

REGION I
Data Review Worksheets

III A. INSTRUMENT CALIBRATION (Section 1)

1. Recovery Criteria

List the analytes which did not meet the percent recovery (%R) criteria for Initial or Continuing Calibration.

<u>DATE</u>	<u>ICV/CCV#</u>	<u>ANALYTE</u>	<u>%R</u> ✓	<u>ACTION</u>	<u>SAMPLES AFFECTED</u>
2-16-06	CCV 8	Be	110.3	None - result rounds to 110% (oc limits are 90-110%) ↓	
↓	↓	Cr	110.2		

ACTIONS:

If any analyte does not meet the %R criteria follow the actions stated below:

For positive results:

	<u>Accept</u>	<u>Estimate (J)</u>	<u>Reject (R)</u>
Metals	90-110%R	75-89%R, 111-125%R	<75%R, >125%R
Mercury	80-120%R	65-79%R, 121-135%R	<65%R, >135%R
Cyanide	85-115%R	70-84%R, 116-130%R	<70%R, >130%R

For Non-detected results

	<u>Accept</u>	<u>Estimate (UJ)</u>	<u>Reject (R)</u>
Metals	90-110%R	75-89%R, 111-125%R	<75%R, >125%R
Mercury	80-120%R	65-79%R, 121-135%R	<65%R, >135%R
Cyanide	85-115%R	70-84%R, 116-130%R	<70%R, >130%R

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III B. INSTRUMENT CALIBRATION (Section 2)

2. Analytical Sequence

- A. Did the laboratory use the proper number of Standards for calibration as described in the SOW? Yes or No
- B. Were calibrations performed at the beginning of Each analysis? Yes or No
- C. Were calibration standards analyzed at the beginning of sample analysis and at a minimum frequency of ten percent or every two hours during analysis, whichever is more frequent? Yes or No
- D. Were the correlation coefficients for the calibration curves for AA, Hg, and CN ≥ 0.995 ? Yes or No
- E. Was a standard at CRQL analyzed for all ICP analyses? ^{KMK} ~~3/5/06 Not provided~~ Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

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III C. INSTRUMENT CALIBRATION (Section 3)

1. Quantitation Limit Criteria

List the analytes which did not meet the percent recovery (%R) criteria for the CRQL standard:

DATE	CRI#	ANALYTE	%R	ACTION	SAMPLES AFFECTED
<p><u>CRQL standard was not analyzed (CRI). The low point of the calibrations was at or below the CRQL (as noted in case narrative). Calibration recoveries (CCV) acceptable. No further action taken.</u></p>					

ACTIONS:

Recovery Criteria

Metals/Mercury/Cyanide	70% - 130%
Antimony, Lead, Thallium (by ICP-AES)	50% - 150%
Cobalt, Manganese, Zinc (by ICP-MS)	50% - 150%

If any analyte does not meet the %R criteria follow the actions stated below:

Recovery	≤MDL	<2xCRQL	≥2xCRQL
<50%	R	R	J
<30% Sb, Pb, Tl (AES)	R	R	J
<30% Co, Mn, Zn (MS)	R	R	J
50% - 69%	UJ	J	A
<30% - 49% Sb, Pb, Tl (AES)	UJ	J	A
<30% - 49% Co, Mn, Zn (MS)	UJ	J	A
130% < R ≤180%			
150% < R ≤200% Sb, Pb, Tl (AES)	A	J	A
150% < R ≤200% Co, Mn, Zn (MS)	A	J	A
130% < R ≤165% Cyanide	A	J	A
>180%			
>200% Sb, Pb, Tl (AES)	R	R	R
>200% Co, Mn, Zn (MS)	R	R	R
>165% Cyanide	R	R	R

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IV A. BLANK ANALYSIS RESULTS (Section 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water samples.

1. Laboratory Blanks

MATRIX: So

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
2/16/06	ICB		Sb	6.9
	CCB 1			5.1
	CCB 2			2.9
	CCB 3			4.1
	CCB 4			3.2

Handwritten notes: mg/L, mg/kg, km² 2.6.06

2. Equipment/Trip Blanks

DATE	EQUIP BL#	ANALYTE	CONC./UNITS

3. Frequency Requirements

A. Was a preparation blank analyzed for each matrix for every 20 samples and for each digestion batch?

Yes or No

B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent?

Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

Handwritten signature and date: 2/27/06

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IV A. BLANK ANALYSIS RESULTS (Section 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water samples.

1. Laboratory Blanks

MATRIX: SO

<u>DATE</u>	<u>ICB/CCB#</u>	<u>PREP BL</u>	<u>ANALYTE</u>	<u>CONC./UNITS</u>
2/16/06	CCB5		Sb	3.5
	CCB6			3.0
	CCB7			1.5
	CCB8			2.5
		PB	Sb	0.110

mg/L
3/16/06

2. Equipment/Trip Blanks

<u>DATE</u>	<u>EQUIP BL#</u>	<u>ANALYTE</u>	<u>CONC./UNITS</u>

3. Frequency Requirements

- A. Was a preparation blank analyzed for each matrix for every 20 samples and for each digestion batch? Yes or No
- B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

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IV A. BLANK ANALYSIS RESULTS (Section 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water samples.

