URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 7/29/2008**
Lab Order I070994

The Caltest Analytical Laboratory (Caltest) report dated August 19, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Five sites were sampled in the morning of July 29, 2008. Samples were collected from the Delta Mendota Canal (DMC); the Newman Wasteway Upstream (NWUS); the San Joaquin River Downstream (SJRDS); the Newman Wasteway Downstream (NWDS); and the San Joaquin River Upstream (SJRUS). A field duplicate was taken with DMC-001.

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
E. Coli
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

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Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Al	NH_3	As	BOD	B	Cu	E. Coli	Hardness	Diss Hg	Total Hg	Se	TKN	TOC	TSS	Turbidity
DMC-001	7/29/2008	5:40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DMC-001-DUP	7/29/2008	5:40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-001	7/29/2008	7:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-001	7/29/2008	6:40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJUS-001	7/29/2008	8:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SUR DS-001	7/29/2008	8:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 15 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5812	TSS	TSS	TSS	
BML/3557	E.Coli			
BOD/3821		BOD	BOD	
MPR/6345	Al Se B	Al Se B		Al Se B
MPR/6346	Al Se B	Al Se B		Al Se B
MPR/6354	Al B Se	Al B Se		Al B Se
MPR/6358	As Cu	As Cu		As Cu
MPR/6359	As Cu	As Cu		As Cu
MPR/6378	Total Hg	Total Hg		Total Hg
MPR/6379	Diss Hg	Diss Hg		Diss Hg
WET/4471	Turbidity	Turbidity	Turbidity	
WET/4492	NH3	NH3		NH3
WET/4501	TKN	TKN		TKN
WET/4505	TOC	TOC		
WTI/1594	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are

summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, E. Coli, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20). It should be noted that the RPD limit for Turbidity was not given, but the RPD value was 0.9, so this concern is inconsequential.

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits except as summarized below:

Table 3. *MS/MSD results outside of project specific limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6345	Boron	DMC-001	88	20	120	110	135	108	85%-115%	4.8	20
MPR/6345	Aluminum	DMC-001	460	40	1100	1100	1655	1493	85%-115%	5.9	20
MPR/6346	Aluminum	Batch QC	2700	40	6600	6500	9545	9505	85%-115%	0.2	20
MPR/6354	Aluminum	SJUS-001	1100	40	2200	2200	2840	2773	85%-115%	1.2	20
MPR/6354	Boron	SJUS-001	1400	20	1400	1400	-365	-190	85%-115%	2.5	20
WET/4501	TKN	SUR DS-001	0.99	5	6.6	6.5	112	111	90%-110%	1	20

For all of the aluminum and boron MS/MSD pairs listed, the original sample concentrations were more than four times the spike concentrations. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. Therefore no qualifications were made based on these discrepancies.

The TKN spike only slightly exceeds the project control limit. For this reason, this result is not qualified.

Field Duplicates

One set of field duplicates was collected and RPDs were calculated to evaluate overall precision. Field duplicate results are summarized below.

Table 4. *Field Duplicate Comparison.*

Sample	Sample Date	Analyte	Result	Duplicate	RL	Units	RPD
DMC-001	7/29/08 5:40	BOD	ND	ND	5	mg/L	ND
DMC-001	7/29/08 5:40	TSS	11	9	3	mg/L	20
DMC-001	7/29/08 5:40	Turbidity	8.9	9.6	0.05	NTU	8
DMC-001	7/29/08 5:40	Arsenic	2.8	2.7	0.5	ug/L	4
DMC-001	7/29/08 5:40	Copper	1.5	1.4	0.5	ug/L	7
DMC-001	7/29/08 5:40	E. Coli	18	18	1	MPN/100mL	0
DMC-001	7/29/08 5:40	TKN	0.33	0.37	0.1	mg/L	11
DMC-001	7/29/08 5:40	Ammonia	ND	ND	0.1	mg/L	ND
DMC-001	7/29/08 5:40	TOC	3	3	0.5	mg/L	0
DMC-001	7/29/08 5:40	Boron	88	90	10	ug/L	2
DMC-001	7/29/08 5:40	Hardness	96	92	5	mg/L	4
DMC-001	7/29/08 5:40	Selenium	J0.14	J0.14	0.2	ug/L	ND
DMC-001	7/29/08 5:40	Total Hg	0.0023	0.0031	0.0005	ug/L	30
DMC-001	7/29/08 5:40	Diss Hg	0.0007	0.0007	0.0005	ug/L	0
DMC-001	7/29/08 5:40	Aluminum	460	370	10	ug/L	22

The following criteria were used for validation of field duplicate results for all analyses. Where both the sample and duplicate values are greater than 5 times the RL, acceptable sampling and analytical precision is indicated by an RPD for the two field duplicate results of less than or equal to 30 percent for aqueous samples. Where one or both analytes of the field duplicate pair are less than 5 times the RL, satisfactory precision is indicated if the field duplicate results agree within 2 times the higher RL for aqueous samples. No field duplicate pairs associated with this sampling event were outside the acceptable evaluation criterion.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory.

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Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 7/29-30/2008**
SDG I071035

The Caltest Analytical Laboratory (Caltest) report dated August 19, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Six sites were sampled between late morning, July 29, 2008 and mid morning, July 30, 2008. Samples were collected from the San Joaquin River at Crows Landing (SCL); the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJRUS); the San Joaquin River Downstream (SJRDS); and the Delta Mendota Canal (DMC). Field duplicates were collected with NWDS-006, SJRDS-005, and NWUS-006. A field blank was collected with SJRUS-007, although this was not on the original schedule. An equipment blank was collected with NWDS-008.

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
E. Coli
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

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Memorandum

Table 1. *Sampling Sites, Dates, Times, and Analyses.*

Sample Site	Date	Time	Al	NH_3	As	BOD	B	Cu	E. Coli	Hardness	Diss Hg	Total Hg	Se	TKN	TOC	TSS	Turbidity
SCL-001	7/29/2008	11:30	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWUS-002	7/29/2008	12:10	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-002	7/29/2008	12:20	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRUS-002	7/29/2008	13:00	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRDS-002	7/29/2008	13:18	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRDS-003	7/29/2008	18:00	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRUS-003	7/29/2008	18:15	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-003	7/29/2008	18:45	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWUS-003	7/29/2008	19:52	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-004	7/29/2008	21:52	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWUS-004	7/29/2008	22:09	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRUS-004	7/29/2008	22:17	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRDS-004	7/29/2008	23:38	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-005	7/30/2008	0:45	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRUS-005	7/30/2008	1:21	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWUS-005	7/30/2008	1:47	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-006	7/30/2008	2:32	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-006-DUP	7/30/2008	2:32	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRUS-006	7/30/2008	2:45	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRDS-005	7/30/2008	3:15	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRDS-005-DUP	7/30/2008	3:15	X	X	X	X	X	X		X	X	X	X	X	X	X	X
DMC-002	7/30/2008	6:05	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-006-DUP	7/30/2008	6:30	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWUS-006	7/30/2008	6:37	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-007	7/30/2008	6:45	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-007-FB	7/30/2008	7:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-007	7/30/2008	7:25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-006	7/30/2008	7:27	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRUS-008	7/30/2008	8:45	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWUS-007	7/30/2008	9:10	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-008-EB	7/30/2008	9:15	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-008	7/30/2008	9:25	X	X	X	X	X	X		X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 35 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5813	TSS	TSS	TSS	
BIO/5814	TSS	TSS	TSS	
BIO/5816	TSS	TSS	TSS	
BIO/5817	TSS	TSS	TSS	
BML/3559	E. Coli			
BOD/3821		BOD	BOD	
BOD/3823	BOD	BOD		
MPR/6341	As Cu	As Cu		As Cu
MPR/6342	As Cu	As Cu		As Cu
MPR/6343	As Cu	As Cu		As Cu
MPR/6348	Al B Se	Al B Se		Al B Se
MPR/6350	Al B Se	Al B Se		Al B Se
MPR/6354	Al B Se	Al B Se		Al B Se
MPR/6355	Al Se	Al B Se		Al B Se
MPR/6359	As Cu	As Cu		As Cu
MPR/6360	As Cu	As Cu		As Cu
MPR/6379	Total Hg	Total Hg		Total Hg
MPR/6382	Total Hg	Total Hg		Total Hg
MPR/6383	Diss Hg	Diss Hg		Diss Hg
MPR/6391	Diss Hg	Diss Hg		Diss Hg
MPR/6392	Diss Hg	Diss Hg		Diss Hg
MPR/6393	Diss Hg	Diss Hg		Diss Hg
WET/4479	Turbidity	Turbidity	Turbidity	
WET/4480	Turbidity	Turbidity	Turbidity	
WET/4493	Ammonia	Ammonia		Ammonia
WET/4498	Ammonia	Ammonia		Ammonia
WET/4506	TOC	TOC		TOC
WET/4508	TKN	TKN		TKN
WET/4517	TKN	TKN		TKN
WET/4518	TKN	TKN		TKN
WET/4519	TOC	TOC		
WET/4528	TOC	TOC		TOC
WTI/1598	Hardness	Hardness		Hardness
WTI/1600	Hardness	Hardness		Hardness
WTI/1601	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS spikes were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, E. Coli, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to the corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20) except as summarized below.

Table 3. *Sample Duplicate Results Outside of Control Limits.*

QC Batch	Analyte	Sample ID	Result	DUP	RPD	Max RPD
BIO/5813	TSS	70999001	92	74	22	20

The sample spiked was not a project sample, therefore no qualification is necessary due to sample duplicates.

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS/MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits except as summarized below.

