Quality Assurance Tools in DWR F.L.I.M.S. and WDL

(4/23/12)

Definitions

- F.L.I.M.S. = Field and Laboratory Information Management System

- WDL = DWR's Water Data Library, an assortment of databases storing water-related data. F.L.I.M.S. directly feeds the Water Quality Portion of the WDL.

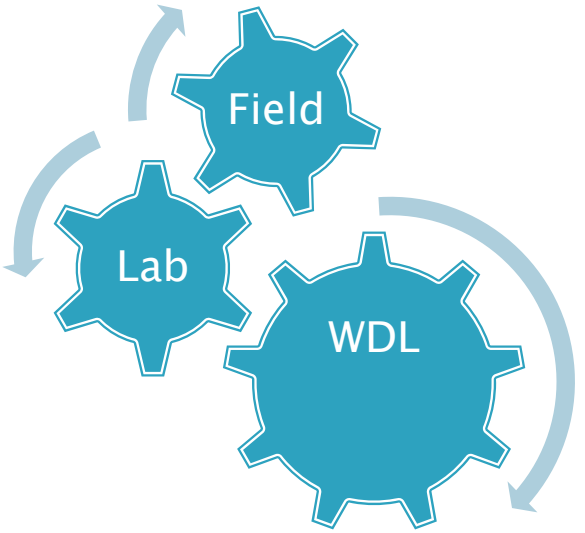
  http://www.water.ca.gov/waterdatalibrary/

Background

- F.L.I.M.S. was developed in the mid 1990's through the Municipal Water Quality Investigations Program, which oversaw the operation of DWR Bryte Lab at the time.
- F.L.I.M.S. went live in 1998, WDL WQ went live in 2002
- F.L.I.M.S. / WDL are collectively designed to capture and permanently store all DWR Grab Sample WQ data, plus QC data for programs throughout DWR
- DES, O&M including Field Divisions, Regional Offices, DOE, Flood, others

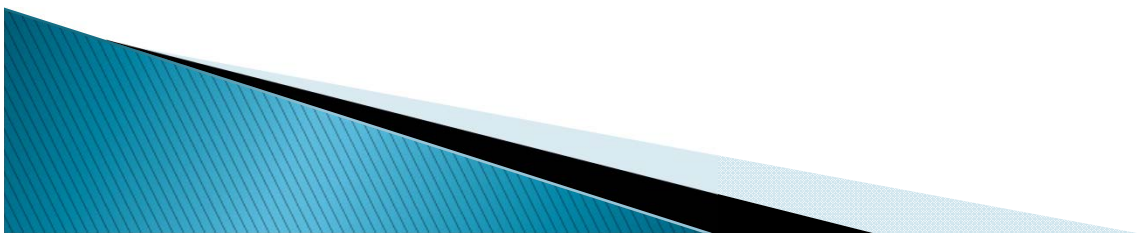
F.L.I.M.S. and WDL/WQ

- Modern Relational Database Design
  - Oracle 11, SQL Server, MS Access
- Designed as an integrated data system serving three groups within DWR, plus the public:
  - Field Sample Collectors
  - DWR Bryte Lab (LIMS system)
  - End Users and Public (WDL)
- Utilize a common set of definitions for all groups



Design

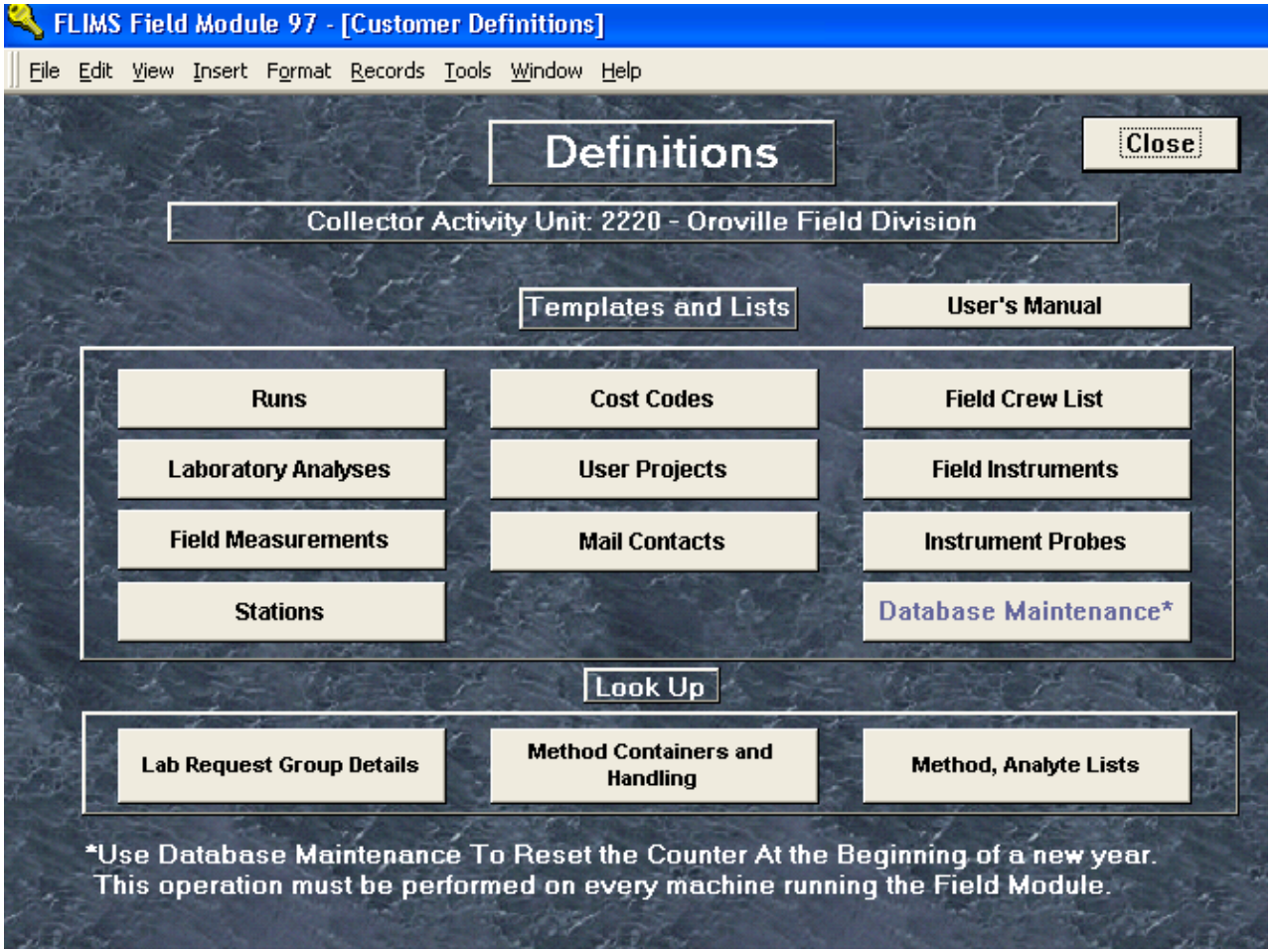
- Database and applications were designed to
  - Capture as much relevant information about the sampling event as possible
  - Identify field QC samples for later analysis
  - Reduce or eliminate systematic data entry errors by using a ‘single’ entry system and through extensive use of pre-defined templates
  - Capture all relevant lab QC
  - Meet the goals of DWR WREM 60
- Paperwork and container labels are generated by the software- reducing the effort required to prepare for runs