1. Laboratory Blanks

MATRIX: SO

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
2/16/06	ICB		Ba	5.0
↓	CCB1	EE	↓	3.3
↓		PBS	↓	0.167
2/16/06	CCB1		Cd	0.2
↓	CCB6		↓	-0.1
↓		PBS	↓	-0.007
2/16/06	ICB		Cr	0.7
↓		PBS	↓	0.014
2/16/06	CCB2		Pb	0.6
↓	CCB3		↓	1.1
↓	CCB5		↓	0.7
↓	CCB6		↓	2.0
↓	CCB7		↓	1.9
2/16/06	ICB		Ni	1.4
↓	CCB1		↓	1.8
↓	CCB3		↓	1.3
↓	CCB5		↓	1.1
↓		PBS	↓	0.033
2/16/06	ICB		Se	-3.0
↓	CCB1		↓	-3.3

negl
max kg
mg/L
3.6.06

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IV A. BLANK ANALYSIS RESULTS (Section 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water samples.

1. Laboratory Blanks

MATRIX: SO

DATE	ICB/CCB#	PREP BL	ANALYTE	CONC./UNITS
2/16/06	CCB2		Se	-2.9
↓	CCB3		↓	-2.8
↓	CCB4		↓	-2.3
↓	CCB6		↓	-2.4
↓	CCB7		↓	-3.9
↓	CCB8		↓	-1.8
↓		PBS	↓	0.118
2/16/06	ICB		TI	1.2
↓	CCB3		↓	4.5
↓	CCB7		↓	1.8
↓	CCB8		↓	1.6
↓		PBS	↓	-0.083
2/16/06	ICB		V	1.4
↓	CCB1		↓	1.2
↓	CCB3		↓	0.7
↓	CCB4		↓	0.7
↓	CCB5		↓	0.8
↓	CCB6		↓	1.0
↓	CCB7		↓	0.6
		PBS		0.

mg/kg
Kerr
3.6.06

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IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the MDL, but less than the CRQL and Action Level, report the CRQL with a U.
2. When the concentration is greater than the CRQL, but less than the Action Level, report the sample concentration detected with a U.
3. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

I = instrument blank PB = prep blank

MATRIX: SO

MATRIX: SD

ELEMENT	MAX CONC./ UNITS mg/kg	AL/ UNITS mg/kg	ELEMENT	MAX CONC./ UNITS mg/kg	AL/ UNITS mg/kg
<u>Sb</u>	<u>0.345</u> ✓	<u>1.725 I</u>	<u>Se</u>	<u>-0.195</u> ✓	<u>-0.975</u>
<u>Ba</u>	<u>0.25</u> ✓	<u>1.25 I</u>	<u>Se</u>	<u>0.0059</u> ✓	<u>0.0295 PB</u>
<u>Cd</u>	<u>0.01</u> ✓	<u>0.05 I</u>	<u>Tl</u> ✓	<u>0.225</u> ✓	<u>1.125 I</u>
<u>Cd</u>	<u>-0.007</u> <u>-0.005</u> ✓	<u>-0.035 PB</u> <u>-0.025</u> ✓	<u>Tl</u>	<u>-0.00415</u>	<u>-0.0208</u>
<u>Cr</u>	<u>0.035</u> ✓	<u>0.175 I</u>	<u>V</u>	<u>0.070</u> ✓	<u>0.35 I</u>
<u>Pb</u>	<u>0.10</u> ✓	<u>0.50 I</u>	<u>Zn</u>	<u>0.845</u> ✓	<u>4.225 I</u>
<u>Ni</u>	<u>0.09</u> ✓	<u>0.45 I</u>			

⇒ BALS ~~adjusted~~ converted to mg/kg for soils

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

$$\text{Conc. in ug/L} \times \frac{\text{Volume digested to (200ml)}}{\text{Weight digested (1gram)}} \times \frac{1\text{L}}{1000\text{ml}} \times \frac{1000\text{gm}}{1\text{kg}} \times \frac{1\text{mg}}{1000\text{ug}} = \text{mg/kg}$$

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be applied to sample results.

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V A. ICP INTERFERENCE CHECK SAMPLE (Sections 1 & 2)

1. Recovery Criteria

List any elements in the ICS AB solution which did not meet the criteria for %R.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED
<i>All criteria met for %R for ICS AB (80-120%).</i>				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

ACTIONS:

If an element does not meet the %R criteria, follow the actions stated below:

	PERCENT RECOVERY		
	<50%	50-79%	>120%
Positive Sample Results	R	J	J
Non-detected Sample Results	R	UJ	A

2. Frequency Requirements

Were Interference QC samples run at the beginning and end of each sample analysis run or a minimum of twice per 8 hour working shift, whichever is more frequent?

Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

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NOT EVALUATED.