Table 4. *MS/MSD Results Outside of Control Limits.*

QC Batch	Analyte	Sample ID	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6348	Aluminum	71035001	510	40	1300	1200	1958	1770	85 - 115	6	20
MPR/6350	Boron	DMC-002	89	20	120	130	171	226	85 - 115	8.5	20
MPR/6350	Aluminum	DMC-002	550	40	1300	1400	1938	2160	85 - 115	6.5	20
MPR/6354	Aluminum	70994006	1100	40	2200	2200	2840	2773	85 - 115	1.2	20
MPR/6354	Boron	70994006	1400	20	1400	1400	-365	-190	85 - 115	2.5	20
MPR/6391	Total Hg	SJRUS-007	0.0058	0.02	0.028	0.021	110	76	71 - 125	27	20

For all of the aluminum and boron MS/MSD pairs listed, the original sample concentrations were more than four times the spike concentrations. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. Therefore no qualifications were made based on these discrepancies.

While the RPD for total mercury listed is above the control limit, recoveries for both the MS and MSD were within control limits, therefore no qualification was made based on this discrepancy.

Field Duplicates

Three sets of field duplicates were collected and RPDs were calculated to evaluate overall precision. Field duplicate results are summarized below.

Table 5. *Field Duplicate Comparison.*

Sample	Sample Date	Analyte	Result	Duplicate	RL	Units	RPD
NWDS-006	7/30/2008 2:32	Aluminum	9600	10000	50	ug/L	4
NWDS-006	7/30/2008 2:32	Ammonia	0.44	0.43	0.1	mg/L	2
NWDS-006	7/30/2008 2:32	Arsenic	1.9	1.8	0.5	ug/L	5
NWDS-006	7/30/2008 2:32	BOD	7	7	5	mg/L	0
NWDS-006	7/30/2008 2:32	Boron	260	260	10	ug/L	0
NWDS-006	7/30/2008 2:32	Copper	1.1	1	0.5	ug/L	10
NWDS-006	7/30/2008 2:32	Hardness	270	270	20	mg/L	0
NWDS-006	7/30/2008 2:32	Total Hg	0.12	0.13	0.0025	ug/L	8
NWDS-006	7/30/2008 2:32	Diss Hg	0.0021	0.002	0.0005	ug/L	5
NWDS-006	7/30/2008 2:32	Selenium	0.79	0.91	0.2	ug/L	14
NWDS-006	7/30/2008 2:32	TKN	2.6	2.6	0.1	mg/L	0
NWDS-006	7/30/2008 2:32	TOC	6.7	6.9	0.5	mg/L	3
NWDS-006	7/30/2008 2:32	TSS	440	460	6	mg/L	4
NWDS-006	7/30/2008 2:32	Turbidity	160	200	1	NTU	22
NWUS-006	7/30/2008 6:37	Aluminum	210	520	10	ug/L	85
NWUS-006	7/30/2008 6:37	Ammonia	ND	ND	0.1	mg/L	NA
NWUS-006	7/30/2008 6:37	Arsenic	2.5	2.5	0.5	ug/L	0
NWUS-006	7/30/2008 6:37	BOD	ND	ND	5	mg/L	NA
NWUS-006	7/30/2008 6:37	Boron	110	94	10	ug/L	16
NWUS-006	7/30/2008 6:37	Copper	1.5	1.3	0.5	ug/L	14
NWUS-006	7/30/2008 6:37	Hardness	240	180	20	mg/L	29
NWUS-006	7/30/2008 6:37	Total Hg	0.003	0.0029	0.0005	ug/L	3
NWUS-006	7/30/2008 6:37	Diss Hg	0.0008	0.0008	0.0005	ug/L	0
NWUS-006	7/30/2008 6:37	Selenium	J0.11	J0.14	0.2	ug/L	NA
NWUS-006	7/30/2008 6:37	TKN	0.38	0.37	0.1	mg/L	3
NWUS-006	7/30/2008 6:37	TOC	3	2.9	0.5	mg/L	3
NWUS-006	7/30/2008 6:37	TSS	6	6	3	mg/L	0
NWUS-006	7/30/2008 6:37	Turbidity	12	11	0.05	NTU	9
SJRDS-005	7/30/2008 3:15	Aluminum	4500	4100	50	ug/L	9
SJRDS-005	7/30/2008 3:15	Ammonia	0.26	0.27	0.1	mg/L	4
SJRDS-005	7/30/2008 3:15	Arsenic	2.7	2.7	0.5	ug/L	0
SJRDS-005	7/30/2008 3:15	BOD	6	6	5	mg/L	0
SJRDS-005	7/30/2008 3:15	Boron	560	560	10	ug/L	0
SJRDS-005	7/30/2008 3:15	Copper	1.2	1.2	0.5	ug/L	0
SJRDS-005	7/30/2008 3:15	Hardness	290	280	20	mg/L	4
SJRDS-005	7/30/2008 3:15	Total Hg	0.048	0.045	0.0005	ug/L	6
SJRDS-005	7/30/2008 3:15	Diss Hg	0.002	0.0021	0.0005	ug/L	5
SJRDS-005	7/30/2008 3:15	Selenium	1	1	0.2	ug/L	0
SJRDS-005	7/30/2008 3:15	TKN	1.9	1.9	0.1	mg/L	0
SJRDS-005	7/30/2008 3:15	TOC	6.2	6.3	0.5	mg/L	2
SJRDS-005	7/30/2008 3:15	TSS	220	120	6	mg/L	59
SJRDS-005	7/30/2008 3:15	Turbidity	200	63	0.2	NTU	104

The following criteria were used for to evaluate field duplicate results. Where both the sample and duplicate values are greater than 5 times the RL, satisfactory precision is indicated by a RPD of 30 or less. Where one or both values are less than 5 times the RL, precision is indicated if the field duplicate results are within 2 times the RL for aqueous samples. Three field duplicate pairs reported in this SDG were outside these criteria: aluminum for NWUS-006 (RPD = 85), TSS for SJRDS-005 (RPD = 59), and turbidity for SJRDS-005 (RPD = 104).

TSS and turbidity are both associated with particulate and colloidal material which could readily be variable in the river. Both TSS and turbidity are higher in the original sample and we would expect them to vary in the same manner. It is unclear why aluminum results would be so different. In any case these differences suggest some uncertainty associated with the data, probably due to matrix effects. Therefore, the parent and duplicate sample results are qualified as estimated and flagged "J" to indicate uncertainty for these results.

Field Blanks

Field blanks consist of analyte-free water poured directly into sample collection containers in the field, then shipped to the laboratory with field samples. Field blanks are used to assess the potential for contamination through the sample collection, preparation, and analysis process.

A field blank was collected with sample SJRUS-007. The field blank results are compared to the parent sample results below.

Table 7. *Field Blank Results.*

Sample	Sample Date	Analyte	Result	Field Blank	RL	Units
SJRUS-007	7/30/2008 7:25	Aluminum	1400	J6	10	ug/L
SJRUS-007	7/30/2008 7:25	Ammonia	ND	ND	0.1	mg/L
SJRUS-007	7/30/2008 7:25	Arsenic	5.5	ND	0.5	ug/L
SJRUS-007	7/30/2008 7:25	BOD	J4.6	ND	5	mg/L
SJRUS-007	7/30/2008 7:25	Boron	1300	J2	10	ug/L
SJRUS-007	7/30/2008 7:25	Copper	1.6	ND	0.5	ug/L
SJRUS-007	7/30/2008 7:25	E. Coli	200	ND	1	MPN/100mL
SJRUS-007	7/30/2008 7:25	Hardness	440	ND	5	mg/L
SJRUS-007	7/30/2008 7:25	Total Hg	0.0058	J0.0004	0.0005	ug/L
SJRUS-007	7/30/2008 7:25	Diss Hg	0.0016	ND	0.0005	ug/L
SJRUS-007	7/30/2008 7:25	Selenium	2	ND	0.2	ug/L
SJRUS-007	7/30/2008 7:25	TKN	1.4	ND	0.1	mg/L
SJRUS-007	7/30/2008 7:25	TOC	6.4	J0.36	0.5	mg/L
SJRUS-007	7/30/2008 7:25	TSS	69	ND	3	mg/L
SJRUS-007	7/30/2008 7:25	Turbidity	22	ND	0.05	NTU

All field blank concentrations are below both the reporting limit and the detection limit.

Equipment Blanks

Equipment blanks consist of analyte-free water poured through decontaminated field sampling equipment into sample collection containers, then shipped to the laboratory with field samples. Equipment blanks are used to assess the adequacy of the decontamination process and the potential for contamination through the sample collection, preparation, and analysis process. If the result for a blank is greater than the reporting limit, all associated results for that analyte less than five times the value of the blank should be qualified.

An equipment blank was collected with sample NWDS-008. The equipment blank results are compared to the parent sample results below.

Table 6. *Equipment Blank Results.*

Sample	Sample Date	Analyte	Result	Equipment Blank	RL	Units
NWDS-008	7/30/2008 9:25	Aluminum	6900	17	10	ug/L
NWDS-008	7/30/2008 9:25	Ammonia	0.13	ND	0.1	mg/L
NWDS-008	7/30/2008 9:25	Arsenic	1.7	ND	0.5	ug/L
NWDS-008	7/30/2008 9:25	BOD	ND	ND	5	mg/L
NWDS-008	7/30/2008 9:25	Boron	190	J2	10	ug/L
NWDS-008	7/30/2008 9:25	Copper	0.9	ND	0.5	ug/L
NWDS-008	7/30/2008 9:25	Hardness	210	ND	5	mg/L
NWDS-008	7/30/2008 9:25	Total Hg	0.1	ND	0.0005	ug/L
NWDS-008	7/30/2008 9:25	Diss Hg	0.0014	ND	0.0005	ug/L
NWDS-008	7/30/2008 9:25	Selenium	0.54	ND	0.2	ug/L
NWDS-008	7/30/2008 9:25	TKN	1.4	ND	0.1	mg/L
NWDS-008	7/30/2008 9:25	TOC	4.3	J0.32	0.5	mg/L
NWDS-008	7/30/2008 9:25	TSS	350	ND	3	mg/L
NWDS-008	7/30/2008 9:25	Turbidity	73	0.23	0.05	NTU

The equipment blank had detections of aluminum and turbidity above the reporting limit. The fact that the field blank had no detections above the reporting limit suggests that these detections are due to inadequate decontamination procedures. However, the parent sample concentrations are more than five times the associated equipment blank concentrations, therefore no qualification is necessary.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a “J” to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory with the following additional qualifications.

