked as pass (P), suspect (S), fail (F), missing data (X) or not available (NA)
4. **Time series plots** – for each individual parameter & several combined parameters (water & air temperature; water temperature and water level)

QC report (Word)

Organizational scheme

1. **Data file information** (siteID, date range, parameters, recording interval)
2. **Overall summary**
    - Count table
    - Overall flag (# entries marked as pass, suspect, fail or missing data, based on the *worst* flag across all of the QC tests)
3. **Individual parameters**
    - Count table
    - Flags by QC test (gross, spike, rate of change and flat line)
    - Time series plot
4. **Multi-parameter time series plots** (as available)

QC report – Section 1

Data Quality Control Report

Report Date: 2017-06-17

DATA FILE INFORMATION

Filename: QC_ECO6702_AirWater_20130910_20140115.csv

SiteID: ECO6702

Period of Record, Requested: 2013-09-10 to 2014-01-15

Period of Record, Actual: 2013-09-10 to 2014-01-15

Recording Interval: 30 minutes

Data Type: AirWater

Parameters Included: Water.P.psi, Water.Temp.C, Air.BP.psi, Sensor.Depth.ft, Air.Temp.C,

DATA SUMMARY, OVERALL

Estimated number of records per day is 48.

Number of records by year and month (with totals).

	1	9	10	11	12	Sum
2013	0	984	1488	1440	1488	5400
2014	696	0	0	0	0	696
Sum	696	984	1488	1440	1488	6096

Number of records by day and month (with totals).

Month

Day

	1	9	10	11	12	Sum
1	48	0	48	48	48	192
2	48	0	48	48	48	192
3	48	0	48	48	48	192
4	48	0	48	48	48	192
5	48	0	48	48	48	192
6	48	0	48	48	48	192
7	48	0	48	48	48	192

QC report – Section 2

‘Count’ tables
(# measurements/day)

Sensor was set to record at 30-minute intervals. This equates to 48 measurements per day.

QC report – Section 2

Overall flags by parameter

Water.P.psi

P	S	Sum
6049	47	6096

Water.Temp.C

P	S	Sum
6047	49	6096

Air.BP.psi

P	Sum
6096	6096

Sensor.Depth.ft

F	P	S	Sum
1	6068	27	6096

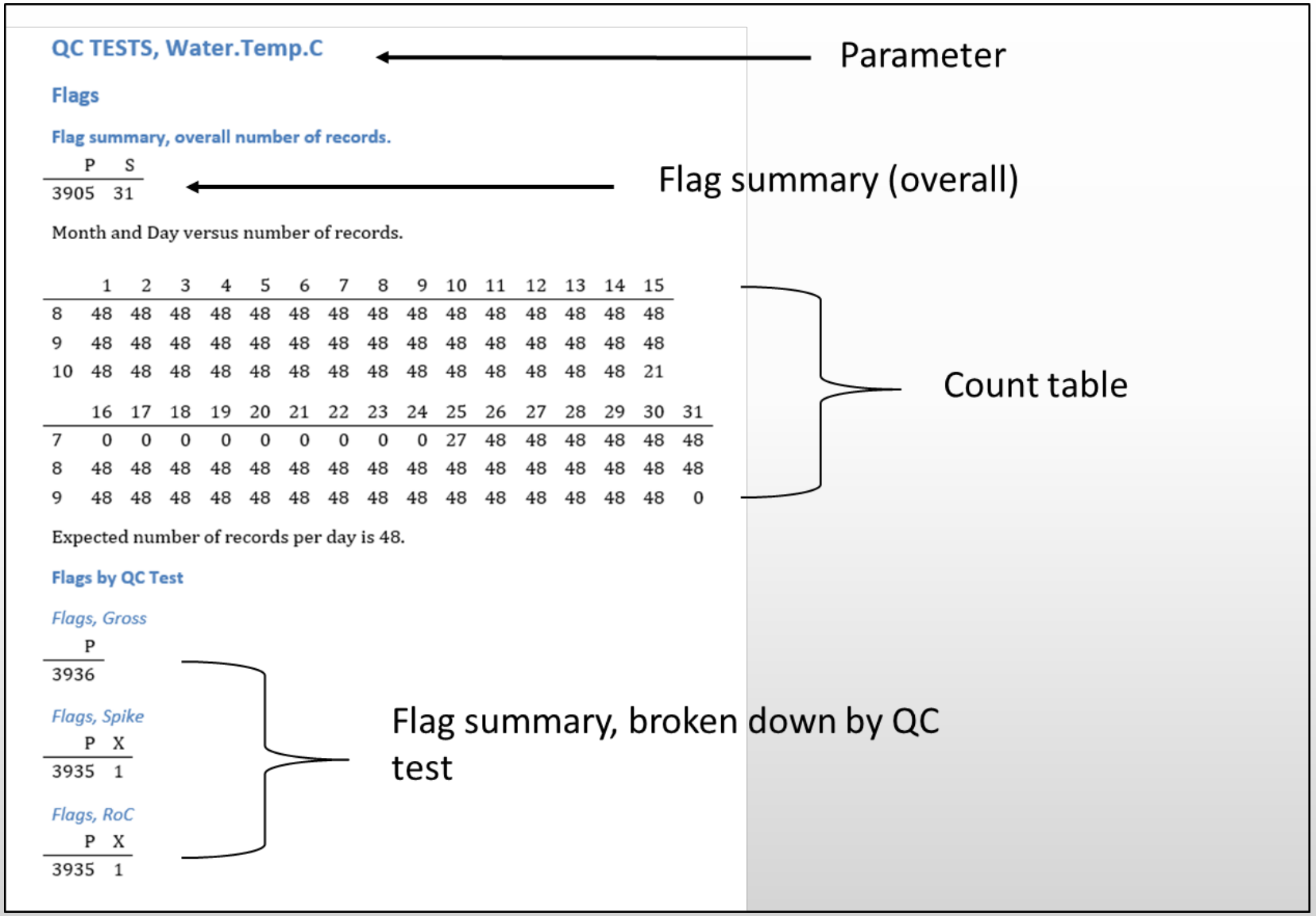
Air.Temp.C

P	S	Sum
6083	13	6096

Overall summary -
For each parameter, # of entries marked as pass (P), suspect (S), fail (F) or missing data (X), for any of the QC tests.

In this example, 6047 of the water temperature entries were marked as pass, and 49 were marked as suspect.

QC report – Section 3



QC TESTS, Water.Temp.C

Parameter

Flags

Flag summary, overall number of records.

P	S
3905	31

Flag summary (overall)

Month and Day versus number of records.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
8	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
9	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
10	48	48	48	48	48	48	48	48	48	48	48	48	48	48	21

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
7	0	0	0	0	0	0	0	0	0	27	48	48	48	48	48	48
8	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
9	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	0

Count table

Expected number of records per day is 48.