V B. ICP INTERFERENCE CHECK SAMPLE (Section 3)

1. Report the concentration of any element detected in the ICS A solution >MDL that should not be present.

ELEMENT	CONC. DETECTED IN THE ICS	CONC. OF INTERFERENTS IN THE ICS	CONC. OF INTERFERENTS IN THE ICS			
			AL	CA	FE	MG
Sb	-4	MDL 1.2	not available			
	-12 (0.6 mg/kg)					
	-11					
	-7					
	-19 (0.95 mg/kg)					

Estimate the concentration produced by the interfering element in all affected samples. See guidelines for examples. List the samples affected by interferences below:

SAMPLE AFFECTED	ELEMENT AFFECTED	SAMPLE CONC. (ug/L)	SAMPLE INTERFERENT CONC.				ESTIMATED INTERF. (ug/L)
			AL	CA	FE	MG	
Data not provided.							

ACTIONS:

- In general, the sample data can be accepted without qualification if the sample concentrations of Al, Ca, Fe, Mg are less than 50% of their respective levels in the ICS solution.
- Estimate (J) positive results for affected elements for samples with levels of interferences 50% or more of that in the ICS solution.
- Reject (R) positive results if the reported concentration is due entirely to the interfering element.
- Estimate (UJ) non-detected results for which false negatives are suspect.

Give explanations for any actions taken below:

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V B. ICP INTERFERENCE CHECK SAMPLE (Section 3)

1. Report the concentration of any element detected in the ICS A solution >MDL that should not be present.

ELEMENT	CONC. DETECTED IN THE ICS		MDL $\frac{\mu\text{g/L}}{\text{mg/kg}}$	CONC. OF INTERFERENTS IN THE ICS			
	AL	CA		FE	MG		
As	-10	(-0.5 $\frac{\text{mg}}{\text{kg}}$)	1.6	not	available		
↓	-4						
↓	-5						
↓	10	(0.5 $\frac{\text{mg}}{\text{kg}}$)					
↓	-7						
Ba	-22		2.1				
↓	-26						
↓	-28	(-1.4 $\frac{\text{mg}}{\text{kg}}$)					
↓	-27						
↓	-28						
Cd	5		0.10				
↓	5	(0.25 $\frac{\text{mg}}{\text{kg}}$)					
↓	5						
↓	5						
↓	5						
Cr	-1		0.38				
↓	-1						
↓	-2	(-0.1 $\frac{\text{mg}}{\text{kg}}$)					
↓	-2						
↓	-2						
Cu	-19		6.3				
↓	-22						
↓	-24						
↓	-24						
↓	-25	(-1.25 $\frac{\text{mg}}{\text{kg}}$)					
Pb	-1	(-0.05 $\frac{\text{mg}}{\text{kg}}$)	0.46 MDL				
↓	+2						
↓	6	(0.3 $\frac{\text{mg}}{\text{kg}}$)					
↓	5						

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V B. ICP INTERFERENCE CHECK SAMPLE (Section 3)

1. Report the concentration of any element detected in the ICS A solution >MDL that should not be present.

ELEMENT	CONC. DETECTED IN THE ICS		MDL $\mu\text{g/L}$	CONC. OF INTERFERENTS IN THE ICS			
	AL	CA		FE	MG		
Ni	3	(0.15 mg/kg)	0.59	not available			
↓	2						
↓	1						
Se	-12		0.98				
↓	-22						
↓	-16						
↓	-26	(-1.3 mg/kg)					
↓	-22						
As	3		0.91				
↓	2						
↓	2						
↓	2						
↓	2						
↓	3	(0.15 mg/kg)					
Pb	6		1.2				
↓	5						
↓	-3	(-0.15 mg/kg)					
↓	17	(0.85 mg/kg)					
↓	3						
V	-11		0.47 MDL				
↓	-11	(-0.55 mg/kg)					
↓	-11						
↓	-11						
Zn	43	(2.15 mg/kg)	2.3 MDL				
↓	30						
↓	28						
↓	32						
↓	28						

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VI. MATRIX SPIKE

TR # MEB-1-0-2

MATRIX: SD

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added
SSR - spiked sample result
SR - sample result

Analyte	SSR	SR	S	%R	Action
Sb	8.6986	ND 1.2 u	26.33	33.0	J/US (NO) all samples KMK 3/21/06

Matrix Spike Actions apply to all samples of the same matrix.

ACTIONS:

- If the sample concentration exceeds the spike concentration by a factor of 4 or more, no action is taken.
- If any analyte does not meet the %R criteria, follow the actions stated below:

	PERCENT RECOVERY		
	<30%	30%-74%	>125%
Positive Samples Results	J	J	J
Non-detected Results	R	UJ	A

2. Frequency Criteria

- Was a matrix spike prepared at the required frequency? Yes or No
- Was a post digestion spike analyzed for elements that did not meet required criteria for matrix spike recovery? Yes or No

A separate worksheet should be used for each matrix spike pair.

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VII. LABORATORY DUPLICATES

List the concentrations of any analytes not meeting the criteria for duplicate precision. For soil duplicates, calculate the CRQL in mg/kg using the sample weight, volume and percents solids data for the sample. Indicate what criterion was used to evaluate precision by circling either the RPD or CRQL for each element.