- Aluminum for samples NWUS-006 and NWUS-006-DUP are qualified as estimated and flagged “J” to indicate uncertainty.
- TSS and turbidity for samples SJRDS-005 and SJRDS-005-DUP are qualified as estimated and flagged “J” to indicate uncertainty.

URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 7/30/2008**
Lab Order I071072

The Caltest Analytical Laboratory (Caltest) report dated August 25, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Four sites were sampled between the late morning of July 30, 2008, and the early afternoon of July 30, 2008. Samples were collected from the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJUS); and the San Joaquin River Downstream (SJRDS, or STRDS). Field duplicates were taken with SJRDS-007 and SJUS-009. A field blank was taken with SJRDS-007. It should be noted that the SJRDS-007-DUP and SJRDS-007-FB were taken 15 minutes after the sampling of SJRDS-007.

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH_3	TKN	Hardness	TSS	Turbidity
SJRDS-007	7/30/2008	11:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-007-DUP	7/30/2008	11:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-007-FB	7/30/2008	11:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-008	7/30/2008	13:35	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STRDS-008	7/30/2008	14:39	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-009	7/30/2008	12:55	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJUS-009	7/30/2008	13:25	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJUS-009-DUP	7/30/2008	13:25	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 15 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5817	TSS	TSS	TSS	
BOD/3823		BOD	BOD	
MPR/6372	Al Se B	Al Se B		Al Se B
MPR/6969	As Cu	As Cu		As Cu
MPR/6370	As Cu	As Cu		As Cu
MPR/6393	Total Hg	Total Hg		Total Hg Total Hg
MPR/6394	Diss Hg	Diss Hg		Diss Hg
MPR/6412	Total Hg	Total Hg		Total Hg
WET/4489	Turbidity	Turbidity	Turbidity	
WET/4490	Ammonia	Ammonia		Ammonia
WET/4511	Ammonia	Ammonia		Ammonia
WET/4523	TKN	TKN		TKN
WET/4524	TKN	TKN		TKN
WET/4529	TOC	TOC		TOC TOC
WTI/1601	Hardness	Hardness		Hardness

Each analyses method is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Method blank results were non-detects with respect to each reporting limit with the following exception:

Table 3. *Method Blank results above reporting limit (RL).*

Analyte	Result	RL	Units
TOC	0.61	0.5	mg/L

No TOC results are less than five times the method blank result. Therefore no qualification was made based on this discrepancy.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits.

Field Duplicates

Three sets of field duplicates were collected and RPDs were calculated to evaluate overall precision. Field duplicate results are summarized below.

Table 4. *Field Duplicate Comparison.*

Sample	Sample Date	Analyte	Result	Duplicate	RL	Units	RPD
SJRDS-007	7/30/08 11:00	BOD	ND	5	5	mg/L	0
SJRDS-007	7/30/08 11:00	TSS	310	410	6	mg/L	28
SJRDS-007	7/30/08 11:00	Arsenic	2.5	2.6	0.5	ug/L	4
SJRDS-007	7/30/08 11:00	Copper	1.2	1.2	0.5	ug/L	0
SJRDS-007	7/30/08 11:00	Turbidity	120	170	1	NTU	34
SJRDS-007	7/30/08 11:00	TKN	1.9	1.8	0.1	mg/L	5
SJRDS-007	7/30/08 11:00	Ammonia	0.65	0.24	0.1	mg/L	92
SJRDS-007	7/30/08 11:00	TOC	5.1	5.1	0.5	mg/L	0
SJRDS-007	7/30/08 11:00	Hardness	280	280	20	mg/L	0
SJRDS-007	7/30/08 11:00	Selenium	1	1.1	0.2	ug/L	10
SJRDS-007	7/30/08 11:00	Total Hg	0.085	0.12	0.0005	ug/L	34
SJRDS-007	7/30/08 11:00	Diss Hg	0.0014	0.0016	0.001	ug/L	13
SJRDS-007	7/30/08 11:00	Aluminum	6400	7700	50	ug/L	18
SJRDS-007	7/30/08 11:00	Boron	520	530	10	ug/L	2
SJUS-009	7/30/08 13:25	BOD	5	5	5	mg/L	0
SJUS-009	7/30/08 13:25	TSS	48	41	3	mg/L	16
SJUS-009	7/30/08 13:25	Arsenic	5.2	5.3	0.5	ug/L	2
SJUS-009	7/30/08 13:25	Copper	1.7	1.7	0.5	ug/L	0
SJUS-009	7/30/08 13:25	Turbidity	20	20	0.05	NTU	0
SJUS-009	7/30/08 13:25	TKN	1.6	1.5	0.1	mg/L	6
SJUS-009	7/30/08 13:25	Ammonia	J0.077	0.33	0.1	mg/L	107
SJUS-009	7/30/08 13:25	TOC	6.9	ND	0.5	mg/L	--
SJUS-009	7/30/08 13:25	Hardness	390	370	20	mg/L	5
SJUS-009	7/30/08 13:25	Selenium	2	2	0.2	ug/L	0
SJUS-009	7/30/08 13:25	Total Hg	0.0056	0.0051	0.0005	ug/L	9
SJUS-009	7/30/08 13:25	Diss Hg	0.0014	0.0013	0.0005	ug/L	7
SJUS-009	7/30/08 13:25	Aluminum	580	640	10	ug/L	10
SJUS-009	7/30/08 13:25	Boron	1200	1300	10	ug/L	8

The following criteria were used for to evaluate field duplicate results. Where both the sample and duplicate values are greater than 5 times the RL, satisfactory precision is indicated by a RPD of 30 or less. Where one or both values are less than 5 times the RL, precision is indicated if the field duplicate results are within 2 times the RL for aqueous samples. Four field duplicate pairs reported in this SDG were outside these criteria: turbidity for SJRDS-007 (RPD = 34); ammonia for SJRDS-007 (RPD = 92); total mercury for SJRDS-007 (RPD = 34); and ammonia for SJUS-009 (RPD = 107).

Data is typically not qualified by field duplicates alone. It should be noted that the SJRDS-007-DUP was taken 15 minutes after the sampling of SJRDS-007.

Field Blanks

Field blanks are analyte-free water poured into the preserved containers in the field, then shipped to the laboratory with field samples. They assess the adequacy of the decontamination process and the sample preparation and measurement process. If a field blank result is greater than its reporting limit, results for that analyte that are less than five times the blank result are qualified.

A field blank was taken with sample SJRDS-007. The field blank results are compared to the parent sample results below.

Table 5. *Field Blanks.*

Sample	Sample Date	Analyte	Result	Field Blank	RL	Units
SJRDS-007-DUP	7/30/08 11:15	Aluminum	7700	J3	10	ug/L
SJRDS-007-DUP	7/30/08 11:15	Ammonia	0.24	ND	0.1	mg/L
SJRDS-007-DUP	7/30/08 11:15	Arsenic	2.6	ND	0.5	ug/L
SJRDS-007-DUP	7/30/08 11:15	BOD	5	ND	5	mg/L
SJRDS-007-DUP	7/30/08 11:15	Boron	530	J2	10	ug/L
SJRDS-007-DUP	7/30/08 11:15	Copper	1.2	ND	0.5	ug/L
SJRDS-007-DUP	7/30/08 11:15	Hardness	280	ND	5	mg/L
SJRDS-007-DUP	7/30/08 11:15	Diss Hg	0.0016	ND	0.0005	ug/L
SJRDS-007-DUP	7/30/08 11:15	Total Hg	0.12	ND	0.0005	ug/L
SJRDS-007-DUP	7/30/08 11:15	Selenium	1.1	ND	0.2	ug/L
SJRDS-007-DUP	7/30/08 11:15	TKN	1.8	J0.066	0.1	mg/L
SJRDS-007-DUP	7/30/08 11:15	TOC	5.1	J0.44	0.5	mg/L
SJRDS-007-DUP	7/30/08 11:15	TSS	410	4	3	mg/L
SJRDS-007-DUP	7/30/08 11:15	Turbidity	170	0.14	0.05	NTU

Two analytes, TSS and turbidity, are above the reporting limits. All associated TSS and turbidity sample results are greater than five times the field blank value; therefore, no qualifications were made based on these discrepancies.

It should be noted that SJRDS-007-FB was taken 15 minutes after the sampling of SJRDS-007.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory.

URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 7/30-31/2008**
Lab Order I071088

The Caltest Analytical Laboratory (Caltest) report dated September 2, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Six sites were sampled between late afternoon, July 30, 2008, and morning of July 31, 2008. Samples were collected from the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS, or MWDS); the San Joaquin River Upstream (SJUS, or SJRUS); the San Joaquin River Downstream (SJRDS); the Delta Mendota Canal (DMC); and the San Joaquin River at Crows Landing (SCL).