Flags by QC Test

Flags, Gross

P
3936

Flags, Spike

P	X
3935	1

Flags, RoC

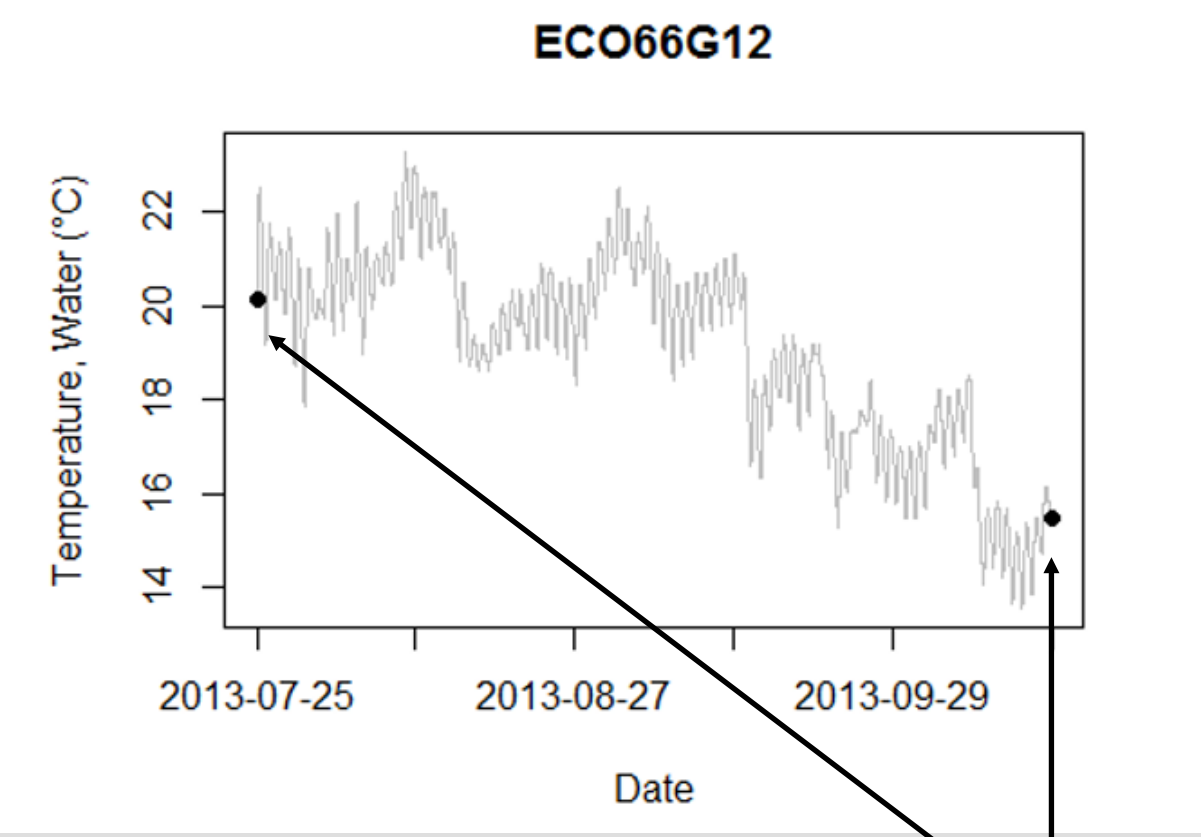
P	X
3935	1

Flag summary, broken down by QC test

Individual parameters – e.g., water temperature

QC report – Section 3

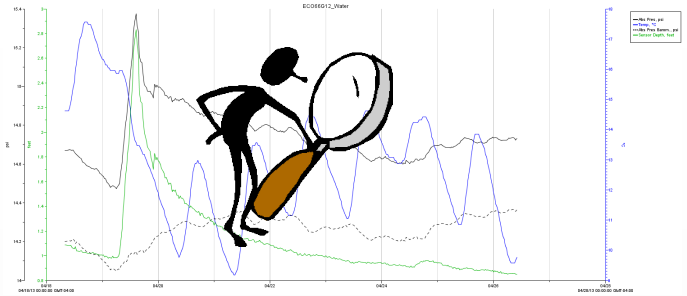
Individual parameters continued…



Time series plot (all values plotted vs. date/time) for water temperature

This example includes discrete measurements
(this feature is not currently available in TNCON)

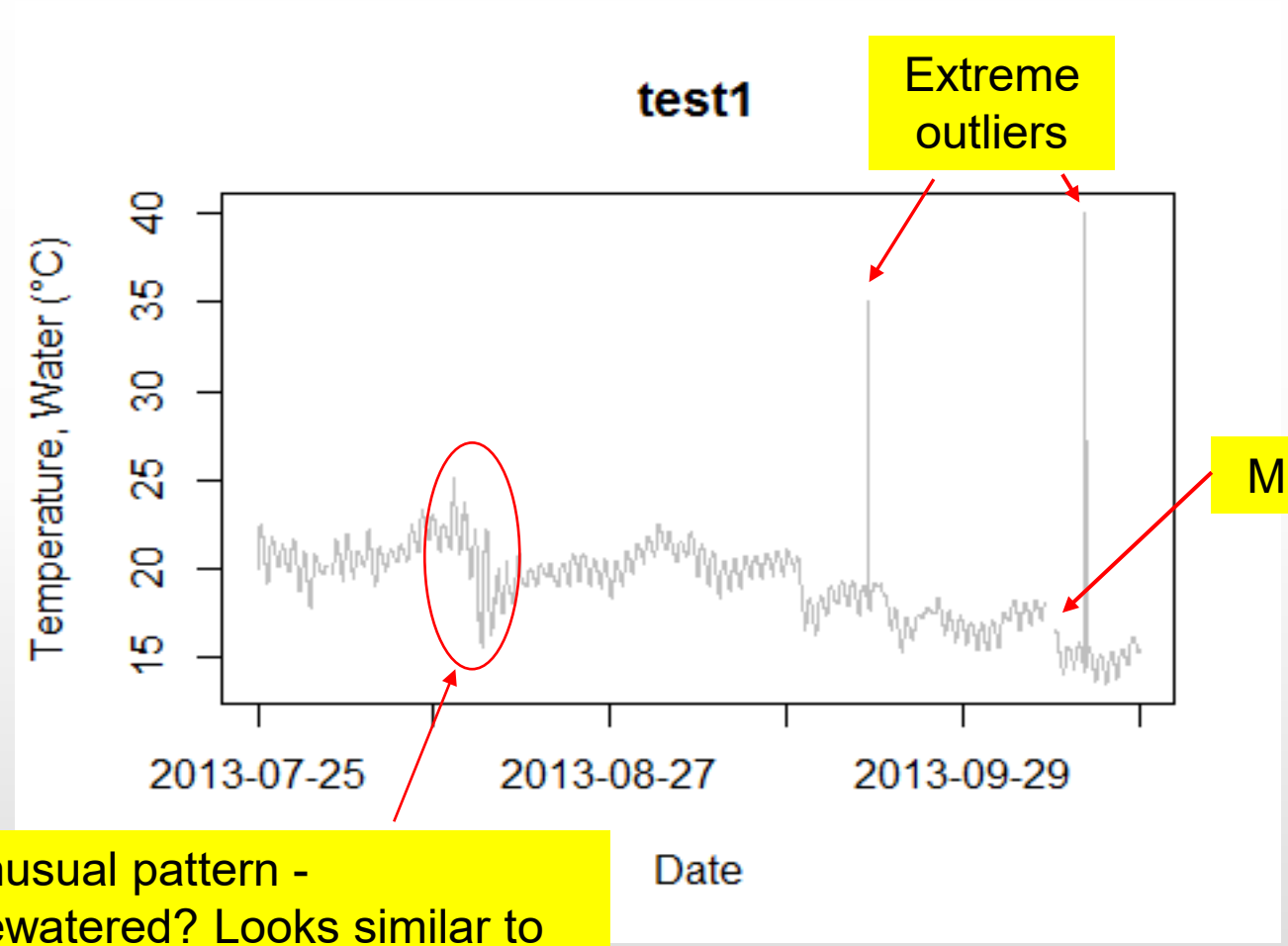
Visual checks on time series plots



- **Missing data**
- **Closely matching water and air temperature** values (this indicates that the stream sensor may have been out of the water)
- **Diel fluxes with flat tops, or "chatter**" in the gage height record (this indicates that the sensor may have been buried in sediment)
- **Water level values of 0** (this could mean that the pressure transducer was dewatered. With vented transducers, another possibility is that moisture got into the cable and caused readings of zero water depth)
- **Water level values that are negative**
- **Outliers or rapidly fluctuating values** (it is possible that the sensor moved, e.g., due to a high flow event or vandalism)
- Values recorded before the sensor was correctly positioned & stabilized, or after the sensor was removed from its location **("trimming")**