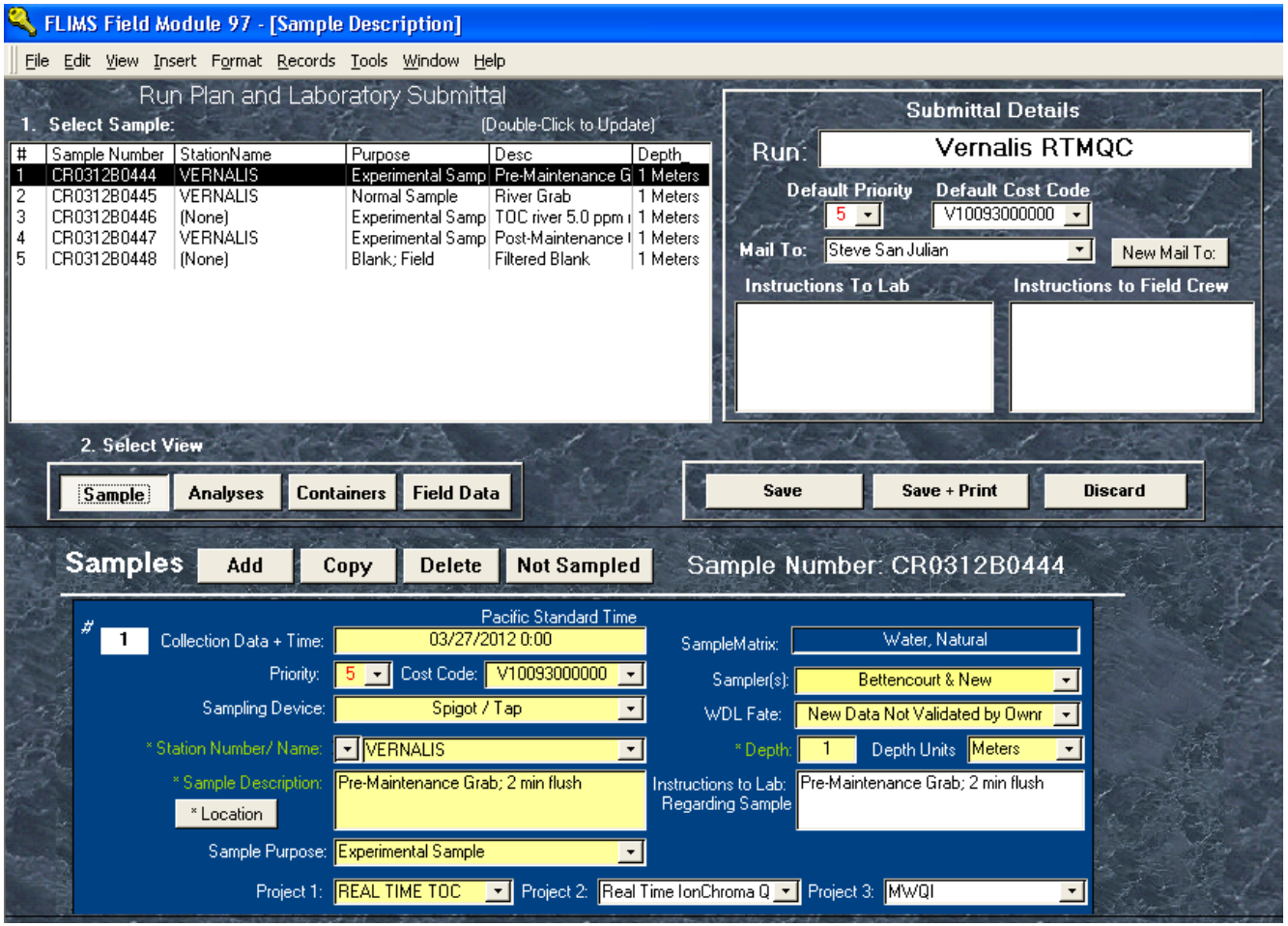
F.L.I.M.S. Field QC

- F.L.I.M.S. field modules are designed to capture as much information as possible about the sample and the conditions under which it was collected.
  - Lab template definitions are utilized to help define user runs
  - Users can define new items, like stations. These definitions are used later by the lab and WDL
  - Samples are identified by their purpose, e.g.
    - 'Normal' samples, Blanks, Duplicates (Sample purpose is not shared with the lab so that they treat it in a normal manner)
  - Collection Staff are reminded about holding times and proper container handling in the run paperwork and container labels