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
E. Coli
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Al	NH_3	As	BOD	B	Cu	E. Coli	Hardness	Diss Hg	Total Hg	Se	TKN	TOC	TSS	Turbidity
NWUS-009	7/30/2008	16:00	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SCL-002	7/30/2008	17:07	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRDS-010	7/30/2008	18:18	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWUS-010	7/30/2008	19:36	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJUS-010	7/30/2008	16:05	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-010	7/30/2008	16:05	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-011	7/30/2008	19:00	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRUS-011	7/30/2008	19:25	X	X	X	X	X	X		X	X	X	X	X	X	X	X
MWDS-012	7/30/2008	23:53	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRUS-012	7/31/2008	0:10	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJRDS-011	7/31/2008	0:15	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWUS-011	7/31/2008	1:06	X	X	X	X	X	X		X	X	X	X	X	X	X	X
DMC-003	7/31/2008	6:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-012	7/31/2008	6:37	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-012	7/31/2008	7:20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCL-003	7/31/2008	8:10	X	X	X	X	X	X		X	X	X	X	X	X	X	X
NWDS-013	7/31/2008	6:40	X	X	X	X	X	X		X	X	X	X	X	X	X	X
SJUS-013	7/31/2008	7:10	X	X	X	X	X	X		X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times with the exception of every Turbidity sample. EPA Method 180.1 has a hold time of 48 hrs before analysis; each Turbidity sample was held for an additional 79 to 85 hours before analysis occurred. This occurred due to a misunderstanding regarding the delivery schedule of the samples; the turbidity samples were left unanalyzed over a weekend.

For this reason, all 18 turbidity results are qualified as estimated, "J".

The Total Mercury result for NWDS-013 was not in the initial report. The auto-analyzer had inadvertently skipped the sample. The mercury result was resampled and the report re-issued with this result. However, Mercury hold time of 28 days had been exceeded by 11 days.

For this reason, the NWDS-013 Total Mercury result is qualified as estimated, "J".

Quality Control Batches

The samples were grouped into 12 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5821	TSS	TSS		
BOD/3825		BOD	BOD	
MPR/6402	Aluminum Boron Selenium	Aluminum Boron Selenium		Aluminum Boron Selenium
MPR/6396	Aluminum Boron Selenium	Aluminum Boron Selenium		Aluminum Boron Selenium
MPR/6416	Total Hg	Total Hg		Total Hg Total Hg
MPR/6420	Total Hg	Total Hg		Total Hg Diss Hg
MPR/6423	Arsenic Copper	Arsenic Copper		Arsenic Copper
WET/4490	Turbidity	Turbidity	Turbidity	
WET/4512	Ammonia	Ammonia		Ammonia
WET/4530	TKN	TKN		TKN
WET/4543	TOC	TOC		
WTI/1603	Hardness	Hardness		Hardness

Each analyses method is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, E. Coli, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits except as summarized below:

Table 3. *MS/MSD results outside of project specific limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6386	Aluminum	NWUS-009	720	40	2000	1900	3069	3050	85-115	0.4	20
MPR/6386	Boron	NWUS-009	130	20	170	170	193	181	85-115	1.4	20
MPR/6387	Aluminum	NWUS-010	700	40	1600	1600	2197	2285	85-115	2.2	20
MPR/6388	Boron	Batch QC	4100	20	4100	4100	-50	-130	85-115	0.4	20
MPR/6396	Boron	Batch QC	86	20	120	120	151	152	85-115	0.2	20
MPR/6396	Aluminum	Batch QC	640	40	1600	1600	2414	2491	85-115	1.9	20

For all of the aluminum and boron MS/MSD pairs listed, the original sample concentrations were more than four times the spike concentrations. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. Therefore no qualifications were made based on these discrepancies.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory with the following additional qualifications.

- Turbidity for all samples (DMC-003, SCL-002, SCL-003, NWUS-009, NWUS-010, NWUS-011, NWUS-012, NWDS-010, NWDS-011, NWDS-012, NWDS-013, SJRUS-010, SJRUS-011, SJRUS-012, SJRUS-013, SJRDS-010, SJRDS-011, and SJRDS-012) are qualified as estimated and flagged "J" to indicate uncertainty
- Total mercury for sample NWDS-013 is qualified as estimated and flagged "J" to indicate uncertainty.

URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 7/31/2008**
Lab Order I080060

The Caltest Analytical Laboratory (Caltest) report dated September 2, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Six sites were sampled between the evening of July 31, 2008, and the morning of August 1, 2008. Samples were collected from the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJRUS); the San Joaquin River Downstream (SJRDS). A field duplicates was taken with NWDS-016. It should be noted that NWDS-016-DUP was sampled 7 minutes after the sampling of NWDS-016.

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling sites, times, and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH_3	TKN	Hardness	TSS	Turbidity
SJRDS-014	7/31/2008	18:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-015	8/1/2008	0:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-015	8/1/2008	1:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-014	7/31/2008	18:45	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-015	7/31/2008	17:49	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-015	7/31/2008	18:08	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-016	7/31/2008	23:50	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-016 DUP	7/31/2008	23:57	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-016	8/1/2008	0:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DMC-004	8/1/2008	6:25	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-016	8/1/2008	6:50	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-017	8/1/2008	7:45	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-017	8/1/2008	8:05	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-016	8/1/2008	9:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCL-004	8/1/2008	9:40	X	X	X	X	X	X	X	X	X	X	X	X	X	X

It should be noted that the Total Mercury sample for SJRUS-017 did not have a sample pH less than 2 before digestion.

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 20 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5819	TSS	TSS	TSS	
BOD/3827		BOD	BOD	
MPR/6402	Aluminum Boron Selenium	Aluminum Boron Selenium		Aluminum Boron Selenium
MPR/6397	Aluminum Boron Selenium	Aluminum Boron Selenium		Aluminum Boron Selenium
MPR/6398	Aluminum Selenium Boron	Aluminum Selenium Boron		Aluminum Selenium Boron
MPR/6420	Total Hg	Total Hg		Total Hg Total Hg
MPR/6426	Total Hg	Total Hg		Total Hg Total Hg
MPR/6427	Diss Hg	Diss Hg		Diss Hg
MPR/6424	Arsenic Copper	Arsenic Copper		Arsenic Copper
MPR/6425	Arsenic Copper	Arsenic Copper		Arsenic Copper
WET/4490	Turbidity	Turbidity	Turbidity	
WET/4491	Turbidity	Turbidity	Turbidity	
WET/4512	Ammonia	Ammonia		Ammonia
WET/4513	Ammonia	Ammonia		Ammonia
WET/4533	TKN	TKN		TKN
WET/4535	TKN	TKN		TKN
WET/4543	TOC	TOC		
WET/4544	TOC	TOC		
WET/4547	TOC	TOC		TOC TOC
WTI/1605	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits except as summarized below:

Table 3. *MS/MSD results outside of project specific limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6402	Aluminum	SJRDS-014	180	40	400	390	564	536	85-115	2.8	20
MPR/6402	Boron	SJRDS-014	1500	20	1600	1600	635	410	85-115	2.8	20
MPR/6397	Aluminum	SJRUS-016	1400	40	3100	3000	4293	4180	85-115	1.5	20
MPR/6397	Boron	SJRUS-016	1300	20	1400	1400	90	190	85-115	1.5	20
MPR/6398	Aluminum	Batch QC	15	40	63	61	119	114	85-115	3.7	20
MPR/6398	Boron	Batch QC	370	20	360	380	-16	59	85-115	4	20

For all of the aluminum and boron MS/MSD pairs listed, the original sample concentrations were more than four times the spike concentrations for project samples. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. The sample used in QC batch MPR/6398 was not a project sample and not representative of the project samples. Therefore no qualifications were made based on these discrepancies.

Field Duplicates

Three sets of field duplicates were collected and RPDs were calculated to evaluate overall precision. Field duplicate results are summarized below.

Table 4. *Field Duplicate Comparison.*

Sample	Sample Date	Analyte	Result	Duplicate	RL	Units	RPD
NWDS-016	7/31/08 23:57	Aluminum	15000	16000	100	ug/L	6
NWDS-016	7/31/08 23:57	Ammonia	0.51	0.48	0.1	mg/L	6
NWDS-016	7/31/08 23:57	Arsenic	2.1	2.1	0.5	ug/L	0
NWDS-016	7/31/08 23:57	BOD	ND	ND	5	mg/L	ND
NWDS-016	7/31/08 23:57	Boron	190	190	10	ug/L	0
NWDS-016	7/31/08 23:57	Copper	1	0.9	0.5	ug/L	11
NWDS-016	7/31/08 23:57	Hardness	240	280	20	mg/L	15
NWDS-016	7/31/08 23:57	Mercury	0.17	0.19	0.0025	ug/L	11
NWDS-016	7/31/08 23:57	Mercury	0.0012	0.0014	0.0005	ug/L	15
NWDS-016	7/31/08 23:57	Selenium	0.68	0.74	0.2	ug/L	8
NWDS-016	7/31/08 23:57	TKN	2.4	2.7	0.1	mg/L	12
NWDS-016	7/31/08 23:57	TOC	4.2	4	0.5	mg/L	5
NWDS-016	7/31/08 23:57	TSS	610	770	6	mg/L	23
NWDS-016	7/31/08 23:57	Turbidity	240	310	1	NTU	25

The following criteria were used for to evaluate field duplicate results. Where both the sample and duplicate values are greater than 5 times the RL, satisfactory precision is indicated by a RPD of 30 or less. Where one or both values are less than 5 times the RL, precision is indicated if the field

duplicate results are within 2 times the RL for aqueous samples. All field duplicate pairs reported in this SDG were within the acceptable evaluation criterion.

It should be noted that NWDS-016-DUP was sampled 7 minutes after the sampling of NWDS-016.

Other Lab Notes

The laboratory noted that pH was above 2 in the dissolved mercury aliquot for sample SJRDS-016. There is some uncertainty associated with the sample result due to this anomaly and therefore the result is qualified as estimated and flagged "J".

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory with the following additional qualification.

- Dissolved mercury for sample SJRDS-016 is qualified as estimated and flagged "J" to indicate uncertainty.

URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 7/31/2008**
Lab Order I071113

The Caltest Analytical Laboratory (Caltest) report dated August 25, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Four sites were sampled during the early afternoon of July 31, 2008. Samples were collected from the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJUS); and the San Joaquin River Downstream (SJRDS). Field duplicates were taken with NWUS-013. It should be noted that NWUS-013-DUP was sampled 10 minutes after the sampling of NWUS-013.

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH_3	TKN	Hardness	TSS	Turbidity
NWUS-013	7/31/2008	13:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-013-DUP	7/31/2008	13:10	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-013	7/31/2008	12:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-014	7/31/2008	12:05	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJUS-014	7/31/2008	12:25	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 12 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5821	TSS	TSS		
BOD/3825		BOD	BOD	
MPR/6402	Aluminum Boron Selenium	Aluminum Boron Selenium		Aluminum Boron Selenium
MPR/6396	Aluminum Boron Selenium	Aluminum Boron Selenium		Aluminum Boron Selenium
MPR/6416	Total Hg	Total Hg		Total Hg Total Hg
MPR/6420	Total Hg	Total Hg		Total Hg Diss Hg
MPR/6423	Arsenic Copper	Arsenic Copper		Arsenic Copper
WET/4490	Turbidity	Turbidity	Turbidity	
WET/4512	Ammonia	Ammonia		Ammonia
WET/4530	TKN	TKN		TKN
WET/4543	TOC	TOC		
WTI/1603	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits except as summarized below:

Table 3. *MS/MSD results outside of project specific limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6402	Aluminum	Batch QC	180	40	400	390	564	536	85-115	2.8	20
MPR/6402	Boron	Batch QC	1500	20	1600	1600	635	410	85-115	2.8	20

For all of the aluminum and boron MS/MSD pairs listed, the original sample concentrations were more than four times the spike concentrations. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. Therefore no qualifications were made based on these discrepancies.

Field Duplicates

One set of field duplicates and RPDs were calculated to evaluate overall precision. Field duplicate results are summarized below.

Table 4. *Field Duplicate Comparison.*

Sample	Sample Date	Analyte	Result	Duplicate	RL	Units	RPD
NWUS-013	7/31/08 13:00	Aluminum	610	640	10	ug/L	5
NWUS-013	7/31/08 13:00	Ammonia	ND	ND	0.1	mg/L	ND
NWUS-013	7/31/08 13:00	Arsenic	2.7	2.6	0.5	ug/L	4
NWUS-013	7/31/08 13:00	BOD	ND	ND	5	mg/L	ND
NWUS-013	7/31/08 13:00	Boron	98	86	10	ug/L	13
NWUS-013	7/31/08 13:00	Copper	1.6	1.5	0.5	ug/L	6
NWUS-013	7/31/08 13:00	Hardness	210	170	20	mg/L	21
NWUS-013	7/31/08 13:00	Total Hg	0.0038	0.0026	0.0005	ug/L	38
NWUS-013	7/31/08 13:00	Diss Hg	0.0011	0.001	0.0005	ug/L	10
NWUS-013	7/31/08 13:00	Selenium	J0.15	J0.17	0.2	ug/L	13
NWUS-013	7/31/08 13:00	TKN	0.35	0.11	0.1	mg/L	104
NWUS-013	7/31/08 13:00	TOC	2.9	2.9	0.5	mg/L	0
NWUS-013	7/31/08 13:00	TSS	11	16	3	mg/L	37
NWUS-013	7/31/08 13:00	Turbidity	13	13	0.05	NTU	0

The following criteria were used for to evaluate field duplicate results. Where both the sample and duplicate values are greater than 5 times the RL, satisfactory precision is indicated by a RPD of 30 or less. Where one or both values are less than 5 times the RL, precision is indicated if the field duplicate results are within 2 times the RL for aqueous samples. Two field duplicate pairs reported in this SDG were outside these criteria: Total Hg for NWUS-013 (RPD = 38, Difference between result and duplicate is greater than twice the RL) and TKN for NWUS-013 (RPD = 104, Difference between result and duplicate is greater than twice the RL).

Data is typically not qualified by field duplicates alone. It should be noted that NWUS-013-DUP was sampled 10 minutes after the sampling of NWUS-013.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory.

URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 8/4/2008**
Lab Order I080139

The Caltest Analytical Laboratory (Caltest) report dated September 12, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Six sites were sampled between the early and late afternoon of August 4, 2008. Samples were collected from the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJRUS); the San Joaquin River Downstream (SJRDS); the Delta Mendota Canal (DMC); and the San Joaquin River at Crows Landing (SCL).

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH_3	TKN	Hardness	TSS	Turbidity
NWUS-017	8/4/2008	12:30	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DMC-005	8/4/2008	13:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-018	8/4/2008	13:45	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-018	8/4/2008	14:05	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-017	8/4/2008	15:10	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCL-005	8/4/2008	15:40	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 17 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5826	TSS	TSS	TSS	
BOD/3835		BOD	BOD	
MPR/6411	Aluminum Boron Slenium	Aluminum Boron Slenium		Aluminum Boron Slenium
MPR/6425	Arsenic Copper	Arsenic Copper		Arsenic Copper
MPR/6433	Total Hg	Total Hg		Total Hg
MPR/6434	Total Hg	Total Hg		Total Hg
MPR/6439	Diss Hg	Diss Hg		Diss Hg
MPR/6443	Arsenic Copper	Arsenic Copper		Arsenic Copper
WET/4494	Turbidity	Turbidity	Turbidity	
WET/4515	Ammonia	Ammonia		Ammonia
WET/4540	TKN	TKN		TKN
WET/4541	TKN	TKN		TKN
WET/4542	TKN	TKN		TKN
WET/4547	TOC	TOC		TOC
WET/4548	TOC	TOC		TOC TOC
WET/4555	TOC	TOC		
WTI/1606	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits except as summarized below:

Table 3. *MS/MSD results outside of project specific limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6411	Aluminum	NPS	41	40	94	94	133	132	85%-115%	0.5%	20%
MPR/6411	Boron	NPS	800	20	790	790	-34	-56	85%-115%	0.6%	20%

For the boron MS/MSD pair listed, the original sample concentration was more than four times the spike concentration. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. The sample used for the MS/MSD was not a project sample and therefore no qualification is necessary.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory without qualification.

URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 8/11/2008**
Lab Order I080487

The Caltest Analytical Laboratory (Caltest) report dated September 11, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Six sites were sampled between the late morning and afternoon of August 11, 2008. The sites were the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJRUS); the San Joaquin River Downstream (SJRDS); the Delta Mendota Canal (DMC); and the San Joaquin River at Crows Landing (SCL). A field duplicate was taken with SJRUS-019. It should be noted that SJRUS-019-DUP was taken 15 minutes after the sampling of SJRUS-019.

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH_3	TKN	Hardness	TSS	Turbidity
DMC-006	8/11/2008	11:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-018	8/11/2008	11:30	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-019	8/11/2008	12:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-019 DUP	8/11/2008	12:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-019	8/11/2008	13:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-018	8/11/2008	13:50	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCL-006	8/11/2008	14:45	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 15 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5856	TSS	TSS		
BOD/3847		BOD	BOD	
MPR/6445	Aluminum Boron Selenium	Aluminum Boron Selenium		Aluminum Boron Selenium
MPR/6447	Total Hg	Total Hg		Total Hg Total Hg
MPR/6469	Arsenic Copper	Arsenic Copper		Arsenic Copper
MPR/6470	Arsenic Copper	Arsenic Copper		Arsenic Copper
MPR/6471	Arsenic Copper	Arsenic Copper		Arsenic Copper
MPR/6494	Total Hg	Total Hg		Total Hg
WET/4534	Ammonia	Ammonia		Ammonia
WET/4555	TOC	TOC		
WET/4556	TOC	TOC		
WET/4564	TKN	TKN		TKN
WET/4565	TKN	TKN		TKN
WTI/1606	Hardness	Hardness		Hardness
WTI/1608	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits except as summarized below:

Table 3. *MS/MSD results outside of project specific limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6645	Aluminum	DMC-006	280	40	640	660	903	969	85-115	4.1	20

For the aluminum MS/MSD pair listed, the original sample concentration was more than four times the spike concentration. This renders the resulting recovery not meaningful in accordance with EPA guidelines. Therefore no qualification was made based on this discrepancy.

Field Duplicates

One set of field duplicates was collected and RPDs were calculated to evaluate overall precision. Field duplicate results are summarized below.

Table 4. *Field Duplicate Comparison.*

Sample	Sample Date	Analyte	Result	Duplicate	RL	Units	RPD
SJRUS-019	8/11/08 12:00	Aluminum	910	850	10	ug/L	7
SJRUS-019	8/11/08 12:00	Ammonia	ND	ND	0.1	mg/L	ND
SJRUS-019	8/11/08 12:00	Arsenic	5.4	5.5	0.5	ug/L	2
SJRUS-019	8/11/08 12:00	BOD	J4.7	J4.7	5	mg/L	ND
SJRUS-019	8/11/08 12:00	Boron	1300	1200	10	ug/L	8
SJRUS-019	8/11/08 12:00	Copper	1.5	1.4	0.5	ug/L	7
SJRUS-019	8/11/08 12:00	Hardness	490	420	20	mg/L	15
SJRUS-019	8/11/08 12:00	Total Hg	0.0055	0.0049	0.0005	ug/L	12
SJRUS-019	8/11/08 12:00	Diss Hg	0.001	0.0011	0.0005	ug/L	10
SJRUS-019	8/11/08 12:00	Selenium	2.4	2.4	0.2	ug/L	0
SJRUS-019	8/11/08 12:00	TKN	1.1	1.2	0.1	mg/L	9
SJRUS-019	8/11/08 12:00	TOC	5.8	6	0.5	mg/L	3
SJRUS-019	8/11/08 12:00	TSS	34	15	3	mg/L	78
SJRUS-019	8/11/08 12:00	Turbidity	15	16	0.05	NTU	6

The following criteria were used for validation of field duplicate results for all analyses. Where both the sample and duplicate values are greater than 5 times the RL, acceptable sampling and analytical precision is indicated by an RPD for the two field duplicate results of less than or equal to 30 percent for aqueous samples. Where one or both analytes of the field duplicate pair are less than 5 times the RL, satisfactory precision is indicated if the field duplicate results agree within 2 times the higher RL for aqueous samples. One field duplicate pair reported in this SDG was outside these criteria: TSS for SJRUS-019 (RPD = 78). Laboratory results are not qualified based on field duplicate results alone.