MATRIX: SO

Element	CRQL		Sample #	Duplicate#	RPD	Action
	water ug/L	soil mg/kg				
Aluminum	200		MEB-1-0-2	MEB-1-0-2D		
Antimony	60		<i>All criteria met for laboratory duplicates.</i>			
Arsenic	10					
Barium	200					
Beryllium	5					
Cadmium	5					
Calcium	5000					
Chromium	10					
Cobalt	50					
Copper	25					
Iron	100					
Lead	5					
Magnesium	5000					
Manganese	15					
Mercury	0.2		0.0442	0.034 U	200 DE	J/UT
Nickel	40					
Potassium	5000					
Selenium	5					
Silver	10					
Sodium	5000					
Thallium	10					
Vanadium	50					
Zinc	20					
Cyanide	10					

Laboratory Duplicate Actions should be applied to all other samples of the same matrix type.

ACTIONS:

1. Estimate (J) positive results for elements which have an RPD >20% for waters and >35% for soils.
2. If sample results are less than 5x the CRQL, estimate (J) positive results for elements whose absolute difference is >CRQL, (2xCRQL for soil). If both samples are non-detected the RPD is not calculated (NC).

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VIII. FIELD DUPLICATES

List the concentrations of all analytes in the field duplicate pair. For soil duplicates, calculate the CRQL in mg/kg using the sample weight, volume and percents solids data for the sample. Indicate what criteria was used to evaluate precision by circling either the RPD or CRQL for each element.

MATRIX: 50

Element	CRQL		Sample # <u>MEW-3-0-2.2</u>	Duplicate# <u>MEK-3-0-2.2</u>	RPD	Action
	water ug/L	soil mg/kg				
Aluminum	200					
Antimony	60					
Arsenic	10					
Barium	200					
Beryllium	5					
Cadmium	5					
Calcium	5000					
Chromium	10					
Cobalt	50					
Copper	25					
Iron	100					
Lead	5	0.18 0.20	507	917	58	J/UJ
Magnesium	5000					
Manganese	15					
Mercury	0.2	0.028 0.029	0.076	0.038	67	J/UJ
Nickel	40					
Potassium	5000					
Selenium	5					
Silver	10					
Sodium	5000					
Thallium	10					
Vanadium	50					
Zinc	20					
Cyanide	10					

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Field Duplicate Actions should be applied to all other samples of the same matrix type.

ACTIONS:

1. Estimate (J) positive results for elements which have an RPD >30% for waters and >50% for soils.
2. If sample results are less than 5x the CRQL, estimate (J) positive results and (UJ) nondetected results for elements whose absolute difference is >2xCRQL, (4xCRQL for soil). If both samples are non-detected the RPD is not calculated (NC).

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IX. LABORATORY CONTROL SAMPLE

1. Aqueous LCS

List any LCS recoveries not within the 80-120% criteria and the samples affected.

<u>DATE</u>	<u>ELEMENT</u>	<u>%R</u>	<u>ACTION</u>	<u>SAMPLES AFFECTED</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2. Solid LCS

List any analytes that were not within the control windows set by the EPA for the solids LCS sample. The 80-120% criteria is not used to evaluate solid LCS results.

<u>ELEMENT</u>	<u>LCS CONC.</u>	<u>CONTROL WINDOWS</u>	<u>ACTION</u>	<u>SAMPLES AFFECTED</u>
<p>Recoveries for solid LCS/LCS duplicate were within 80%-120%. RPDs for LCS/LCSD were ≤ 30%. All criteria met.</p>				
<p>Recoveries were within lab's control limits.</p>				
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

ACTIONS:

<u>AQUEOUS LCS</u>	<u>Percent Recovery</u>		
	<u><50%</u>	<u>51-79%</u>	<u>>120%</u>
Positive Results	R	J	A
Non-detected Results	R	J	A

<u>SOLID LCS</u>	<u><EPA Control Windows</u>	<u>>EPA Control Windows</u>
Positive Results	J	J
Non-detected Results	UJ	A

3. Frequency Criteria

- A. Was an LCS analyzed for every matrix, every digestion batch, and every 20 samples? Yes or No
 one per batch Yes

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XI. INDUCTIVELY COUPLED PLASMA (ICP) SERIAL DILUTION ANALYSIS

Serial dilutions were performed for each matrix and results of the diluted sample analysis agreed within 10% of the original undiluted analysis, for concentrations greater than 50x MDL.

Serial dilutions were not performed for the following:

✓ Serial dilutions were performed, but analytical results did not agree within 10% for analyte concentrations greater than 50x MDL before dilution.

Report all results below that do not meet the required laboratory criteria for ICP serial dilution analysis.

MATRIX: SO

ELEMENT	MDL	50xMDL	SAMPLE RESULT	SERIAL DILUTION	>10% %D	ACTION
Aluminum						
Antimony						
Arsenic	1.6	80	97.65	112.49	15.2	J/UJ NO AC
Barium	2.1	105	1664.64	1951.75	17.2	J/UJ
Beryllium	0.15	7.5	2.90	4.10	41.4	J None - orig. result 50xmdl
Cadmium	0.10	5.0	12.16	5.53	54.5	J/UJ
Calcium						
Chromium	0.38	19	286.99	331.38	15.5	J/UJ NO AC NO
Cobalt						
Copper	6.3	315	420.36	466.98	11.1	None (%D < 15%)
Iron						
Lead	0.46	23	279.23	326.22	16.8	J/UJ
Magnesium	0					
Manganese						
Nickel	0.59	29.5	155.46	183.55	18.1	J/UJ
Potassium						
Selenium						
Silver						
Sodium						
Thallium						
Vanadium	0.47	23.5	429.74	500.70	16.5	J/UJ
Zinc	2.3	115	687.73	803.32	16.8	J/UJ

Actions apply to all samples of the same matrix.