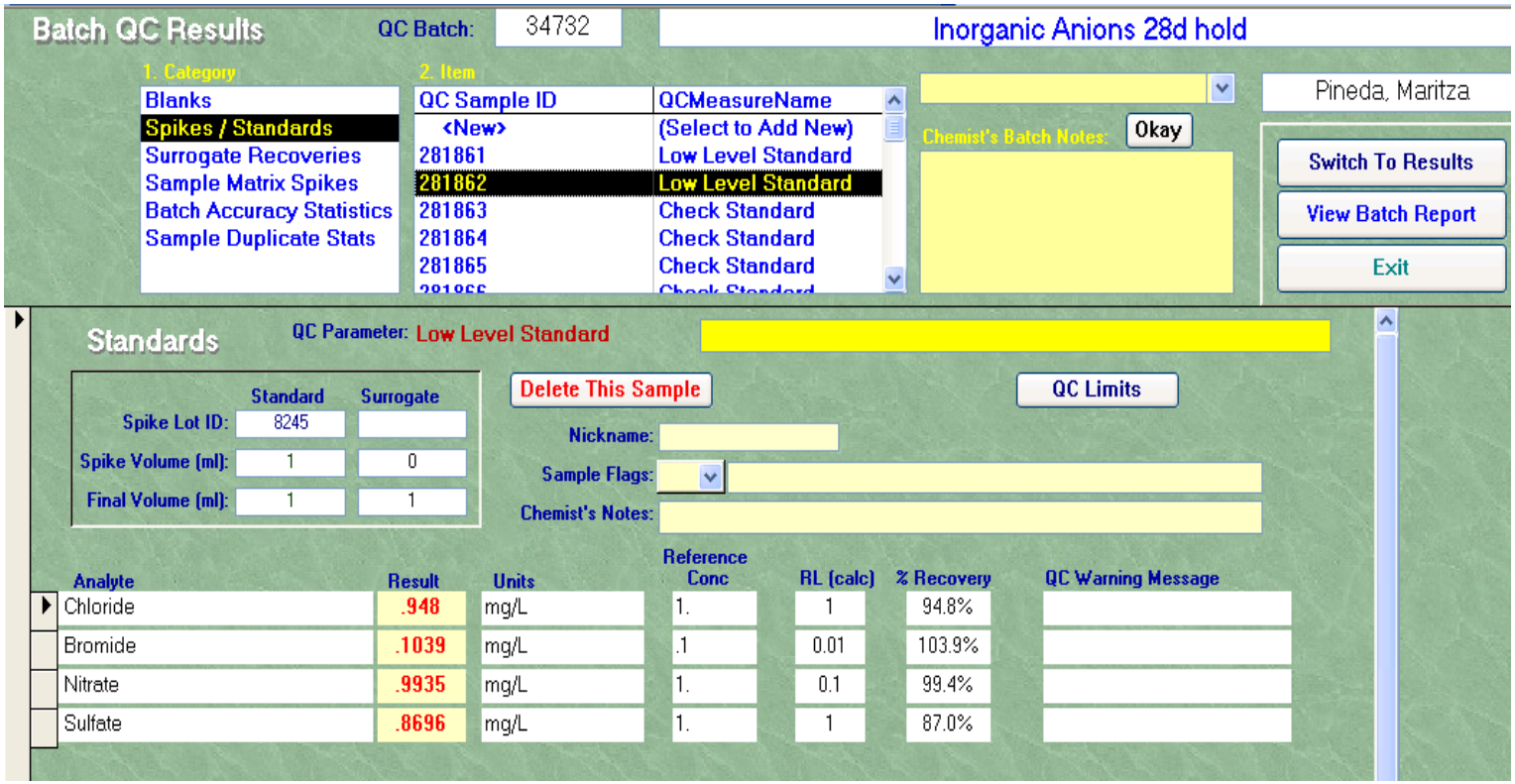
F.L.I.M.S. Field Module



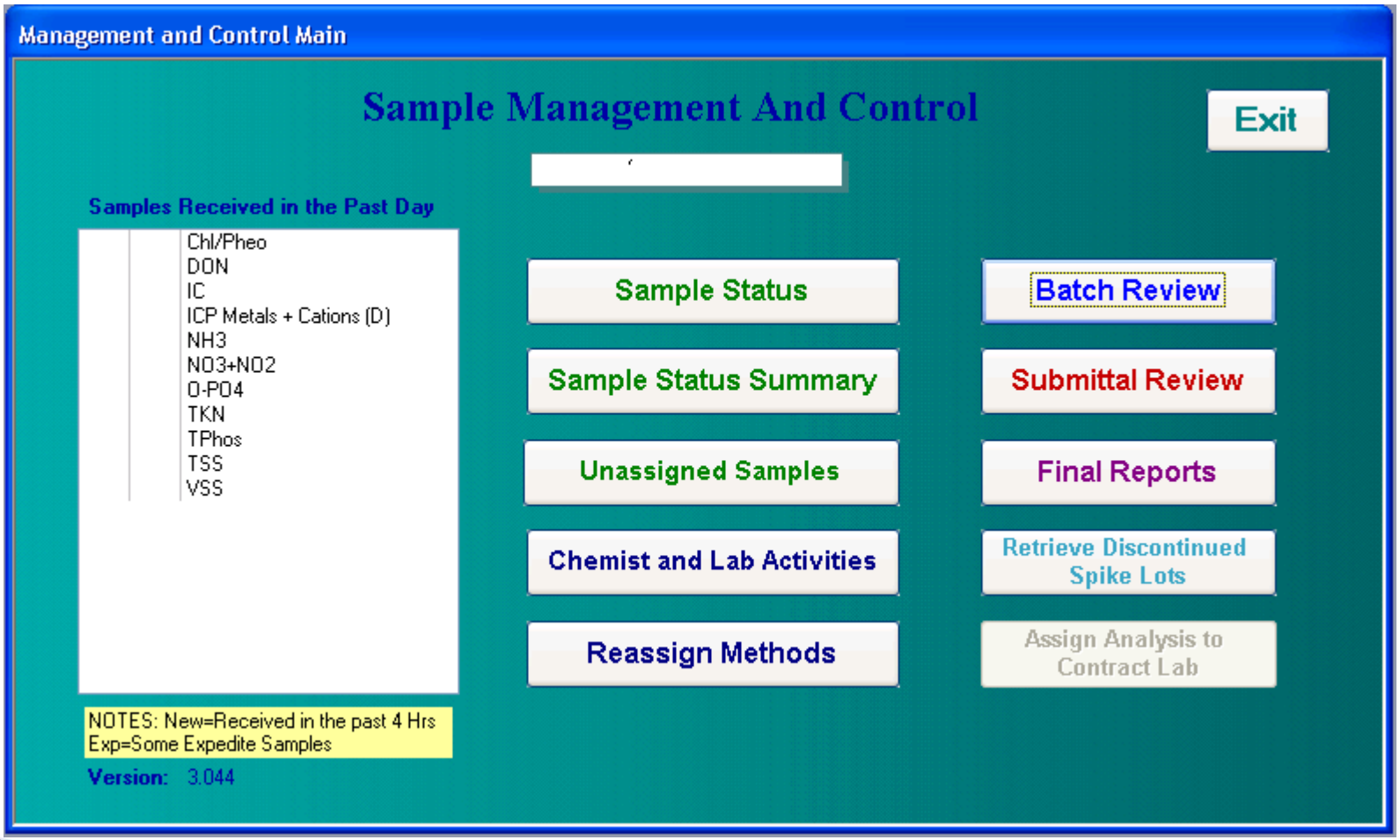
F.L.I.M.S. Field Module



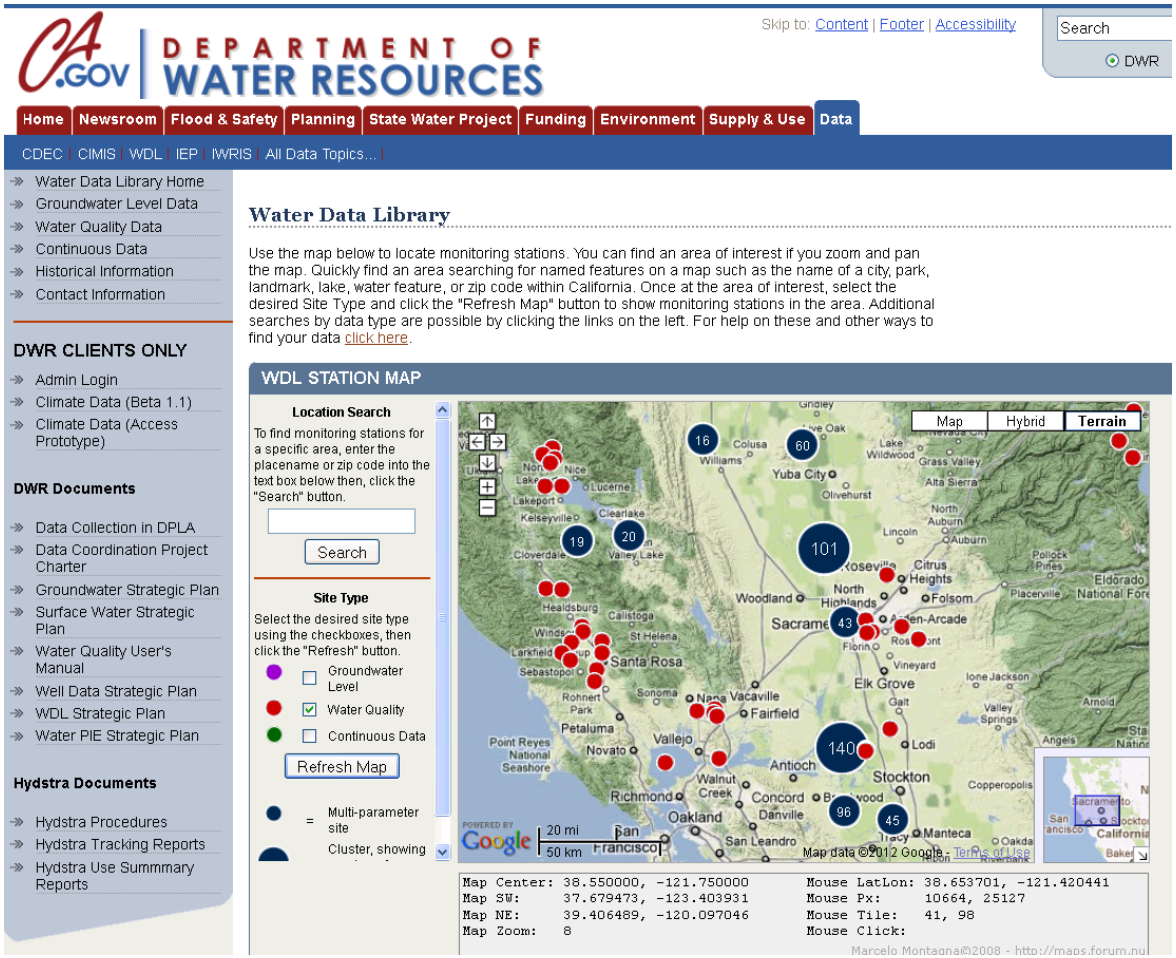
F.L.I.M.S. Lab QC


Batch QC Results
QC Batch: 34732
Inorganic Anions 28d hold
1. Category
Blanks
Spikes / Standards
Surrogate Recoveries
Sample Matrix Spikes
Batch Accuracy Statistics
Sample Duplicate Stats
2. Item
QC Sample ID
QCMeasureName
<New>
(Select to Add New)
281861
Low Level Standard
281862
Low Level Standard
281863
Check Standard
281864
Check Standard
281865
Check Standard
Pineda, Maritza
Chemist's Batch Notes:
Okay
Switch To Results
View Batch Report
Exit
Standards
QC Parameter: Low Level Standard
Standard
Surrogate
Spike Lot ID: 8245
Spike Volume (ml): 1 0
Final Volume (ml): 1 1
Delete This Sample
QC Limits
Nickname:
Sample Flags:
Chemist's Notes:
Analyte
Result
Units
Reference Conc
RL (calc)