It should be noted that SJRUS-019-DUP was sampled 15 minutes after the sampling of SJRUS-019.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory.

URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 8/18/2008**
Lab Order I080781

The Caltest Analytical Laboratory (Caltest) report dated September 15, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Six sites were sampled between the late morning and afternoon of August 18, 2008. The sites were the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJRUS); the San Joaquin River Downstream (SJRDS); the Delta Mendota Canal (DMC); and the San Joaquin River at Crows Landing (SCL). A equipment blank was taken with NWUS-019.

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

It should be noted that the lab confused the chain of custody sample label "DMC-007" and reported it as "DMC-001", a label applied to a previous sample in this project. For the purposes of this analysis, the sample will be refered to by its chain of custody label, "DMC-007".

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH_3	TKN	Hardness	TSS	Turbidity
DMC-007	8/18/2008	9:45	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-019	8/18/2008	10:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-019 EB	8/18/2008	10:15	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-020	8/18/2008	11:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-020	8/18/2008	11:20	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCL-007	8/18/2008	12:30	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-019	8/18/2008	13:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 13 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5879	TSS	TSS	TSS	
BOD/3861		BOD	BOD	
MPR/6498	As Cu	As Cu		As Cu
MPR/6509	Al Se B	Al Se B		Al Se B
MPR/6517	Total Hg	Total Hg		Total Hg Total Hg
WET/4549	Turbidity	Turbidity	Turbidity	
WET/4558	Ammonia	Ammonia		Ammonia
WET/4584	TOC	TOC		TOC
WET/4585	TOC	TOC		TOC
WET/4594	TKN	TKN		TKN
WET/4598	TOC	TOC		TOC TOC
WET/4600	TKN	TKN		TKN
WTI/1621	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits.

Equipment Blanks

Equipment blanks consist of analyte-free water poured through decontaminated field sampling equipment into sample collection containers, then shipped to the laboratory with field samples. Equipment blanks are used to assess the adequacy of the decontamination process and the potential for contamination through the sample collection, preparation, and analysis process. If the result for a blank is greater than the reporting limit, all associated results for that analyte less than five times the value of the blank should be qualified.

An equipment blank was collected with sample NWDS-008. The equipment blank results are compared to the parent sample results below.

Table 6. *Equipment Blank Results.*

Sample	Sample Date	Analyte	Result	Equipment Blank	RL	Units
NWUS-019	8/18/2008	Aluminum	2300	25	10	ug/L
NWUS-019	8/18/2008	Ammonia	ND	ND	0.1	mg/L
NWUS-019	8/18/2008	Arsenic	3.3	ND	0.5	ug/L
NWUS-019	8/18/2008	BOD	ND	ND	5	mg/L
NWUS-019	8/18/2008	Boron	470	J2	10	ug/L
NWUS-019	8/18/2008	Copper	1.3	ND	0.5	ug/L
NWUS-019	8/18/2008	Hardness	170	14	5	mg/L
NWUS-019	8/18/2008	Total Hg	0.018	ND	0.0005	ug/L
NWUS-019	8/18/2008	Diss Hg	0.0013	J0.0005	0.0005	ug/L
NWUS-019	8/18/2008	Selenium	0.72	ND	0.2	ug/L
NWUS-019	8/18/2008	TKN	0.86	0.21	0.1	mg/L
NWUS-019	8/18/2008	TOC	4	1.1	0.5	mg/L
NWUS-019	8/18/2008	TSS	89	ND	3	mg/L
NWUS-019	8/18/2008	Turbidity	37	ND	0.05	NTU

The equipment blank had detections of aluminum, hardness, TKN and TOC above the reporting limit. The parent sample concentrations for aluminum and hardness are greater than ten times the associated equipment blank concentrations, therefore no qualification is necessary. The parent sample concentrations for TKN and TOC are less than five times the associated equipment blank concentrations, therefore these sample results are qualified as not detected above the sample quantitation limit, and flagged "U".

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory with the following additional qualifications.

- TKN and TOC for sample NWUS-019 are qualified as not detected and flagged "U" to indicate the results were below the reported sample quantitation limit.

URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 8/25/2008**
Lab Order I080962

The Caltest Analytical Laboratory (Caltest) report dated September 17, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Six sites were sampled between the late morning and afternoon of August 25, 2008. The sites were the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJRUS); the San Joaquin River Downstream (SJRDS); the Delta Mendota Canal (DMC); and the San Joaquin River at Crows Landing (SCL). A field duplicate sample was taken with SCL-008. It should be noted that the SCL-008 DUP was sampled ten minutes after SCL-008.

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH_3	TKN	Hardness	TSS	Turbidity
DMC-008	8/25/2008	10:10	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-020	8/25/2008	10:30	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-021	8/25/2008	12:30	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-021	8/25/2008	11:40	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-020	8/25/2008	14:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCL-008	8/25/2008	14:45	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCL-008 DUP	8/25/2008	14:55	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 12 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5901	TSS	TSS	TSS	
BOD/3875		BOD	BOD	
MPR/6519	As Cu	As Cu		As Cu
MPR/6544	Total Hg	Total Hg		Total Hg Total Hg
MPR/6532	Al B Se	Al B Se		Al B Se
MPR/6555	Diss. Hg	Diss. Hg		Diss. Hg
WET/4572	Turbidity	Turbidity	Turbidity	
WET/4589	Ammonia	Ammonia		Ammonia
WET/4614	TOC	TOC		TOC TOC
WET/4615	TOC	TOC		TOC TOC
WET/4622	TKN	TKN		TKN
WTI/1623	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits except as summarized below:

Table 3. *MS/MSD results outside of project specific limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6532	Aluminum	DMC-008	330	40	830	800	1229	1175	85-115	2.7	20
WET/4614	TOC	Batch QC	2.7	10	43	43	401	402	85-115	0.4	20

For the aluminum result, the original sample concentration was more than four times the spike concentrations. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. Therefore no qualifications were made based on these discrepancies.

The TOC result is from a sample in the quality control batch not belonging to this project. No qualifications can be assigned based on its control limit exceedance.

Field Duplicates

One set of field duplicates was collected and RPDs were calculated to evaluate overall precision. Field duplicate results are summarized below.

Table 4. *Field Duplicate Comparison.*

Sample	Sample Date	Analyte	Result	Duplicate	RL	Units	RPD
SCL-008	8/25/2008	Aluminum	780	780	10	ug/L	0
SCL-008	8/25/2008	Ammonia	ND	ND	0.1	mg/L	NA
SCL-008	8/25/2008	Arsenic	3	3.1	0.5	ug/L	3
SCL-008	8/25/2008	BOD	ND	ND	5	mg/L	NA
SCL-008	8/25/2008	Boron	310	310	10	ug/L	0
SCL-008	8/25/2008	Copper	1.7	1.7	0.5	ug/L	0
SCL-008	8/25/2008	Hardness	210	200	20	mg/L	5
SCL-008	8/25/2008	Total Hg	0.0066	0.0062	0.0005	ug/L	6
SCL-008	8/25/2008	Diss. Hg	0.0013	0.0011	0.0005	ug/L	17
SCL-008	8/25/2008	Selenium	0.48	0.51	0.2	ug/L	6
SCL-008	8/25/2008	TKN	0.86	0.92	0.1	mg/L	7
SCL-008	8/25/2008	TOC	3.9	3.9	0.5	mg/L	0
SCL-008	8/25/2008	TSS	23	23	3	mg/L	0
SCL-008	8/25/2008	Turbidity	17	16	0.1	NTU	6

The following criteria were used for validation of field duplicate results for all analyses. Where both the sample and duplicate values are greater than 5 times the RL, acceptable sampling and analytical precision is indicated by an RPD for the two field duplicate results of less than or equal to 30 percent for aqueous samples. Where one or both analytes of the field duplicate pair are less than 5 times the RL, satisfactory precision is indicated if the field duplicate results agree within 2 times the higher RL for aqueous samples. No field duplicate pairs reported in this SDG were outside these criteria.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory.

URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 9/2/2008**
Lab Order I090082

The Caltest Analytical Laboratory (Caltest) report dated September 30, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Five sites were sampled between the late morning and afternoon of September 2, 2008. The sites were the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJRUS); the Delta Mendota Canal (DMC); and the San Joaquin River at Crows Landing (SCL). A field blank was taken with DMC-009.

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH_3	TKN	Hardness	TSS	Turbidity
DMC-009	9/2/2008	9:50	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DMC-009-FB	9/2/2008	10:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-021	9/2/2008	10:20	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-022	9/2/2008	12:10	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-022	9/2/2008	11:20	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCL-009	9/2/2008	13:35	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 13 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5910	TSS	TSS	TSS	
BOD/3891		BOD	BOD	
MPR/6529	As Cu	As Cu		As Cu
MPR/6563	Total Hg	Total Hg		Total Hg
MPR/6558	Al B Se	Al B Se		Al B Se
MPR/6583	Total Hg	Total Hg		Total Hg
WET/4605	Turbidity	Turbidity	Turbidity	
WET/4612	Ammonia	Ammonia		Ammonia
WET/4621	Ammonia	Ammonia		Ammonia
WET/4628	TKN	TKN		TKN
WET/4638	TKN	TKN		TKN
WET/4652	TOC	TOC		TOC TOC
WTI/1625	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material

(CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, BOD, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD ≤ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits except as summarized below:

Table 3. *MS/MSD results outside of project specific limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6563	Total Hg	Batch QC	0.018	0.02	0.031	0.031	65	62	71-125	1.6	20
WET/4621	Ammonia	Batch QC	86	5	92	92	116	110	90-110	0.3	20

For the ammonia result, the original sample concentration was more than four times the spike concentration. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. Therefore no qualifications were made based on these discrepancies.