Note: you can also do these visual checks on plots in HOBOware or with other software

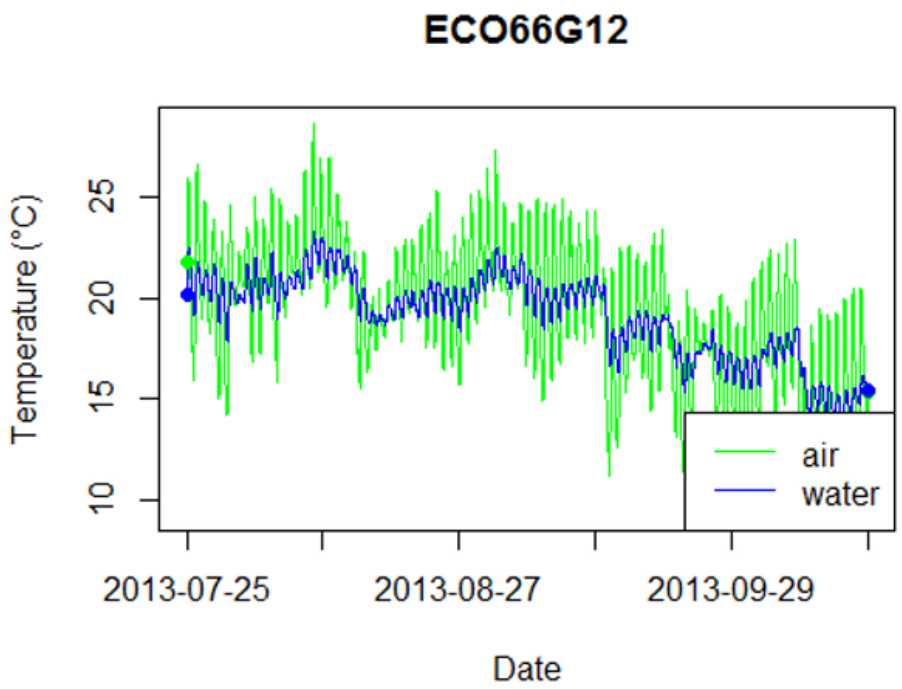
Examples of visual checks on time series plots



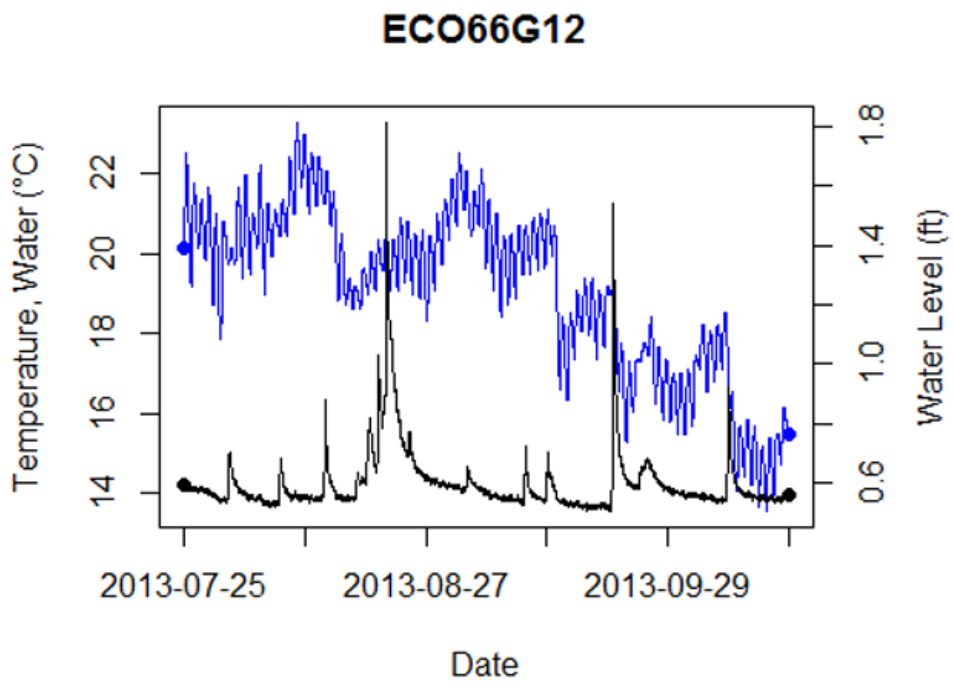
QC report – Section 4

Multi-parameter time series plots

PLOT, Temperature (Air vs. Water)



PLOT, Water Level vs. Water Temperature



Do the patterns make sense? (e.g., water temperature should fluctuate less than air temperature; increases in water level may correspond with decreases in water temperature)

QC .csv file

Lots of columns!

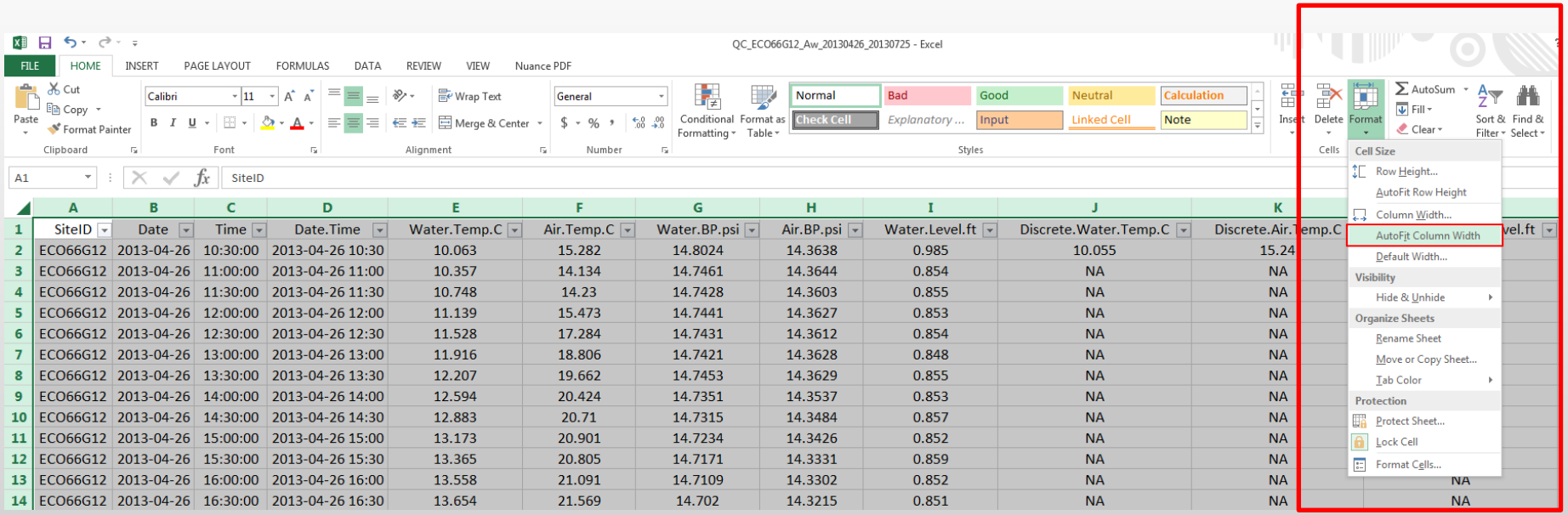
The R scripts add in many additional fields – flags (overall & each parameter/QC test), plus RAW and Comment fields