% Recovery
QC Warning Message
Chloride .948 mg/L 1. 1 94.8%
Bromide .1039 mg/L .1 0.01 103.9%
Nitrate .9935 mg/L 1. 0.1 99.4%
Sulfate .8696 mg/L 1. 1 87.0%

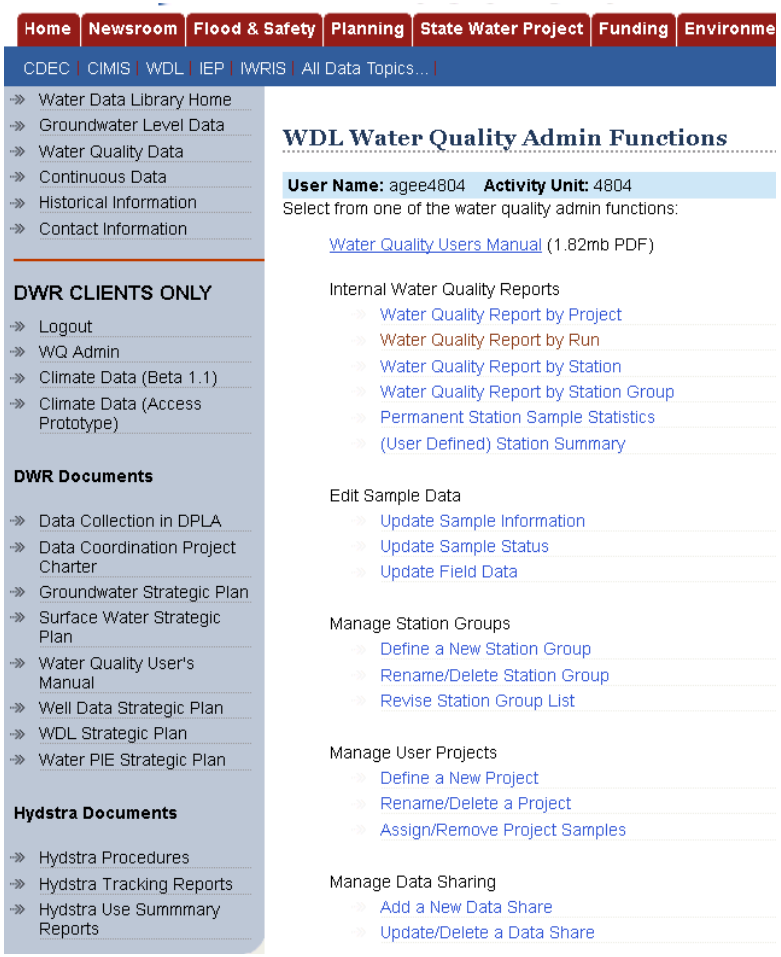
F.L.I.M.S. Lab QC Review



WDL Water Quality – Public Face

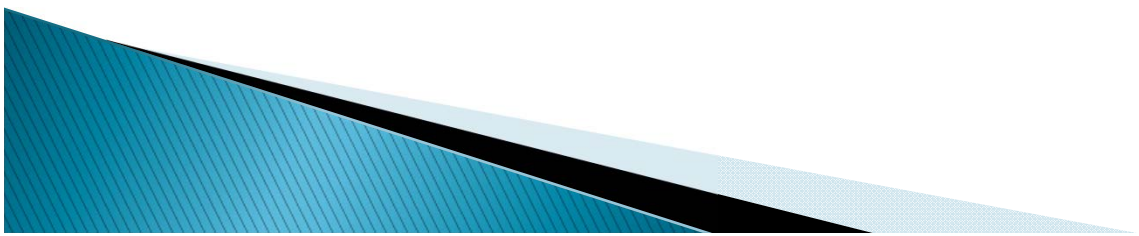


WDL – Internal Face



What About Program QA?

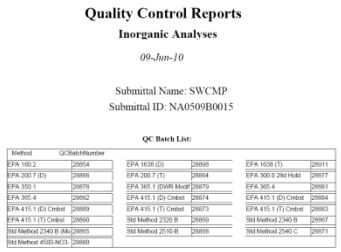
- You've set up a Program Plan incl. data quality standards
- You're collecting control samples; blanks, duplicates and you've identified them in your field runs
- You have lab QC reports – but they're in .pdf format
- How do you get and analyze your QC samples and the lab info to demonstrate that your efforts meet the standards of data quality you've described in your plan?



Quality Assurance

Former Method

- Lab QC Reports: .pdf summary available from the lab at the time of data release.