ACTIONS:

1. Estimate (J) positive results if %D > 15.

$$\%D = \frac{|orig - dil|}{orig} \times 100$$

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XII. DETECTION LIMIT ANALYSIS

1. Method Detection Limits

Method Detection Limit results were present and found to be less than the Contract Required Quantitation Limits.

MDLs were not included in the data package on Form 9.

MDLs were present, but the criteria was not met for the following elements: _____

2. Reporting Requirements

Were sample results on Form I reported down to the MDL not the CRQL for all analytes? *to CRQL* Yes or No

Were sample results that were analyzed for ICP for Se, Tl, As, or Pb at least 5x IDL. Yes or No

Were sample weights, volumes, and dilutions taken into account when reporting detection limits on Form I. Yes or No

If No, the reported results may be inaccurate. Make the necessary changes on the data summary tables and request that the laboratory resubmit the corrected data.

3. Estimated Results

List the samples and elements that had concentrations that were qualified as estimated (J and UJ) for being greater than the MDL but less than the CRQL. Include blank-qualified results.

SR = Sample result SQL = sample quant limit

Element	Sample(s)	
Sb	MEB-2-0-1.5	nondetect (u) at SR
Cd	MEW-9-0.5-3	nondetect (UJ) at SQL
Se	all samples	nondetect (u) at BAL (0.975 u)
Tl	all samples	nondetect (UJ) at SQL

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XIII. SAMPLE QUANTITATION

Sample results fall within the linear range for ICP and within the calibrated range for all other parameters.

Sample results were beyond the linear range/calibration range of the instrument for the following elements:

In the space below, please show a minimum of one sample calculation per method:

raw data not provided

ICP

FURNACE

MERCURY

CYANIDE

For soil samples, the following equation may be necessary to convert raw data values (usually reported in ug/L) to actual sample concentrations (mg/kg):

$$C \times \frac{V}{W \times S} \times \frac{1L}{1000mL} \times DF \times \frac{1mg}{1000ug} \times \frac{1000g}{1kg} = \frac{mg}{kg} \text{ (dry weight)}$$

Where,

C = concentration, ug/L

V = final sample volume, mL

W = wet sample weight, g

S = percent solids

DF = dilution factor

Rutherford, Kristin

From: Rutherford, Kristin
Sent: Wednesday, March 08, 2006 12:29 PM
To: Edward Lawler (elawler@mitkem.com)
Cc: Laferte, Denise; Purdy, Richard

Hi Ed,

I am reviewing the data for the Brownfields Mill St. soil samples, Lab Project #E0139, and wanted to note the following information:

- 1) the cover letter and pages 0001 and 0002 incorrectly refer the Client Project as Aztec Industries. It should be Mill Street, North Brookfield. Our copy has been hand-corrected; a revised version is not necessary.
- 2) there was no sample receipt date or time on the chains of custody associated with this data set. Since the receipt date was on the Sample Condition Form, a revised version of the COC is not necessary.
- 3) according to EPA SW-846 Method 7471A, the control limits for mercury on the initial and continuing calibration Form 2A should be 90%-110%, not 80%-120%. Since all criteria were met for the 90%-110% range, a revised Form 2A is not necessary.

Thanks for your help,
Kristin Rutherford
Environmental Chemist
Metcalf & Eddy, Inc.
781-224-6186

Metcalf & Eddy
 701 Edgewater Drive, Wakefield, Massachusetts 01880-5371
 T 781.246.5200 F 781.245.6293 www.m-e.com

MEMORANDUM

PROJECT NO:	036800269.00115	DATE:	April 14, 2006
TO:	TBA: Mill Street, Brookfield, MA	OFFICE:	Wakefield
FROM:	R. Shoemaker	COMPANY:	Metcalf & Eddy, Inc.
REVIEWED BY:	R. Purdy 		
CC:	B. Weir		
	N. Thurber		
	D. Laferte (memo only)		

SUBJECT: Limited QC Review/Modified Tier II-Like Review
 Metals Analytical Results
 Mitkem Corporation, Warwick, Rhode Island
 Lab Project No. E0140

On February 8, 2006, ten soil samples, including two field duplicate samples were collected by Metcalf & Eddy, Inc. (M&E) from the Targeted Brownfields Assessment (TBA) Mill Street Site, located in Brookfield, Massachusetts. The sampling was performed as part of the TBA Response Action Contract Work Assignment #155-SIBZ-0100. The samples were submitted to Mitkem Corporation (Warwick, Rhode Island) for the analysis of mercury according to *SW-846 Method 7471A, Mercury in Solid or Semisolid Waste (Manual Cold Vapor Technique)*, and for the analysis of metals according to *SW-846 Method 6010B, Inductively Coupled Plasma-Atomic Emission Spectrometry*. The samples were received by the laboratory on February 8, 2006. The data package was received in the M&E office on February 24, 2006.