The following tips will make them easier to work with…

.csv file

Tip for easier navigation

Highlight all the fields, then click **Format – Autofit Column Width**. Excel then automatically adjusts column widths so that you can see the full field names.

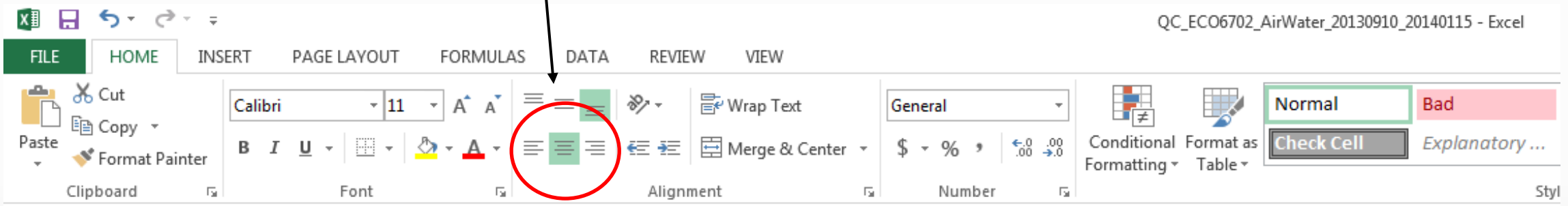


	A	B	C	D	E	F	G	H	I	J	K
1	SiteID	Date	Time	Date.Time	Water.Temp.C	Air.Temp.C	Water.BP.psi	Air.BP.psi	Water.Level.ft	Discrete.Water.Temp.C	Discrete.Air.Temp.C
2	ECO66G12	2013-04-26	10:30:00	2013-04-26 10:30	10.063	15.282	14.8024	14.3638	0.985	10.055	15.24
3	ECO66G12	2013-04-26	11:00:00	2013-04-26 11:00	10.357	14.134	14.7461	14.3644	0.854	NA	NA
4	ECO66G12	2013-04-26	11:30:00	2013-04-26 11:30	10.748	14.23	14.7428	14.3603	0.855	NA	NA
5	ECO66G12	2013-04-26	12:00:00	2013-04-26 12:00	11.139	15.473	14.7441	14.3627	0.853	NA	NA
6	ECO66G12	2013-04-26	12:30:00	2013-04-26 12:30	11.528	17.284	14.7431	14.3612	0.854	NA	NA
7	ECO66G12	2013-04-26	13:00:00	2013-04-26 13:00	11.916	18.806	14.7421	14.3628	0.848	NA	NA
8	ECO66G12	2013-04-26	13:30:00	2013-04-26 13:30	12.207	19.662	14.7453	14.3629	0.855	NA	NA
9	ECO66G12	2013-04-26	14:00:00	2013-04-26 14:00	12.594	20.424	14.7351	14.3537	0.853	NA	NA
10	ECO66G12	2013-04-26	14:30:00	2013-04-26 14:30	12.883	20.71	14.7315	14.3484	0.857	NA	NA
11	ECO66G12	2013-04-26	15:00:00	2013-04-26 15:00	13.173	20.901	14.7234	14.3426	0.852	NA	NA
12	ECO66G12	2013-04-26	15:30:00	2013-04-26 15:30	13.365	20.805	14.7171	14.3331	0.859	NA	NA
13	ECO66G12	2013-04-26	16:00:00	2013-04-26 16:00	13.558	21.091	14.7109	14.3302	0.852	NA	NA
14	ECO66G12	2013-04-26	16:30:00	2013-04-26 16:30	13.654	21.569	14.702	14.3215	0.851	NA	NA

.csv file

Tip for easier navigation

Alignment - center the entries in the columns



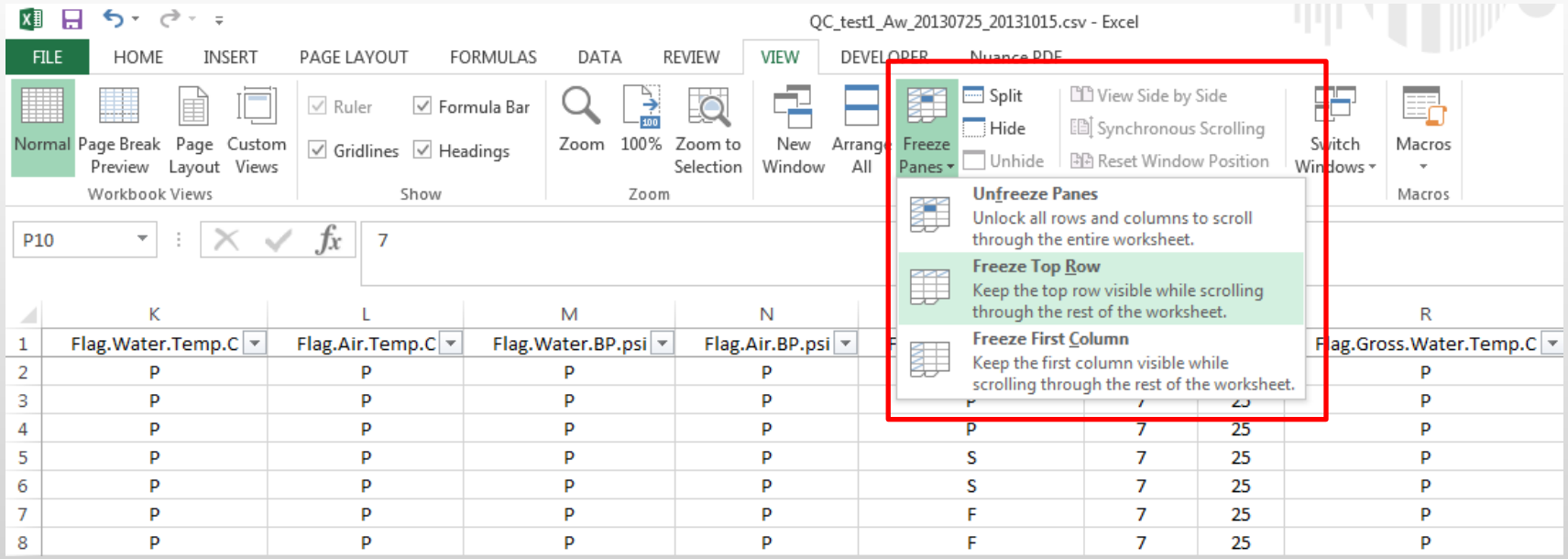
	A	B	C	D	E	F	G	H	I	J	K	
1	SiteID	Date.Time	Water.P.psi	Water.Temp.C	Air.BP.psi	Sensor.Depth.ft	Air.Temp.C	Water.RowID	User.Water.P.psi	User.Water.Temp.C	User.Air.BP.psi	User.Sens
2	ECO6702	2013-09-10 12:00	15.2282	20.805	14.1874	2.406	31.778	0				
3	ECO6702	2013-09-10 12:30	15.2264	20.901	14.1861	2.405	29.252	1				
4	ECO6702	2013-09-10 13:00	15.2194	20.901	14.1814	2.4	29.252	2				
5	ECO6702	2013-09-10 13:30	15.2184	21.187	14.1776	2.406	29.452	3				
6	ECO6702	2013-09-10 14:00	15.2104	21.473	14.1716	2.402	29.752	4				
7	ECO6702	2013-09-10 14:30	15.2043	21.664	14.1653	2.403	30.457	5				
8	ECO6702	2013-09-10 15:00	15.2005	21.855	14.1621	2.401	30.255	6				
9	ECO6702	2013-09-10 15:30	15.1921	22.046	14.1568	2.394	30.154	7				
10	ECO6702	2013-09-10 16:00	15.1873	22.046	14.1534	2.391	30.457	8				
11	ECO6702	2013-09-10 16:30	15.1884	22.238	14.1502	2.401	30.255	9				