Quality Control Reports

Inorganic Analyses

09-Jun-10

Submittal Name: SWCMP

Submittal ID: NA0509B0015

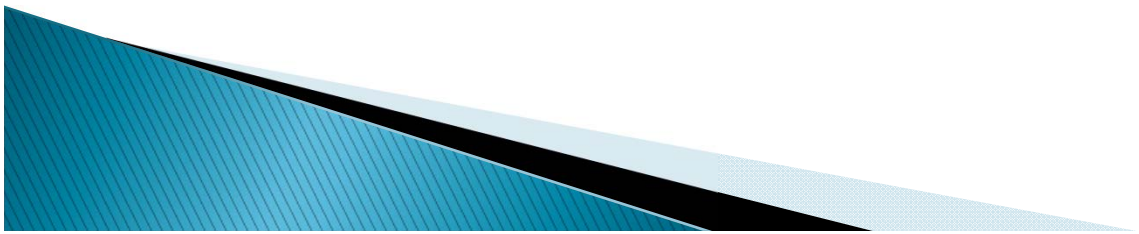
QC Batch List:

Method	QCBatchNumber						
EPA 160.2	28854	EPA 1638 (D)	28898	EPA 1638 (T)	28911		
EPA 200.7 (D)	28868	EPA 200.7 (T)	28864	EPA 300.0 28d Hold	28877		
EPA 350.1	28878	EPA 365.1 (DWR Modif	28879	EPA 365.4	28881		
EPA 365.4	28892	EPA 415.1 (D) Cmbst	28874	EPA 415.1 (D) Cmbst	28884		
EPA 415.1 (D) Cmbst	28889	EPA 415.1 (T) Cmbst	28875	EPA 415.1 (T) Cmbst	28883		
EPA 415.1 (T) Cmbst	28890	Std Method 2320 B	28899	Std Method 2340 B	28887		
Std Method 2340 B (Ma	28905	Std Method 2510-B	28898	Std Method 2540 C	28871		
Std Method 4500-NO3-	28880						

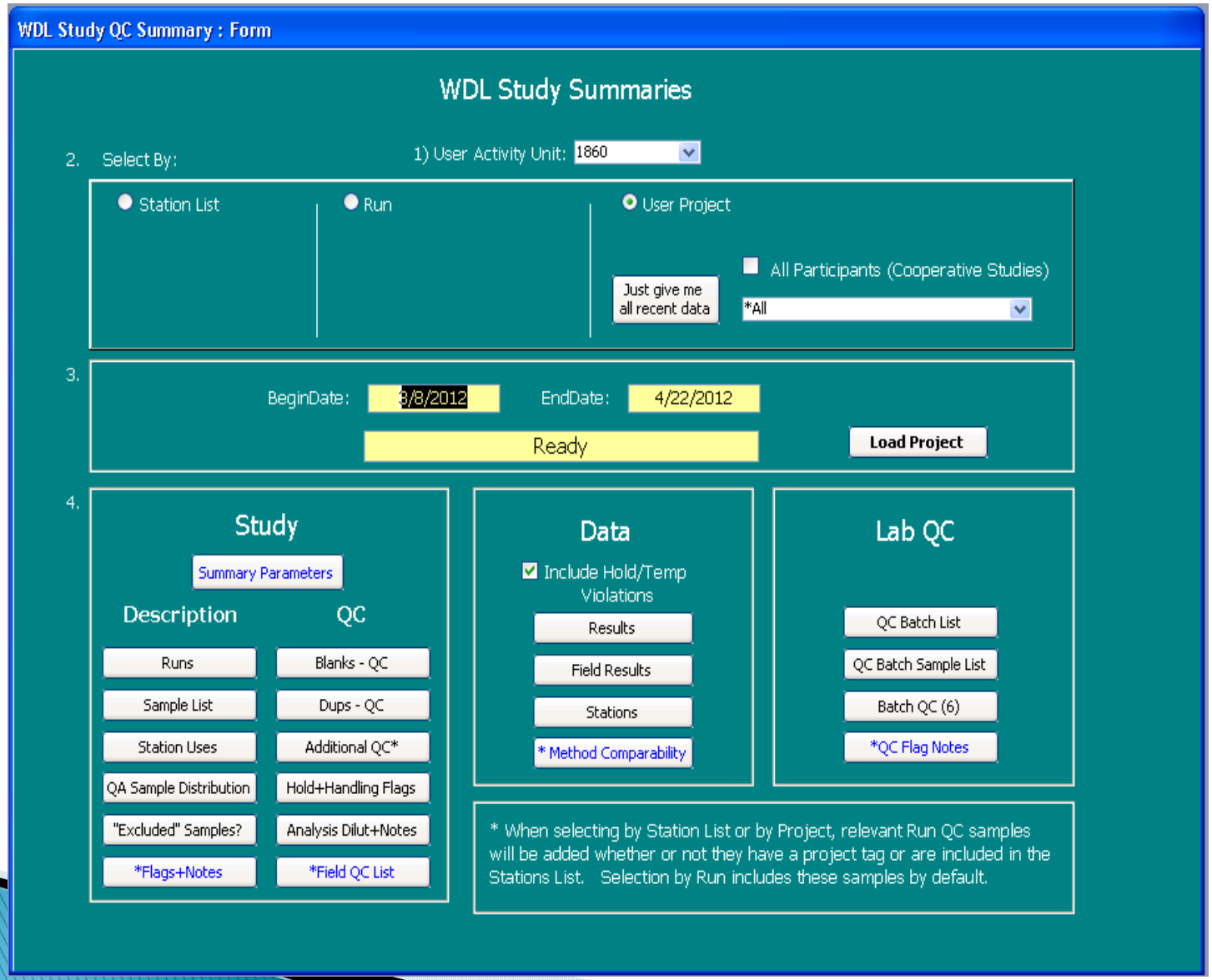
- Some info via WDL internal site – but you had to pull it out from everything else
- Overall summary: full info available through Bruce Agee
- Intent was always to make this more easily accessed by user

WDL Study Summary
(Beta, Limited Distribution)

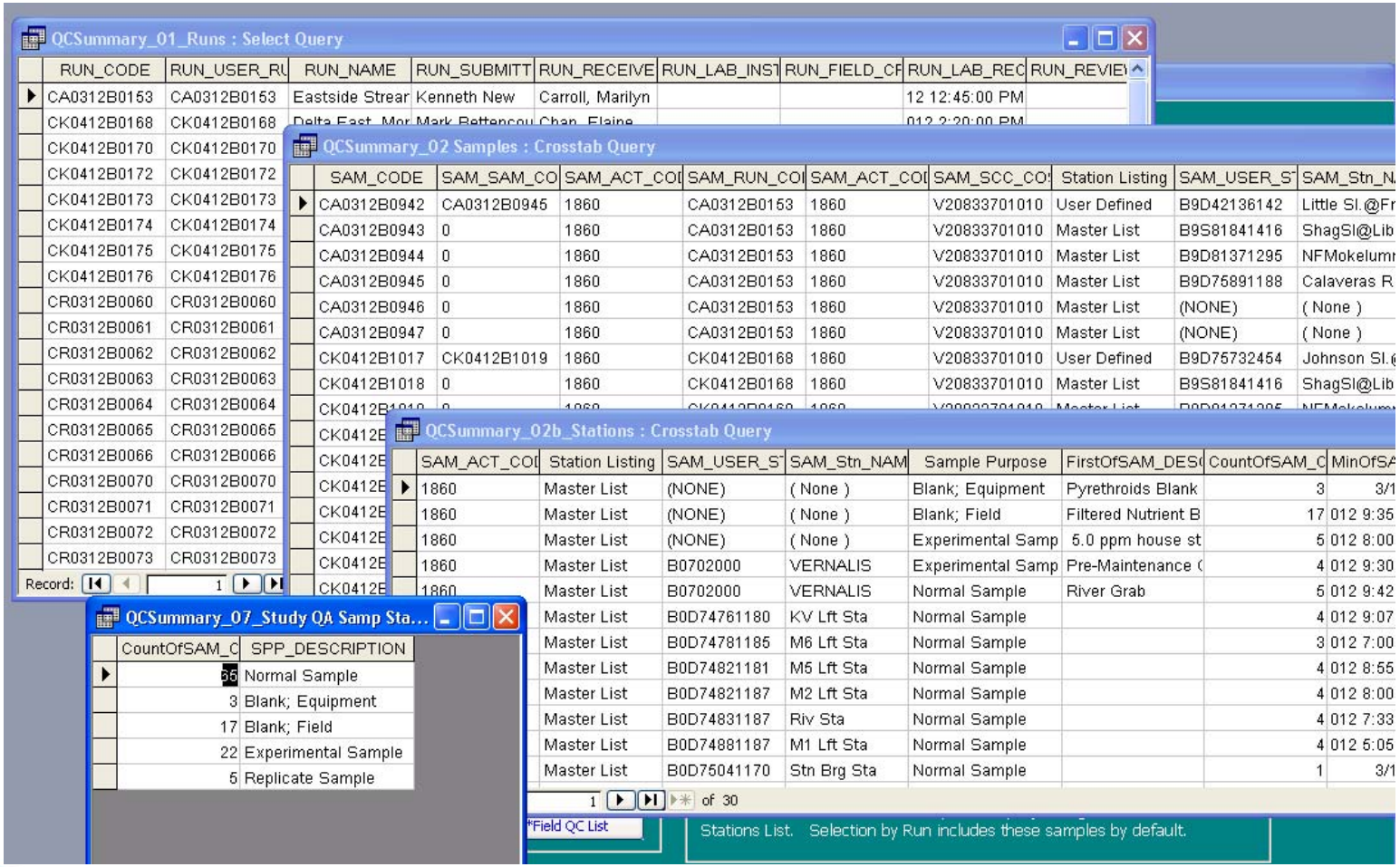
- We've recently created an application that makes it possible to select a portion of your data from the WDL and
  - Produce summary descriptive statistics
  - Produce Program QC data – and results. (This is your QC, e.g. blanks, dups)
  - Produce a summary of holding time and handling alerts
  - Produce an electronic summary of all Lab QC