M&E reviewed the data in accordance with the EPA-approved Final Field Task Work Plan for the site, and the guidance received from EPA Work Assignment Manager, Mr. James Byrne, in a September 17, 1999 letter to former M&E Work Assignment Manager, Barb Wyskowski. The data review included:

- * • Data Completeness
- * • Preservation and Technical Holding Times
- * • Initial and Continuing Calibrations
- * • Blank Analysis
- * • Inductively Coupled Plasma (ICP) Interference Check Samples
- * • ICP Serial Dilution Analysis
- * • Matrix Spike/Matrix Spike Duplicate
- * • Lab Duplicate Samples
- * • Field Duplicate Samples
- * • Laboratory Control Sample/ Laboratory Control Duplicate Sample
- * • Analyte Quantitation and Reported Quantitation Limits
- NA • Performance Evaluation Samples
- * = All criteria met for this sample
- NA = Not applicable and/or no information was provided by the laboratory

Note: Worksheets are not included for parameters that have met criteria or for criteria that are not applicable to the method and/or to the modified Tier II-like review.

Included in Attachment I is a copy of the chain-of-custody (COC) record. Included in Attachment II are the result summary sheets, annotated with qualifiers, if necessary, as detailed in this memorandum. Included in Attachment III are the data validation worksheets.

Data Completeness

The following deficiencies were noted with the data package:

1. The cover letter and pages 0001 and 0002 incorrectly refer the Client Project as Aztec Industries. It should be Mill Street, Brookfield. Hand-corrections were made; a resubmittal was not requested.
2. No receipt date or time was provided on the chains of custody (COC). The receipt date was provided on the Sample Condition Form, therefore the signed and dated COC was not requested.
3. The Control Limits for mercury on the initial and continuing calibration Form 2A should be 90%-110%, not 80%-120%. All criteria were met for 90%-110%, and a resubmittal was not requested.

Blanks

The following table summarizes the level of blank contamination detected in the laboratory blanks associated with the soil samples. If a contaminant was detected in more than one blank, the highest concentration was used to qualify associated sample results. Blank action levels were adjusted for sample size and solids content.

Analyte	Maximum Concentration	Nominal BAL (mg/Kg)	Samples Affected/Actions
antimony	6.9 µg/L	1.7	All sample results were nondetect; no action required.
arsenic	-0.113 mg/Kg	0.57	All sample results were either nondetect or >BAL; no actions required.
barium	5.0 µg/L	1.3	All sample results were >BAL; no actions required.
cadmium	0.2 µg/L	0.05	All sample results were either nondetect or >BAL; no actions required.
chromium	0.7 µg/L	0.18	All sample results were >BAL; no actions required.
copper	0.575 mg/kg	2.9	All sample results were >BAL; no actions required.
lead	1.1 µg/L	0.28	All sample results were >BAL; no actions required.
nickel	1.8 µg/L	0.45	All sample results were >BAL; no actions required.
selenium	-3.3 µg/L	0.83	Qualify the nondetect results as estimated nondetect (UJ) in all samples.
	0.140 mg/Kg	0.70	

Analyte	Maximum Concentration	Nominal BAL (mg/Kg)	Samples Affected/Actions
thallium	4.5 µg/L	1.1	Qualify the nondetect results as estimated nondetect (UJ) in all samples.
	-0.128 mg/Kg	0.64	
vanadium	1.4 µg/L	0.35	All sample results were >BAL; no actions required.
zinc	16.9 µg/L	4.2	All sample results were >BAL; no actions required.

BAL – Blank Action Limit

Matrix Spike/Matrix Spike Duplicate

Matrix spike analysis was performed on soil sample MEB-10-4-8. The following table summarizes the analyte that did not meet criteria for recovery (75% - 125%):

Analyte	MS %R	Action
antimony	46.0	Estimate (UJ) the nondetect antimony results in all samples.

ICP Serial Dilution Analysis Results

ICP Serial Dilution Analysis was performed on sample MEB-10-4-8. Analytes that did not meet the %D criteria of <15% are summarized in the following table:

Analyte	MDL (ug/L)	50xMDL (ug/L)	Sample Result	Serial Dilution	%D	Samples Affected/Actions
barium	2.1	105	528.16	629.46	19.2	Qualify as estimated (J/UJ) the positive and non-detect results in all samples.
chromium	0.38	19	193.93	234.25	20.8	Qualify as estimated (J/UJ) the positive and non-detect results in all samples.
lead	0.46	23	40.79	49.44	21.2	Qualify as estimated (J/UJ) the positive and non-detect results in all samples.
magnesium	0.59	29.5	104.74	127.34	21.6	Qualify as estimated (J/UJ) the positive and non-detect results in all samples.
vanadium	0.47	23.5	227.07	278.17	22.5	Qualify as estimated (J/UJ) the positive and non-detect results in all samples.
zinc	2.3	115	386.87	469.72	21.4	Qualify as estimated (J/UJ) the positive and non-detect results in all samples.