.csv file

Tip for easier navigation

You can also **Freeze Panes – Freeze Top Row** to make viewing easier (this allows you to view the column headings while you scroll down).

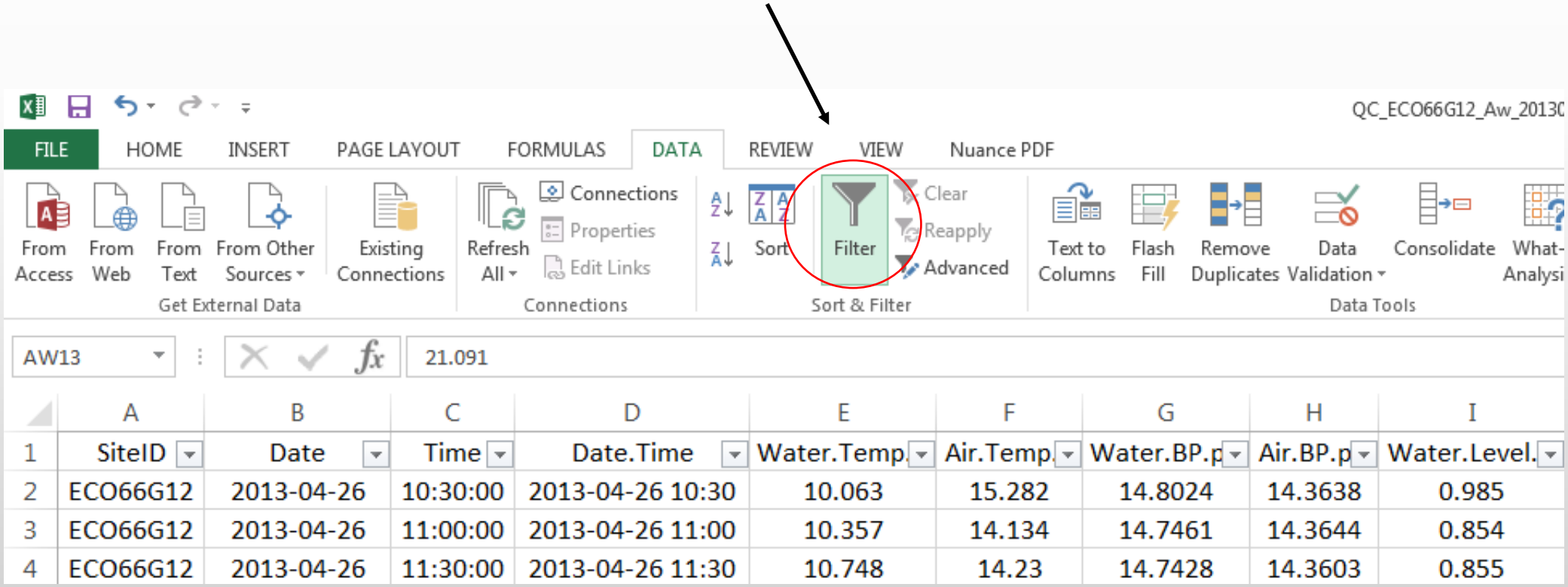
You can also use the **Split** function (this allows you to split the screen so that you can see the column headings while scrolling down, and the left-hand columns (e.g., date-time field) while scrolling to the right.



.csv file

Tip for easier navigation

Using the **Filter function** can help too (e.g., you can filter for entries flagged as ‘F’ or ‘S’ and evaluate)

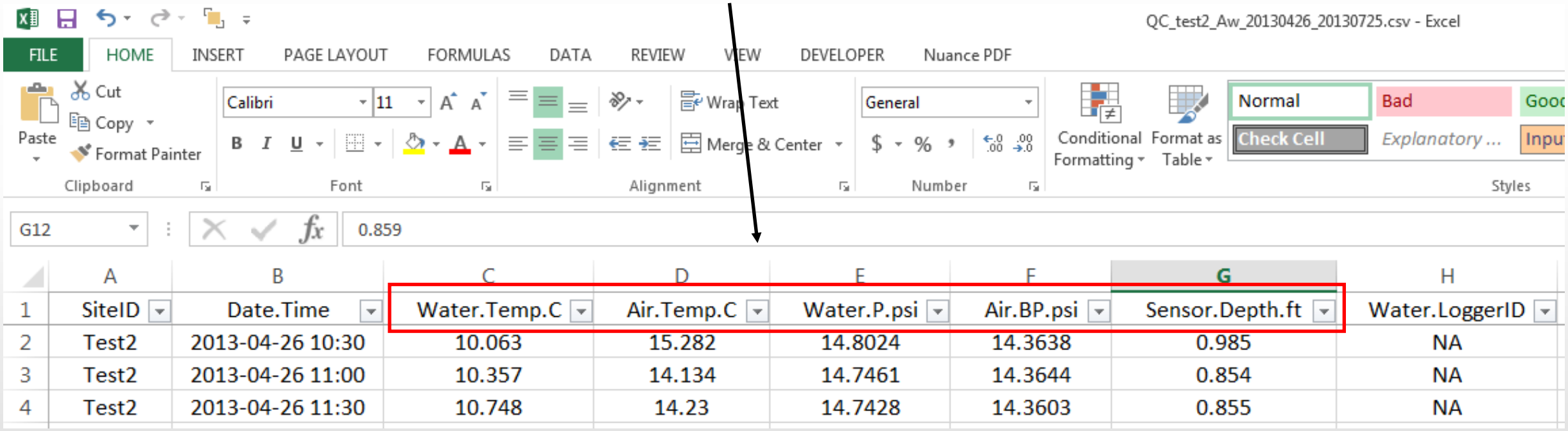


	A	B	C	D	E	F	G	H	I
1	SiteID	Date	Time	Date.Time	Water.Temp	Air.Temp	Water.BP.p	Air.BP.p	Water.Level.
2	ECO66G12	2013-04-26	10:30:00	2013-04-26 10:30	10.063	15.282	14.8024	14.3638	0.985
3	ECO66G12	2013-04-26	11:00:00	2013-04-26 11:00	10.357	14.134	14.7461	14.3644	0.854
4	ECO66G12	2013-04-26	11:30:00	2013-04-26 11:30	10.748	14.23	14.7428	14.3603	0.855

.csv file

Interpretation

Values (water temp, air temp, sensor depth, etc.)