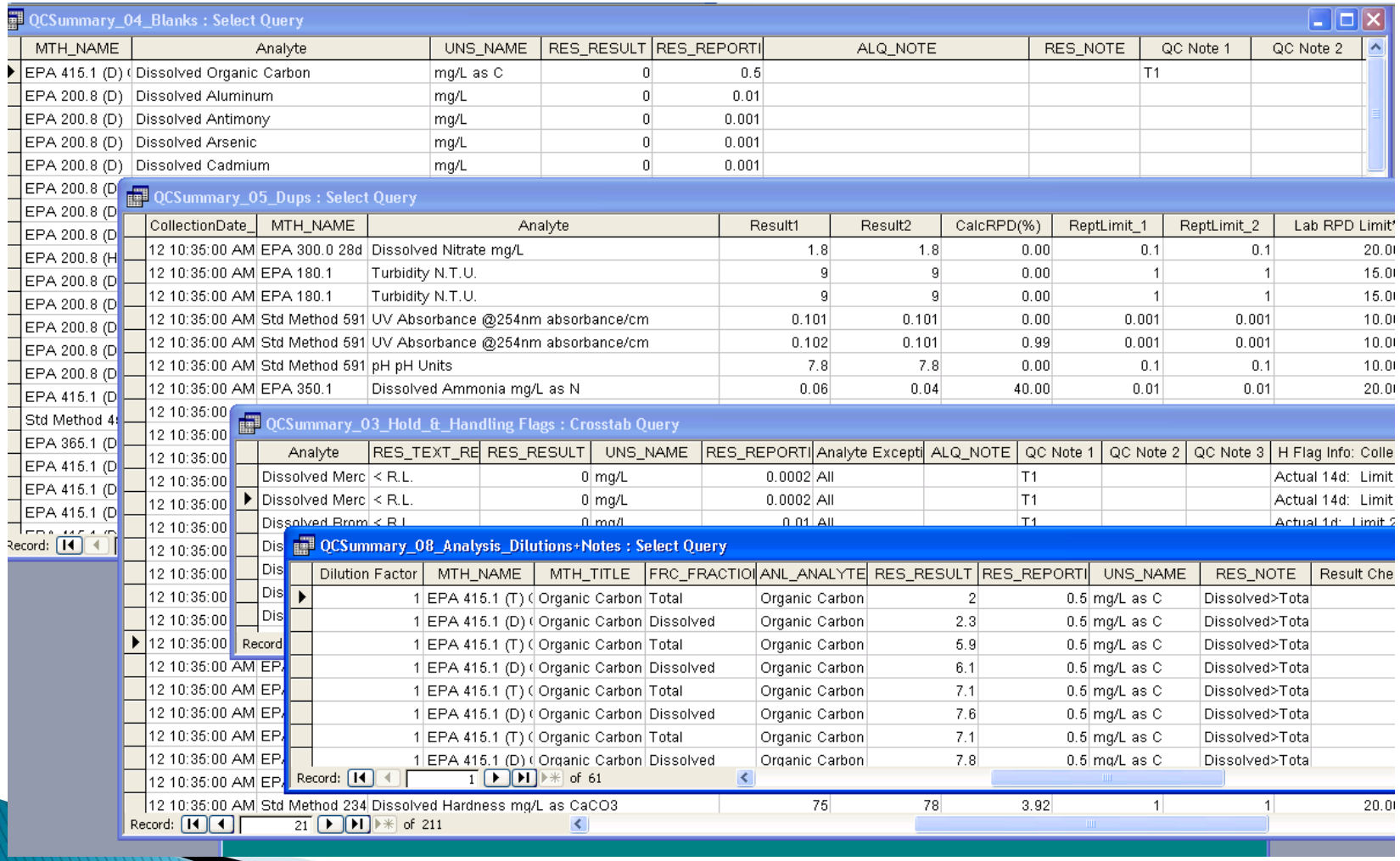
Study Summary Main Form



Study Summary: Descriptive Information



Study Summary: Program QA



QCSummary_04_Blanks : Select Query

MTH_NAME	Analyte	UNS_NAME	RES_RESULT	RES_REPORTI	ALQ_NOTE	RES_NOTE	QC Note 1	QC Note 2
EPA 415.1 (D) (	Dissolved Organic Carbon	mg/L as C	0	0.5			T1	
EPA 200.8 (D)	Dissolved Aluminum	mg/L	0	0.01				
EPA 200.8 (D)	Dissolved Antimony	mg/L	0	0.001				
EPA 200.8 (D)	Dissolved Arsenic	mg/L	0	0.001				
EPA 200.8 (D)	Dissolved Cadmium	mg/L	0	0.001				

QCSummary_05_Dups : Select Query

CollectionDate_	MTH_NAME	Analyte	Result1	Result2	CalcRPD(%)	ReptLimit_1	ReptLimit_2	Lab RPD Limit
12 10:35:00 AM	EPA 300.0 28d	Dissolved Nitrate mg/L	1.8	1.8	0.00	0.1	0.1	20.0
12 10:35:00 AM	EPA 180.1	Turbidity N.T.U.	9	9	0.00	1	1	15.0
12 10:35:00 AM	EPA 180.1	Turbidity N.T.U.	9	9	0.00	1	1	15.0
12 10:35:00 AM	Std Method 591	UV Absorbance @254nm absorbance/cm	0.101	0.101	0.00	0.001	0.001	10.0
12 10:35:00 AM	Std Method 591	UV Absorbance @254nm absorbance/cm	0.102	0.101	0.99	0.001	0.001	10.0
12 10:35:00 AM	Std Method 591	pH pH Units	7.8	7.8	0.00	0.1	0.1	10.0
12 10:35:00 AM	EPA 350.1	Dissolved Ammonia mg/L as N	0.06	0.04	40.00	0.01	0.01	20.0
12 10:35:00 AM	Std Method 234	Dissolved Hardness mg/L as CaCO3	75	78	3.92	1	1	20.0