Both the total mercury and ammonia results are from samples in the quality control batch not belonging to this project. No qualifications can be assigned based on their control limit exceedances.

Field Blanks

Field blanks consist of analyte-free water poured directly into sample collection containers in the field, then shipped to the laboratory with field samples. Field blanks are used to assess the potential for contamination through the sample collection, preparation, and analysis process.

A field blank was collected with sample DMC-009. The field blank results are compared to the parent sample results below.

Table 4. *Field Blank Results.*

Sample	Sample Date	Analyte	Result	Field Blank	RL	Units
DMC-009	9/2/2008	Aluminum	860	130	10	ug/L
DMC-009	9/2/2008	Ammonia	ND	ND	0.1	mg/L
DMC-009	9/2/2008	Arsenic	2.7	ND	0.5	ug/L
DMC-009	9/2/2008	BOD	ND	ND	5	mg/L
DMC-009	9/2/2008	Boron	110	J0.9	10	ug/L
DMC-009	9/2/2008	Copper	1.2	ND	0.5	ug/L
DMC-009	9/2/2008	Hardness	110	6	5	mg/L
DMC-009	9/2/2008	Total Hg	0.0055	ND	0.0005	ug/L
DMC-009	9/2/2008	Diss Hg	0.0008	ND	0.0005	ug/L
DMC-009	9/2/2008	Selenium	J0.13	ND	0.2	ug/L
DMC-009	9/2/2008	TKN	0.66	0.27	0.1	mg/L
DMC-009	9/2/2008	TOC	3.3	0.54	0.5	mg/L
DMC-009	9/2/2008	TSS	31	ND	3	mg/L
DMC-009	9/2/2008	Turbidity	14	0.39	0.05	NTU

The field blank had detections of aluminum, hardness, TKN, TOC and turbidity above the reporting limit. The parent sample concentrations for aluminum, hardness, TOC and turbidity are greater than five times the associated equipment blank concentrations, therefore no qualification is necessary. The parent sample concentration for TKN is less than five times the associated field blank concentration, therefore these sample results are qualified as not detected above the sample quantitation limit, and flagged "U".

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory with the following additional qualification.

- TKN for sample DMC-009 are qualified as not detected and flagged "U" to indicate the result was below the reported sample quantitation limit.

URS

Memorandum

Date: October 16, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 9/3/2008**
Lab Order I090118

The Caltest Analytical Laboratory (Caltest) report dated September 30, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

One site was sampled in the late morning of September 3, 2008. The site was the San Joaquin River Downstream (SJRUS).

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

It should be noted that the copper preparation method for the SJRDS-021 sample, EPA 200.2, did not include filtration. However, the analysis method, EPA 200.7, did include filtration.

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH_3	TKN	Hardness	TSS	Turbidity
SJRDS-021	9/3/2008	11:30	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 12 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5946	TSS	TSS	TSS	
BOD/3891		BOD	BOD	
MPR/6525	Cu	Cu		Cu
MPR/6549	As	As		As
MPR/6583	Diss Hg	Diss Hg		Diss Hg Diss Hg
MPR/6568	Al B Se	Al B Se		Al B Se
MPR/6590	Total Hg	Total Hg		Total Hg
WET/4605	Turbidity	Turbidity	Turbidity	
WET/4621	Ammonia	Ammonia		Ammonia
WET/4639	TKN	TKN		TKN
WET/4652	TOC	TOC		TOC
WTI/1625	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, BOD, total and

dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD ≤ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits except as summarized below:

Table 3. *MS/MSD results outside of project specific limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6568	Aluminum	SJRDS-021	2100	40	5200	5100	7560	7380	85-115	2.1	20
MPR/6568	Boron	SJRDS-021	550	20	590	600	196	234	85-115	1.3	20
MPR/6590	Total Hg	Batch QC	0.039	0.02	0.058	0.16	95	582	71-125	91	20
WET/4621	Ammonia	Batch QC	86	5	92	92	116	110	90-110	0.3	20
WET/4639	TKN	Batch QC	3.9	5	8.1	8.1	84	84	90-110	0.1	20

For the aluminum and boron results, the original sample concentrations were more than four times the spike concentrations. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. Therefore no qualifications were made based on these discrepancies.

The total mercury, ammonia and TKN results are from samples in the quality control batch not belonging to this project. No qualifications can be assigned based on their control limit exceedances.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory.

URS

Memorandum

Date: October 15, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 9/8/2008**
Lab Order I090369

The Caltest Analytical Laboratory (Caltest) report dated October 7, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Six sites were sampled between the late morning and afternoon of September 8, 2008. The sites were the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJRUS); the San Joaquin River Downstream (SJRDS); the Delta Mendota Canal (DMC); and the San Joaquin River at Crows Landing (SCL). A field blank was taken with SCL-010. A duplicate sample was taken with SJRDS-022.

Analytes measured during the sampling regime include:

Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

It should be noted that while samples were also collected for Biological Oxygen Demand (BOD), laboratory error resulted in the invalidation of the BOD batch.

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH_3	TKN	Hardness	TSS	Turbidity
DMC-010	9/8/2008	11:30	X	X	X	X	X	X	X		X	X	X	X	X	X
NWUS-022	9/8/2008	11:50	X	X	X	X	X	X	X		X	X	X	X	X	X
NWDS-023	9/8/2008	13:15	X	X	X	X	X	X	X		X	X	X	X	X	X
SJRUS-023	9/8/2008	12:45	X	X	X	X	X	X	X		X	X	X	X	X	X
SJRDS-022	9/8/2008	14:20	X	X	X	X	X	X	X		X	X	X	X	X	X
SJRDS-022-DUP	9/8/2008	14:25	X	X	X	X	X	X	X		X	X	X	X	X	X
SCL-010	9/8/2008	15:10	X	X	X	X	X	X	X		X	X	X	X	X	X
SCL-010-FB	9/8/2008	15:15	X	X	X	X	X	X	X		X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 18 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5951	TSS	TSS	TSS	
BOD/3936		BOD		
MPR/6585	As Cu	As Cu		As Cu
MPR/6586	As Cu	As Cu		As Cu
MPR/6589	Al Se B	Al Se B		Al Se B
MPR/6602	As Cu	As Cu		As Cu
MPR/6619	Total Hg	Total Hg		Total Hg
MPR/6621	Total Hg	Total Hg		Total Hg Total Hg
MPR/6638	Total Hg	Total Hg		Total Hg
WET/4631	Turbidity	Turbidity	Turbidity	
WET/4635	Ammonia	Ammonia		Ammonia
WET/4636	Ammonia	Ammonia		Ammonia
WET/4640	TKN	TKN		TKN
WET/4646	TKN	TKN		TKN
WET/4649	TKN	TKN		TKN
WET/4652	TOC	TOC		TOC
WET/4653	TOC	TOC		TOC
WTI/1626	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are

summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material (CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, E. Coli, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

The LCS recovery for BOD was 0%. Due to lab error, there are no BOD results to be qualified.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD $\leq$ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits, except as summarized below.

Table 3. *MS/MSD Results Outside of Control Limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6589	Boron	NWUS-022	170	20	200	200	134	142	85-115	0.8	20
MPR/6589	Aluminum	NWUS-022	520	40	1200	1200	1597	1665	85-115	2.3	20

For the boron and aluminum MS/MSD pairs listed, the original sample concentrations were more than four times the spike concentrations. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. Therefore no qualifications were made based on these discrepancies.

Field Duplicates

One set of field duplicates was collected and RPDs were calculated to evaluate overall precision. Field duplicate results are summarized below.

Table 4. *Field Duplicate Comparison.*

Sample	Sample Date	Analyte	Result	Duplicate	RL	Units	RPD
SJRDS-022	9/8/2008	Aluminum	2600	2400	20	ug/L	8
SJRDS-022	9/8/2008	Ammonia	ND	ND	0.1	mg/L	ND
SJRDS-022	9/8/2008	Arsenic	3	3	0.5	ug/L	0
SJRDS-022	9/8/2008	BOD	NR	NR	5	mg/L	ND
SJRDS-022	9/8/2008	Boron	390	380	10	ug/L	2.6
SJRDS-022	9/8/2008	Copper	1.3	1.3	0.5	ug/L	0
SJRDS-022	9/8/2008	Hardness	200	210	20	mg/L	4.9
SJRDS-022	9/8/2008	Total Hg	0.02	0.022	0.0005	ug/L	9.5
SJRDS-022	9/8/2008	Diss Hg	0.001	0.0011	0.0005	ug/L	9.5
SJRDS-022	9/8/2008	Selenium	0.71	0.67	0.2	ug/L	5.8
SJRDS-022	9/8/2008	TKN	0.71	0.78	0.1	mg/L	9.4
SJRDS-022	9/8/2008	TOC	3.7	3.6	0.5	mg/L	2.7
SJRDS-022	9/8/2008	TSS	100	100	3	mg/L	0
SJRDS-022	9/8/2008	Turbidity	27	33	0.1	NTU	20

The following criteria were used for to evaluate field duplicate results. Where both the sample and duplicate values are greater than 5 times the RL, satisfactory precision is indicated by a RPD of 30 or less. Where one or both values are less than 5 times the RL, precision is indicated if the field duplicate results are within 2 times the RL for aqueous samples. All field duplicate pairs reported in this SDG were within these criteria.