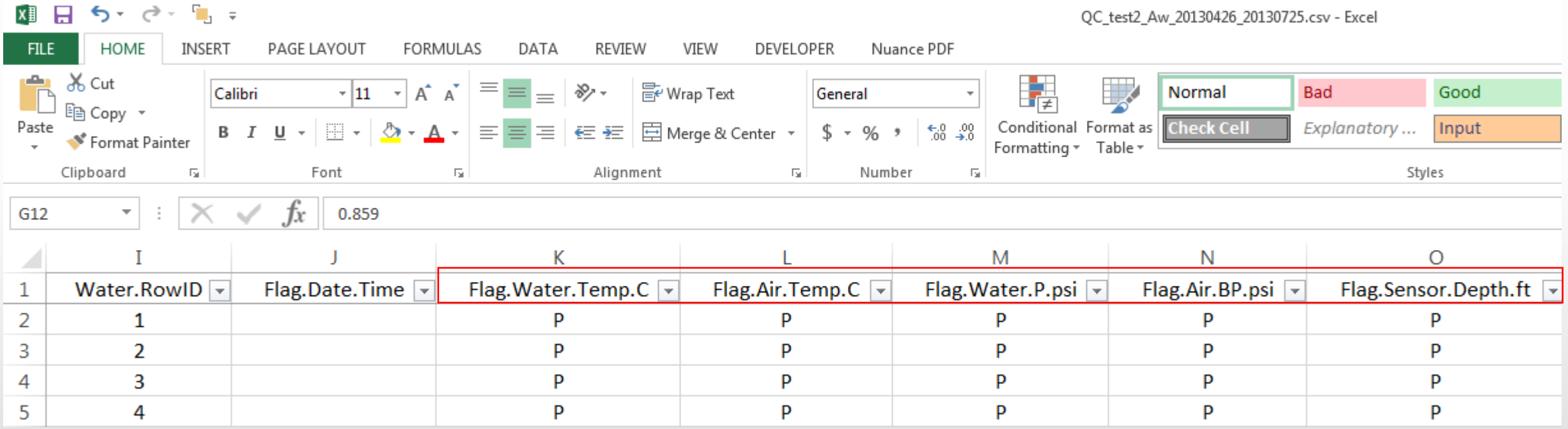
	A	B	C	D	E	F	G	H
1	SiteID	Date.Time	Water.Temp.C	Air.Temp.C	Water.P.psi	Air.BP.psi	Sensor.Depth.ft	Water.LoggerID
2	Test2	2013-04-26 10:30	10.063	15.282	14.8024	14.3638	0.985	NA
3	Test2	2013-04-26 11:00	10.357	14.134	14.7461	14.3644	0.854	NA
4	Test2	2013-04-26 11:30	10.748	14.23	14.7428	14.3603	0.855	NA

Scrolling to the right…

The R tools add in new columns with flags (overall & each parameter/QC test)

.csv file continued…

Overall flags (entries marked as pass, suspect, fail or missing data, based on the *worst* flag across all of the QC tests).



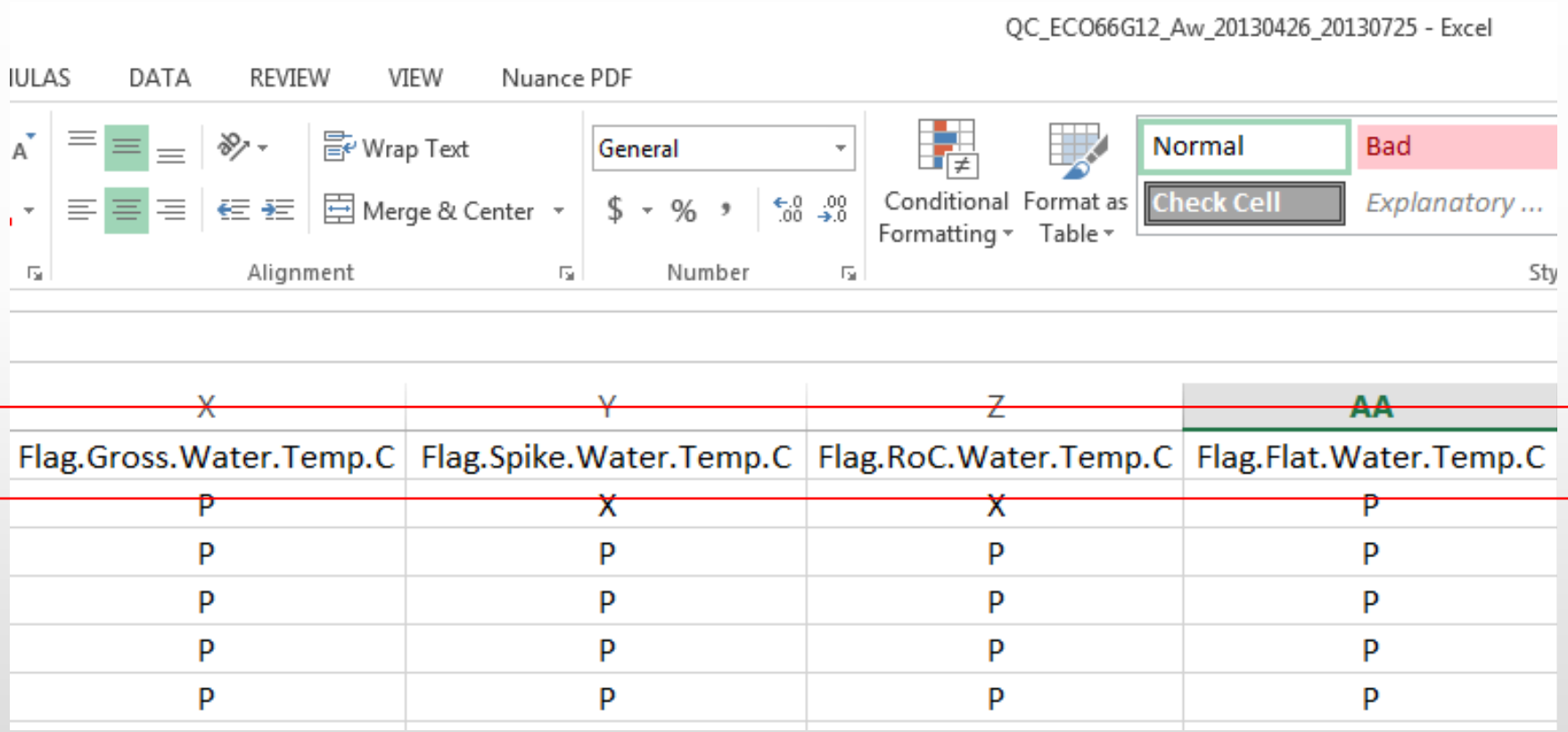
	I	J	K	L	M	N	O
1	Water.RowID	Flag.Date.Time	Flag.Water.Temp.C	Flag.Air.Temp.C	Flag.Water.P.psi	Flag.Air.BP.psi	Flag.Sensor.Depth.ft
2	1		P	P	P	P	P
3	2		P	P	P	P	P
4	3		P	P	P	P	P
5	4		P	P	P	P	P