Attachment I
Chain-of-Custody



CHAIN OF CUSTODY FORM

Job/Project Name: Mill Street		Job/Project Location: Brookfield, MA		Job/Project Number: 36800 269.00114							
Samplers: (Signatures) Cindy Cattleberry		Recorder: (Signature) Cindy Cattleberry		Date: 2/8/06							
Lab (Samples Sent To): Mitkem Corporation		ANALYSIS REQUESTED									
SAMPLING	SAMPLE NUMBER		SAMPLE LOCATION	MATRIX		COMPOSITE/GRAB	PRESERVATIVE (Y/N)	MCP metals	Total #	COMMENTS	
	Date	Time		Water	Soil						
05	2/8/06	1115	MEB-12-05-3		X	C	N	1	1		
06	2/8/06	1130	MEB-12-4-8		X	C	N	1	1		
07	2/8/06	1340	MEB-13-0-3		X	C	N	1	1		
08	2/8/06	1355	MEB-13-4-8		X	C	N	1	1		
09	2/8/06	1405	MEB-14-0-3		X	C	N	1	1		
10	2/8/06	1425	MEB-14-4-8		X	C	N	1	1		
			Temperature		Blank Included						
Relinquished By: (Signature) Cindy Cattleberry		Date: 2/8/06		Time: 1610		Relinquished By: (Signature)		Date:		Time:	
Relinquished By: (Signature)		Date:		Time:		Relinquished By: (Signature)		Date:		Time:	
Relinquished By: (Signature)		Date:		Time:		Relinquished By: (Signature)		Date:		Time:	
Method of Shipment: Courier											

Attachment II
Sample Result Summary Sheets

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO

MEB-10-4-8

Lab Name: Mitkem Corporation

Contract: 36800318.

Lab Code: MITKEM Case No.

SAS No.:

SDG No.: ME0140

Matrix (soil/water): SOIL

Lab Sample ID: E0140-01

Level (low/med): MED

Date Received: 02/08/06
8/2/06

% Solids: 85.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.1	U	X UJ	P
7440-38-2	Arsenic	1.5			P
7440-39-3	Barium	29.0		X J	P
7440-41-7	Beryllium	0.27	U		P
7440-43-9	Cadmium	0.27	U		P
7440-47-3	Chromium	10.7		X J	P
7440-50-8	Copper	6.3			P
7439-92-1	Lead	2.2		X J	P
7440-02-0	Nickel	5.8		X J	P
7782-49-2	Selenium	1.6	U	UJ	P
7440-22-4	Silver	1.6	U		P
7440-28-0	Thallium	1.1	U	UJ	P
7440-62-2	Vanadium	12.5		X J	P
7440-66-6	Zinc	21.3		X J	P
7439-97-6	Mercury	0.033	U		CV

(85)
4/14/06

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO

MEB-11-0.5-3

Lab Name: Mitkem Corporation

Contract: 36800318.

Lab Code: MITKEM Case No.

SAS No.:

SDG No.: ME0140

Matrix (soil/water): SOIL

Lab Sample ID: E0140-03

Level (low/med): MED

Date Received: 02/08/06

⁸
02/08/06
02/23/06

% Solids: 90.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.0	U	X JS	P
7440-38-2	Arsenic	3.2			P
7440-39-3	Barium	61.3		X J	P
7440-41-7	Beryllium	0.25	U		P
7440-43-9	Cadmium	0.25	U		P
7440-47-3	Chromium	12.7		X J	P
7440-50-8	Copper	10.6			P
7439-92-1	Lead	24.5		X J	P
7440-02-0	Nickel	5.2		X J	P
7782-49-2	Selenium	1.5	U	JS	P
7440-22-4	Silver	1.5	U	JS	P
7440-28-0	Thallium	1.0	U	JS	P
7440-62-2	Vanadium	15.9		X J	P
7440-66-6	Zinc	33.7		X J	P
7439-97-6	Mercury	0.035	U		CV

(RS)
4/14/06

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO

MEB-11-4-8

Lab Name: Mitkem Corporation

Contract: 36800318.

Lab Code: MITKEM

Case No.

SAS No.:

SDG No.: ME0140

Matrix (soil/water): SOIL

Lab Sample ID: E0140-04

Level (low/med): MED

Date Received: 02/08/06

% Solids: 89.0

2/23/06

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.0	U	X JS	P
7440-38-2	Arsenic	3.4			P
7440-39-3	Barium	46.2		X J	P
7440-41-7	Beryllium	0.26	U		P
7440-43-9	Cadmium	0.26	U		P
7440-47-3	Chromium	14.5		X J	P
7440-50-8	Copper	9.6			P
7439-92-1	Lead	5.9		X J	P
7440-02-0	Nickel	6.1		X J	P
7782-49-2	Selenium	1.5	U	JS	P
7440-22-4	Silver	1.5	U		P
7440-28-0	Thallium	1.0	U	JS	P
7440-62-2	Vanadium	19.6		X J	P
7440-66-6	Zinc	25.8		X J	P
7439-97-6	Mercury	0.032	U		CV

(R3)

4/14/06

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO

MEB-12-0.5-3

Lab Name: Mitkem Corporation

Contract: 36800318.

Lab Code: MITKEM Case No.