Field Blanks

Field blanks consist of analyte-free water poured directly into sample collection containers in the field, then shipped to the laboratory with field samples. Field blanks are used to assess the potential for contamination through the sample collection, preparation, and analysis process.

A field blank was collected with sample SJRUS-007. The field blank results are compared to the parent sample results below.

Table 5. *Field Blank Results.*

Sample	Sample Date	Analyte	Result	Field Blank	RL	Units
SCL-010	9/8/2008	Aluminum	980	120	10	ug/L
SCL-010	9/8/2008	Ammonia	ND	ND	0.1	mg/L
SCL-010	9/8/2008	Arsenic	2.9	ND	0.5	ug/L
SCL-010	9/8/2008	BOD	NR	NR	5	mg/L
SCL-010	9/8/2008	Boron	360	ND	10	ug/L
SCL-010	9/8/2008	Copper	1.6	ND	0.5	ug/L
SCL-010	9/8/2008	Hardness	240	J4.0	5	mg/L
SCL-010	9/8/2008	Total Hg	0.0067	ND	0.0005	ug/L
SCL-010	9/8/2008	Diss Hg	0.0012	ND	0.0005	ug/L
SCL-010	9/8/2008	Selenium	0.57	ND	0.2	ug/L
SCL-010	9/8/2008	TKN	0.67	ND	0.1	mg/L
SCL-010	9/8/2008	TOC	3.8	0.56	0.5	mg/L
SCL-010	9/8/2008	TSS	24	ND	3	mg/L
SCL-010	9/8/2008	Turbidity	15	0.27	0.05	NTU

The equipment blank had detections of aluminum, TOC and turbidity above the reporting limit. The parent sample concentrations for these analytes are greater than five times the associated field blank concentrations, therefore no qualifications are necessary.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory.

URS

Memorandum

Date: October 15, 2008

To: Michelle Turner

From: Benjamin F. Nicholson

Subject: **DRAFT QC Analysis of DMCRFS Pilot 2008 Sampling, 9/15/2008**
Lab Order I090641

The Caltest Analytical Laboratory (Caltest) report dated October 6, 2008 for the Delta Mendota Canal, Project Number 18600161.10055, has been reviewed for quality assurance and quality control (QA/QC) in accordance with the USEPA Contract Laboratory Program National Functional Guidelines for Data Review.

Six sites were sampled between the late morning and afternoon of September 15, 2008. The sites were the Newman Wasteway Upstream (NWUS); the Newman Wasteway Downstream (NWDS); the San Joaquin River Upstream (SJRUS); the San Joaquin River Downstream (SJRDS); the Delta Mendota Canal (DMC); and the San Joaquin River at Crows Landing (SCL). A duplicate sample was taken with NWUS-023.

It should be noted that NWUS-023 DUP was taken ten minutes after NWUS-023.

Analytes measured during the sampling regime include:

Biochemical Oxygen Demand – BOD
Total Suspended Solids – TSS
Turbidity
Arsenic – As
Copper - Cu
Total Kjeldahl Nitrogen – TKN
Ammonia (as N) – NH_3
Total Organic Carbon – TOC
Boron – B
Hardness (as $CaCO_3$)
Selenium (reaction cell) – Se
Mercury – Total Hg
Mercury, filtered – Diss Hg
Aluminum - Al

Samples collected and analyses performed are listed below.

URS

Memorandum

Table 1. *Sampling Sites, Dates, Times and Analyses.*

Sample Site	Date	Time	Diss Hg	Total Hg	Al	As	B	Cu	Se	BOD	TOC	NH3	TKN	Hardness	TSS	Turbidity
NWUS-23	9/15/2008	7:30	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWUS-23 DUP	9/15/2008	7:40	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRUS-24	9/15/2008	10:40	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NWDS-24	9/15/2008	11:10	X	X	X	X	X	X	X	X	X	X	X	X	X	X
DMC-11	9/15/2008	12:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SJRDS-23	9/15/2008	13:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCL-11	9/15/2008	13:45	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Method Holding Times

Samples were prepared and analyzed within recommended holding times.

Quality Control Batches

The samples were grouped into 11 quality control batches. Method blanks (MB), laboratory control samples (LCS), sample duplicates (SD), and matrix spike and matrix spike duplicate (MS/MSD) analyses were performed to ensure quality control. The quality control analyses performed for each batch are listed below:

Table 2. *Quality Control test performed on each batch analyzed.*

QC Batch	MB	LCS	SD	MS/MSD
BIO/5974	TSS	TSS	TSS	
BOD/3914		BOD	BOD	
MPR/6603	As Cu	As Cu		As Cu
MPR/6604	As Cu	As Cu		As Cu
MPR/6607	Al B Se	Al B Se		Al B Se
MPR/6647	Total Hg	Total Hg		Total Hg Total Hg
WET/4647	Ammonia	Ammonia		Ammonia
WET/4661	TOC	TOC		TOC TOC
WET/4667	Turbidity	Turbidity	Turbidity	
WET/4679	TKN	TKN		TKN
WTI/1629	Hardness	Hardness		Hardness

Each quality control element is discussed below.

Method Blanks

Method blanks (MB) consist of clean laboratory matrix that is carried through each step of the analysis along with the environmental samples for each parameter. Method blanks tested are summarized in Table 2. Each method blank result was non-detect with respect to its corresponding reporting limit.

Laboratory Control Sample Spikes

Laboratory Control Samples (LCS) are laboratory-generated samples analyzed to evaluate interference and accuracy independent of matrix effects. Batch specific certified reference material

(CRM) or LCS recoveries were performed for the analytes in the batches shown in Table 2. All LCS recoveries were within the relevant control limits of 80%-120% for TSS, E. Coli, total and dissolved mercury, TOC, and hardness; 85%-115% for metals; and 90%-110% for turbidity, ammonia, and TKN.

Sample Duplicates

Laboratory sample duplicates (SD) are sub-samples of field samples. Relative percent differences (RPDs) are calculated to evaluate the precision of the preparatory and analytical procedures. SD results should be similar to corresponding field sample results. The SDs associated with this report are shown in Table 2.

All SD results associated with these samples were within control limits (RPD ≤ 20).

Matrix Spikes & Matrix Spike Duplicates

Matrix spikes (MS) and matrix spike duplicates (MSD) are environmental samples into which a known concentration of the target analyte is spiked. MS/MSDs are evaluated by comparing percent recoveries to control limits and calculating a RPD for each MS.MSD pair. The MS/MSD pair is analyzed to evaluate matrix interference, as well as accuracy and precision. Analytes for which MS/MSD pairs were prepared are shown in Table 2.

All MS/MSD results associated with these samples were within control limits, except as summarized below.

Table 3. *MS/MSD Results Outside of Control Limits.*

QC Batch	Analyte	Sample Group	Result	Spike	MS	MSD	MS%	MSD%	% Limit	RPD	Max RPD
MPR/6607	Aluminum	NWUS-23	160	40	360	380	509	556	85-115	5	20
MPR/6607	Boron	NWUS-23	120	20	150	150	130	132	85-115	0.2	50

For the aluminum and boron MS/MSD pairs listed, the original sample concentrations were more than four times the spike concentrations. This renders the resulting recoveries not meaningful in accordance with EPA guidelines. Therefore no qualifications were made based on these discrepancies.

Field Duplicates

One set of field duplicates was collected and RPDs were calculated to evaluate overall precision. Field duplicate results are summarized below.

Table 4. *Field Duplicate Comparison.*

Sample	Sample Date	Analyte	Result	Duplicate	RL	Units	RPD
NWUS-23	9/15/2008	Aluminum	160	370	10	ug/L	79
NWUS-23	9/15/2008	Ammonia	ND	ND	0.1	mg/L	NA
NWUS-23	9/15/2008	Arsenic	2.9	2.8	0.5	ug/L	4
NWUS-23	9/15/2008	BOD	ND	ND	5	mg/L	NA
NWUS-23	9/15/2008	Boron	120	120	10	ug/L	0
NWUS-23	9/15/2008	Copper	1.4	1.2	0.5	ug/L	15
NWUS-23	9/15/2008	Hardness	100	120	50	mg/L	18
NWUS-23	9/15/2008	Total Hg	0.0014	0.0047	0.0005	ug/L	108
NWUS-23	9/15/2008	Diss Hg	0.0009	0.0013	0.0005	ug/L	36
NWUS-23	9/15/2008	Selenium	J0.13	J0.14	0.2	ug/L	NA
NWUS-23	9/15/2008	TKN	0.38	0.42	0.1	mg/L	10
NWUS-23	9/15/2008	TOC	3.5	3.1	0.5	mg/L	12
NWUS-23	9/15/2008	TSS	ND	5	3	mg/L	NA
NWUS-23	9/15/2008	Turbidity	4.2	5.5	0.05	NTU	27

The following criteria were used for to evaluate field duplicate results. Where both the sample and duplicate values are greater than 5 times the RL, satisfactory precision is indicated by a RPD of 30 or less. Where one or both values are less than 5 times the RL, precision is indicated if the field duplicate results are within 2 times the RL for aqueous samples. Two field duplicate pairs reported in this SDG were outside these criteria: Aluminum for NWUS-023 (RPD = 79, Result and duplicate are each greater than five times the RL) and Total Hg for NWUS-023 (RPD = 108, Difference between result and duplicate is greater than twice the RL).

Data is typically not qualified by field duplicates alone. It should be noted that NWUS-023-DUP was sampled 10 minutes after the sampling of NWUS-023.

Lab Qualifiers

The lab reported all data down to the detection limit. For those detections between the reporting limit and the detection limit, the lab flagged the results with a "J" to indicate uncertainty associated with the results.

Summary

The data reviewed are of acceptable precision and accuracy as reported by the laboratory.