F = fail
P = pass
S = suspect
X = Not Data or Not Applicable (NA)

Continue scrolling to the right

.csv file continued…

Flags for each parameter and each QC test (gross, spike, RoC, flat)



X	Y	Z	AA
Flag.Gross.Water.Temp.C	Flag.Spike.Water.Temp.C	Flag.RoC.Water.Temp.C	Flag.Flat.Water.Temp.C
P	X	X	P
P	P	P	P
P	P	P	P
P	P	P	P
P	P	P	P

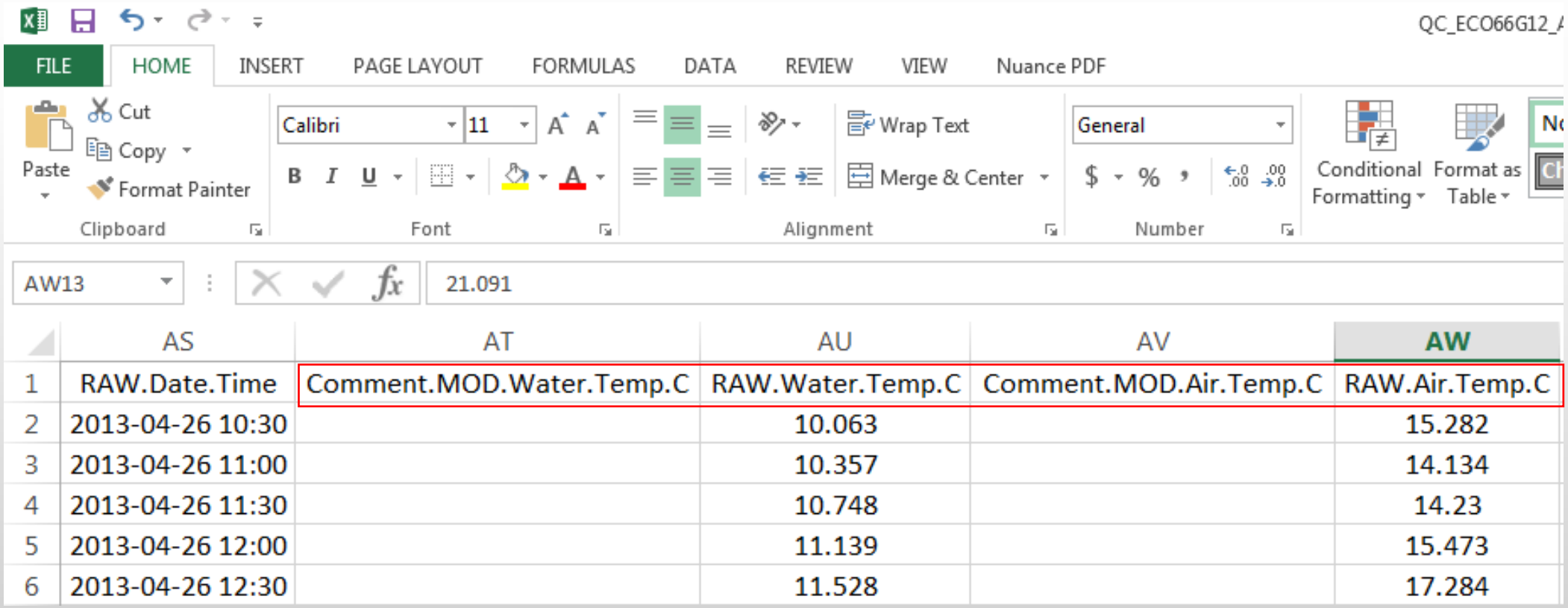
Example - water temperature

Continue scrolling to the right

.csv file continued…

RAW = original values; if you end up making corrections in the primary value fields, the RAW fields allow you to retain the original records and track any changes you make.

COMMENT.MOD = allows you to comment on any changes you make.



	AS	AT	AU	AV	AW
1	RAW.Date.Time	Comment.MOD.Water.Temp.C	RAW.Water.Temp.C	Comment.MOD.Air.Temp.C	RAW.Air.Temp.C
2	2013-04-26 10:30		10.063		15.282
3	2013-04-26 11:00		10.357		14.134
4	2013-04-26 11:30		10.748		14.23
5	2013-04-26 12:00		11.139		15.473
6	2013-04-26 12:30		11.528		17.284

Corrections

In general, 3 possible actions can be taken:

- Leave data as is
- Apply correction factor
- Remove data

Corrections should not be made unless the cause(s) of error(s) can be validated or explained in the field notes or by comparison with information from nearby stations.

Accurate field notes and accuracy check logs are essential in the data correction process.

Any **discrepancies should be documented** in your data file and any actions you take should also be carefully documented.

Corrections

Right now we **don't have any automated corrections programed into the QC package** (this is a future 'wish list' item).

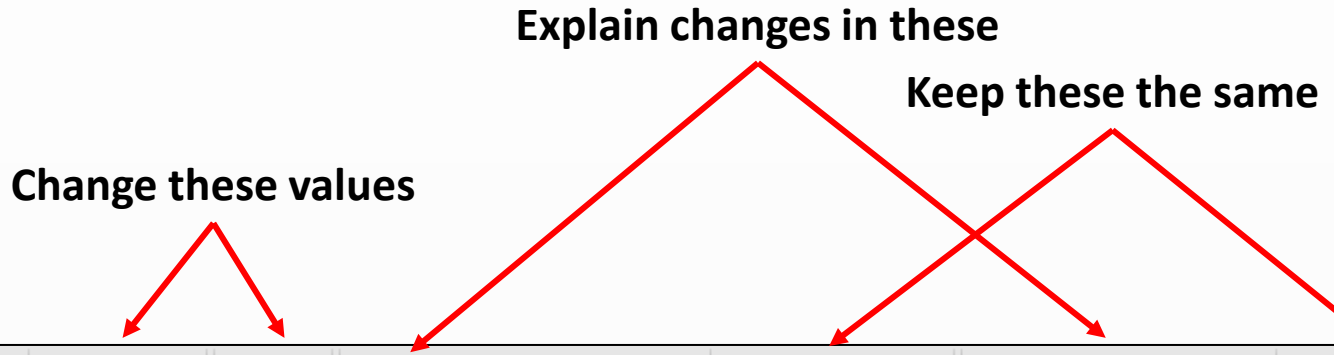
Any corrections you make need to be done **manually**.

Some types of corrections are fairly straightforward and can be done in Excel (e.g., change values by same amount, or basic drift corrections); others are more complex.