Record: 21 of 211

QCSummary_03_Hold_&_Handling Flags : Crosstab Query

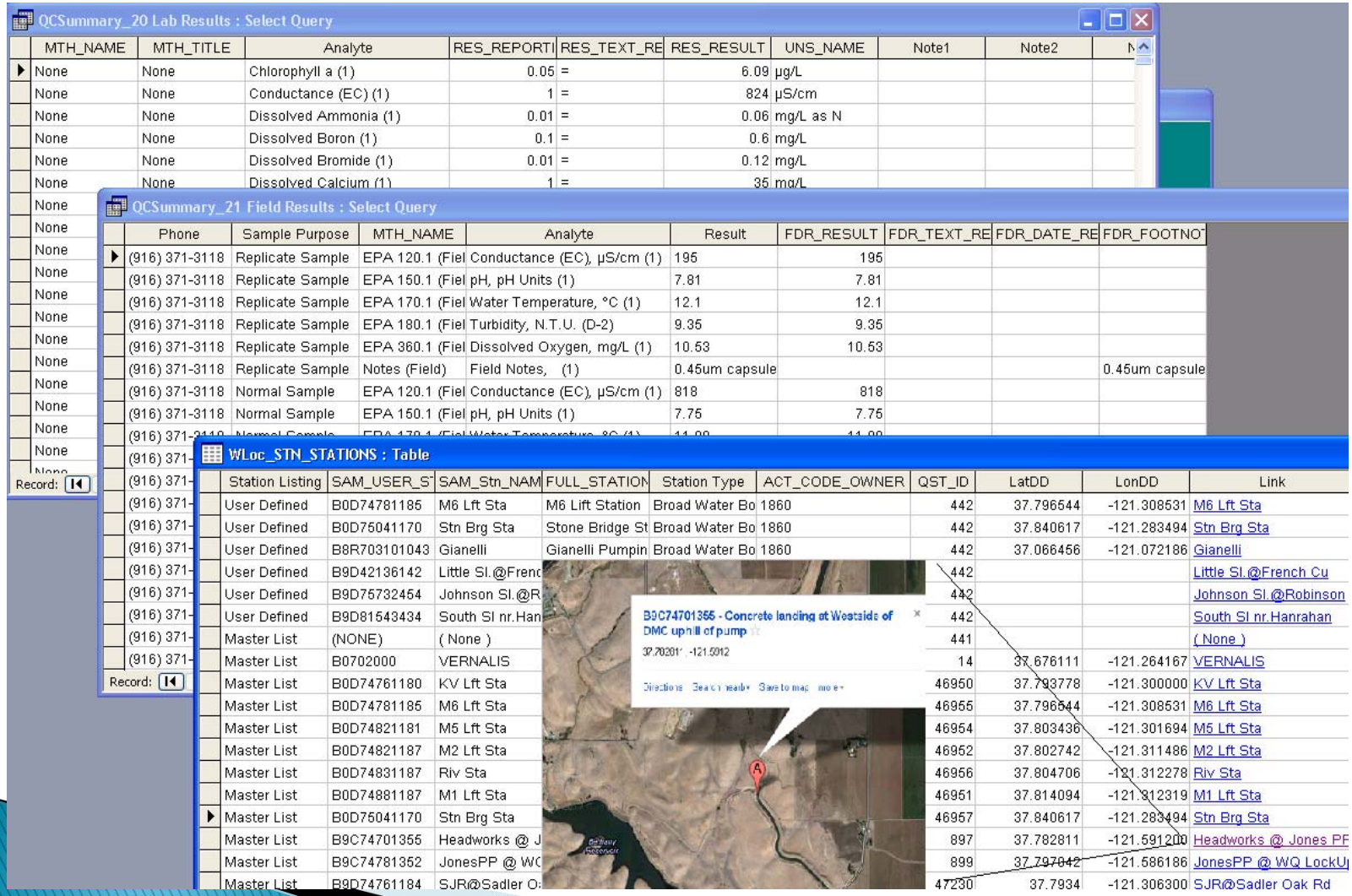
Analyte	RES_TEXT_RE	RES_RESULT	UNS_NAME	RES_REPORTI	Analyte Excepti	ALQ_NOTE	QC Note 1	QC Note 2	QC Note 3	H Flag Info: Colle
Dissolved Merc	< R.L.	0	mg/L	0.0002	All		T1			Actual 14d: Limit
Dissolved Merc	< R.L.	0	mg/L	0.0002	All		T1			Actual 14d: Limit

QCSummary_08_Analysis_Dilutions+Notes : Select Query

Dilution Factor	MTH_NAME	MTH_TITLE	FRC_FRACTIOI	ANL_ANALYTE	RES_RESULT	RES_REPORTI	UNS_NAME	RES_NOTE	Result Che
1	EPA 415.1 (T) (	Organic Carbon	Total	Organic Carbon	2	0.5	mg/L as C	Dissolved>Tota	
1	EPA 415.1 (D) (	Organic Carbon	Dissolved	Organic Carbon	2.3	0.5	mg/L as C	Dissolved>Tota	
1	EPA 415.1 (T) (	Organic Carbon	Total	Organic Carbon	5.9	0.5	mg/L as C	Dissolved>Tota	
1	EPA 415.1 (D) (	Organic Carbon	Dissolved	Organic Carbon	6.1	0.5	mg/L as C	Dissolved>Tota	
1	EPA 415.1 (T) (	Organic Carbon	Total	Organic Carbon	7.1	0.5	mg/L as C	Dissolved>Tota	
1	EPA 415.1 (D) (	Organic Carbon	Dissolved	Organic Carbon	7.6	0.5	mg/L as C	Dissolved>Tota	
1	EPA 415.1 (T) (	Organic Carbon	Total	Organic Carbon	7.1	0.5	mg/L as C	Dissolved>Tota	
1	EPA 415.1 (D) (	Organic Carbon	Dissolved	Organic Carbon	7.8	0.5	mg/L as C	Dissolved>Tota	

Record: 1 of 61

Study Summary: Data



QCSummary_20 Lab Results : Select Query

MTH_NAME	MTH_TITLE	Analyte	RES_REPORTI	RES_TEXT_RE	RES_RESULT	UNS_NAME	Note1	Note2	N
None	None	Chlorophyll a (1)	0.05	=	6.09	µg/L			
None	None	Conductance (EC) (1)	1	=	824	µS/cm			
None	None	Dissolved Ammonia (1)	0.01	=	0.06	mg/L as N			
None	None	Dissolved Boron (1)	0.1	=	0.6	mg/L			
None	None	Dissolved Bromide (1)	0.01	=	0.12	mg/L			
None	None	Dissolved Calcium (1)	1	=	35	mg/L			