Potential references –

- Wagner et al. 2006 (USGS) (more detailed)
- EPA 'Best Practices' report (more general - has a table with a general summary of different types of problems that can occur (e.g., missing data, failed accuracy check) and recommended actions for addressing them)

If you want to make a change in your data…



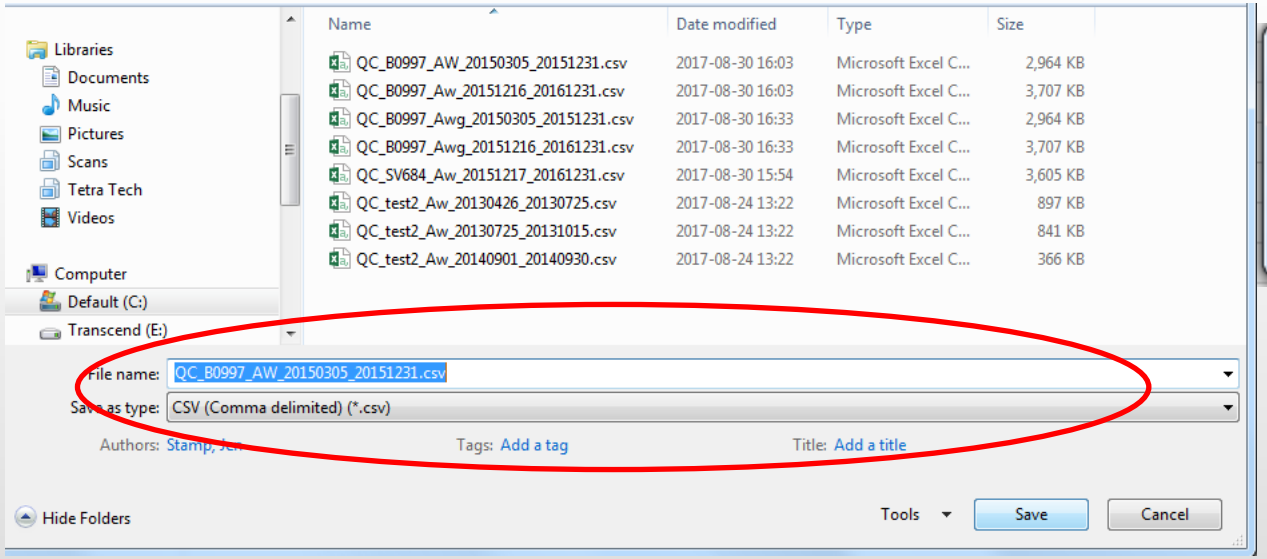
	A	B	C	D	E	G	AH	AI	AL	AM
1	SiteID	Date	Time	Date.Time	Water.Temp.C	Air.BP.psi	Comment.MOD.Water.Temp.C	RAW.Water.Temp.C	Comment.MOD.Air.BP.psi	RAW.Air.BP.psi
2	ECO66G12	4/26/2013	10:30:00	4/26/2013 10:30	10.063	14.3638		10.063		14.3638
3	ECO66G12	4/26/2013	11:00:00	4/26/2013 11:00	10.357	14.3644		10.357		14.3644
4	ECO66G12	4/26/2013	11:30:00	4/26/2013 11:30	10.748	14.3603		10.748		14.3603
5	ECO66G12	4/26/2013	12:00:00	4/26/2013 12:00	11.139	14.3627		11.139		14.3627
6	ECO66G12	4/26/2013	12:30:00	4/26/2013 12:30	11.528	14.3612		11.528		14.3612
7	ECO66G12	4/26/2013	13:00:00	4/26/2013 13:00	11.916	14.3628		11.916		14.3628
8	ECO66G12	4/26/2013	13:30:00	4/26/2013 13:30	12.207	14.3629		12.207		14.3629
9	ECO66G12	4/26/2013	14:00:00	4/26/2013 14:00	12.594	14.3537		12.594		14.3537
10	ECO66G12	4/26/2013	14:30:00	4/26/2013 14:30	12.883	14.3484		12.883		14.3484
11	ECO66G12	4/26/2013	15:00:00	4/26/2013 15:00	13.173	14.3426		13.173		14.3426
12	ECO66G12	4/26/2013	15:30:00	4/26/2013 15:30	13.365	14.3331		13.365		14.3331
13	ECO66G12	4/26/2013	16:00:00	4/26/2013 16:00	13.558	14.3302		13.558		14.3302
14	ECO66G12	4/26/2013	16:30:00	4/26/2013 16:30	13.654	14.3215		13.654		14.3215
15	ECO66G12	4/26/2013	17:00:00	4/26/2013 17:00	13.75	14.3152		13.75		14.3152

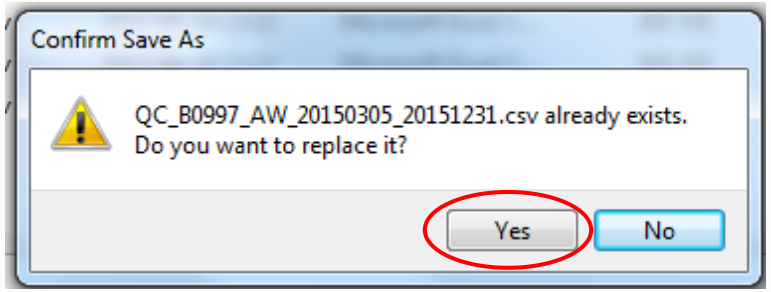
NOTE: Any changes to recorded data (including deleting data) should be done carefully and fully documented.

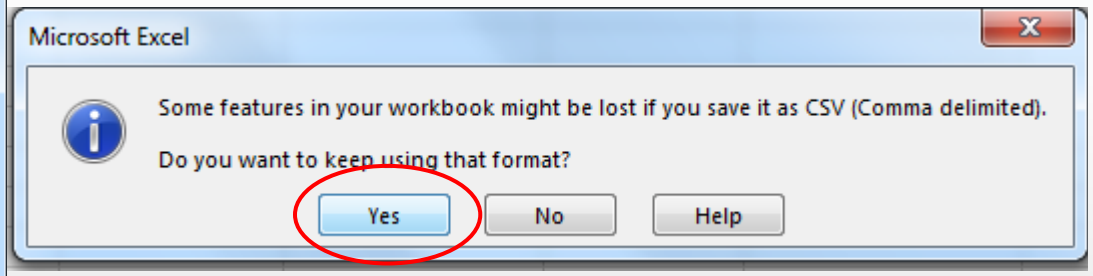
Resave as .csv file

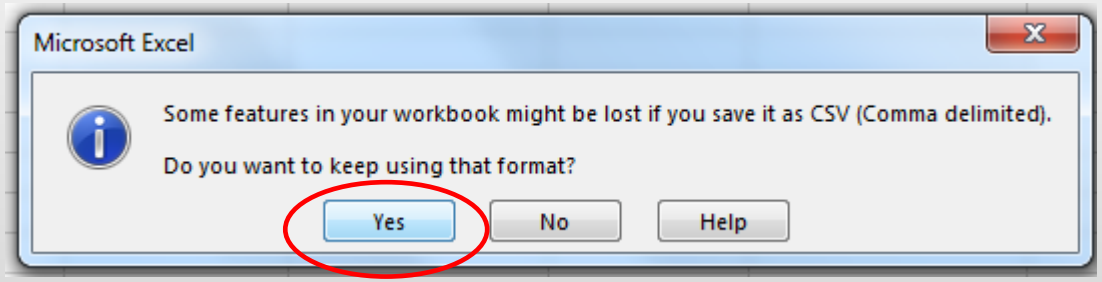
Make sure you resave the corrected QC .csv file as a CSV (Comma delimited)

Click ‘Yes’ through the multiple series of prompts.









Seeking feedback!

We are still learning & gaining experience with the QC process ourselves.

Please provide feedback as you go through these files.

- Are there certain types of errors the QC reports are not catching?
- How well are the QC test thresholds working?

There will be some things we can fix and some things we cannot fix (those will go on a ‘wish list’).