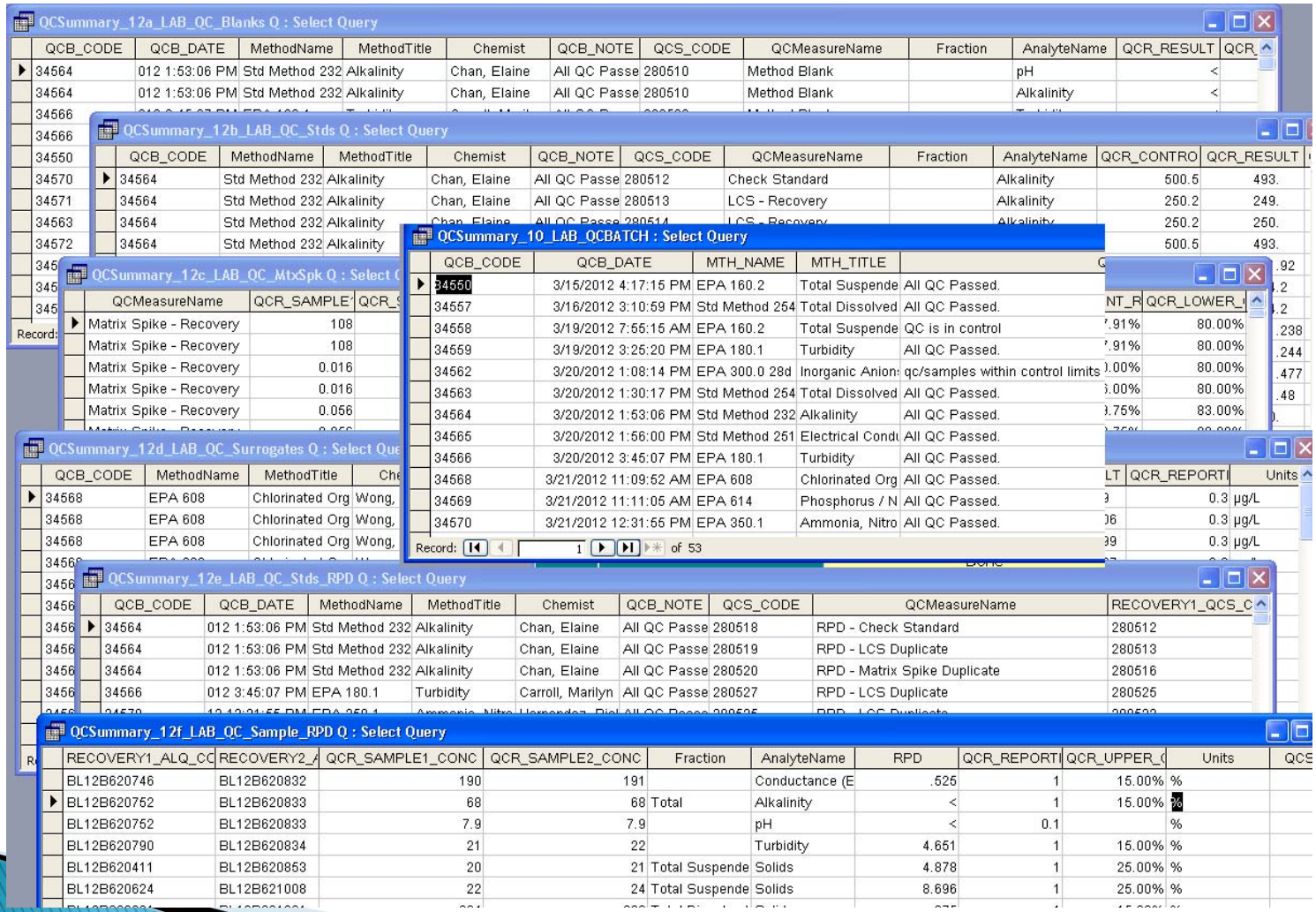
QCSummary_21 Field Results : Select Query

Phone	Sample Purpose	MTH_NAME	Analyte	Result	FDR_RESULT	FDR_TEXT_RE	FDR_DATE_RE	FDR_FOOTNOT
(916) 371-3118	Replicate Sample	EPA 120.1 (Fiel	Conductance (EC), µS/cm (1)	195	195			
(916) 371-3118	Replicate Sample	EPA 150.1 (Fiel	pH, pH Units (1)	7.81	7.81			
(916) 371-3118	Replicate Sample	EPA 170.1 (Fiel	Water Temperature, °C (1)	12.1	12.1			
(916) 371-3118	Replicate Sample	EPA 180.1 (Fiel	Turbidity, N.T.U. (D-2)	9.35	9.35			
(916) 371-3118	Replicate Sample	EPA 360.1 (Fiel	Dissolved Oxygen, mg/L (1)	10.53	10.53			
(916) 371-3118	Replicate Sample	Notes (Field)	Field Notes, (1)	0.45um capsule				0.45um capsule
(916) 371-3118	Normal Sample	EPA 120.1 (Fiel	Conductance (EC), µS/cm (1)	818	818			
(916) 371-3118	Normal Sample	EPA 150.1 (Fiel	pH, pH Units (1)	7.75	7.75			

WLoc_STN_STATIONS : Table

Station Listing	SAM_USER_ST	SAM_Stn_NAM	FULL_STATION	Station Type	ACT_CODE_OWNER	QST_ID	LatDD	LonDD	Link
User Defined	B0D74781185	M6 Lft Sta	M6 Lift Station	Broad Water Bo	1860	442	37.796544	-121.308531	M6 Lft Sta
User Defined	B0D75041170	Stn Brg Sta	Stone Bridge St	Broad Water Bo	1860	442	37.840617	-121.283494	Stn Brg Sta
User Defined	B8R703101043	Gianelli	Gianelli Pumpin	Broad Water Bo	1860	442	37.066456	-121.072186	Gianelli
User Defined	B9D42136142	Little Sl.@Frenc				442			Little Sl.@French Cu
User Defined	B9D75732454	Johnson Sl.@R				442			Johnson Sl.@Robinson
User Defined	B9D81543434	South Sl nr.Han				442			South Sl nr.Hanrahan
Master List	(NONE)	(None)				441			(None)
Master List	B0702000	VERNALIS				14	37.676111	-121.264167	VERNALIS
Master List	B0D74761180	KV Lft Sta				46950	37.793778	-121.300000	KV Lft Sta
Master List	B0D74781185	M6 Lft Sta				46955	37.796544	-121.308531	M6 Lft Sta
Master List	B0D74821181	M5 Lft Sta				46954	37.803436	-121.301694	M5 Lft Sta
Master List	B0D74821187	M2 Lft Sta				46952	37.802742	-121.311486	M2 Lft Sta
Master List	B0D74831187	Riv Sta				46956	37.804706	-121.312278	Riv Sta
Master List	B0D74881187	M1 Lft Sta				46951	37.814094	-121.312319	M1 Lft Sta
Master List	B0D75041170	Stn Brg Sta				46957	37.840617	-121.283494	Stn Brg Sta
Master List	B9C74701355	Headworks @ J				897	37.782811	-121.591200	Headworks @ Jones PP
Master List	B9C74781352	JonesPP @ WC				899	37.797842	-121.586186	JonesPP @ WQ LockU
Master List	B9D74761184	SJR@Sadler O				47230	37.7934	-121.306300	SJR@Sadler Oak Rd

Study Summary: Lab QC



Where Is It / Contact

- General Questions about QA/QC: Murage Ngatia
- A copy of WDL Study Summary is on the MWQI guest computer. Log in using the DES plotter login (note on computer)
- Copy also at DWR Bryte Lab (Agee, Pepper)
- Contact for custom assistance

  Bruce Agee or Kelley Pepper
  DWR Bryte Lab
  1450 Riverbank Rd
  West Sac
  375-6008