SAS No.:

SDG No.: ME0140

Matrix (soil/water): SOIL

Lab Sample ID: E0140-05

Level (low/med): MED

Date Received: 02/08/06

8
2/23/06

% Solids: 93.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.88	U	X UJ	P
7440-38-2	Arsenic	2.8			P
7440-39-3	Barium	28.4		X J	P
7440-41-7	Beryllium	0.22	U		P
7440-43-9	Cadmium	0.22	U		P
7440-47-3	Chromium	9.4		X J	P
7440-50-8	Copper	8.5			P
7439-92-1	Lead	4.6		X J	P
7440-02-0	Nickel	4.6		X J	P
7782-49-2	Selenium	1.3	U	UJ	P
7440-22-4	Silver	1.3	U		P
7440-28-0	Thallium	0.88	U	UJ	P
7440-62-2	Vanadium	12.8		X J	P
7440-66-6	Zinc	16.5		X J	P
7439-97-6	Mercury	0.032	U		CV

RS
4/14/06

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO

MEB-12-4-8

Lab Name: Mitkem Corporation

Contract: 36800318.

Lab Code: MITKEM

Case No.

SAS No.:

SDG No.: ME0140

Matrix (soil/water): SOIL

Lab Sample ID: E0140-06

Level (low/med): MED

Date Received: 02/08/06

2/23/06

% Solids: 93.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.90	U	X UJ	P
7440-38-2	Arsenic	2.0			P
7440-39-3	Barium	56.2		X J	P
7440-41-7	Beryllium	0.22	U		P
7440-43-9	Cadmium	0.23			P
7440-47-3	Chromium	14.3		X J	P
7440-50-8	Copper	10.9			P
7439-92-1	Lead	3.7		X J	P
7440-02-0	Nickel	5.3		X J	P
7782-49-2	Selenium	1.3	U	UJ	P
7440-22-4	Silver	1.3	U		P
7440-28-0	Thallium	0.90	U	UJ	P
7440-62-2	Vanadium	20.2		X J	P
7440-66-6	Zinc	19.9		X J	P
7439-97-6	Mercury	0.031	U		CV

(R)
4/14/06

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO

MEB-13-0-3

Lab Name: Mitkem Corporation

Contract: 36800318.

Lab Code: MITKEM Case No.

SAS No.:

SDG No.: ME0140

Matrix (soil/water): SOIL

Lab Sample ID: E0140-07

Level (low/med): MED

Date Received: 02/09/06

% Solids: 85.0

⁸
E 2/23/06

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.97	U	X JS	P
7440-38-2	Arsenic	2.2			P
7440-39-3	Barium	66.5		X J	P
7440-41-7	Beryllium	0.24	U		P
7440-43-9	Cadmium	0.49			P
7440-47-3	Chromium	25.3		X J	P
7440-50-8	Copper	13.3			P
7439-92-1	Lead	7.8		X J	P
7440-02-0	Nickel	6.6		X J	P
7782-49-2	Selenium	1.5	U	U J	P
7440-22-4	Silver	1.5	U		P
7440-28-0	Thallium	0.97	U	U J	P
7440-62-2	Vanadium	34.3		X J	P
7440-66-6	Zinc	31.6		X J	P
7439-97-6	Mercury	0.036	U		CV

(13)
4/14/06

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO

MEB-13-4-8

Lab Name: Mitkem Corporation

Contract: 36800318.

Lab Code: MITKEM

Case No.

SAS No.:

SDG No.: ME0140

Matrix (soil/water): SOIL

Lab Sample ID: E0140-08

Level (low/med): MED

Date Received: 02/08/06
8
02/22/06

% Solids: 88.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	0.97	U	X JS	P
7440-38-2	Arsenic	0.97	U		P
7440-39-3	Barium	101		X J	P
7440-41-7	Beryllium	0.24	U		P
7440-43-9	Cadmium	0.69			P
7440-47-3	Chromium	31.4		X J	P
7440-50-8	Copper	16.5			P
7439-92-1	Lead	4.1		X J	P
7440-02-0	Nickel	9.8		X J	P
7782-49-2	Selenium	1.5	U	JS	P
7440-22-4	Silver	1.5	U		P
7440-28-0	Thallium	0.97	U	JS	P
7440-62-2	Vanadium	47.4		X J	P
7440-66-6	Zinc	39.5		X J	P
7439-97-6	Mercury	0.031	U		CV

(JS)
4/14/06

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO

MEB-14-0-3

Lab Name: Mitkem Corporation

Contract: 36800318.

Lab Code: MITKEM Case No.

SAS No.:

SDG No.: ME0140

Matrix (soil/water): SOIL

Lab Sample ID: E0140-09

Level (low/med): MED

Date Received: 02/08/06

% Solids: 85.0

E-2/23/06

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.0	U	X UJ	P
7440-38-2	Arsenic	3.3			P
7440-39-3	Barium	57.7		X J	P
7440-41-7	Beryllium	0.26	U		P
7440-43-9	Cadmium	0.40			P
7440-47-3	Chromium	21.7		X J	P
7440-50-8	Copper	13.5			P
7439-92-1	Lead	6.3		X J	P
7440-02-0	Nickel	6.4		X J	P
7782-49-2	Selenium	1.6	U	UJ	P
7440-22-4	Silver	1.6	U		P
7440-28-0	Thallium	1.0	U	UJ	P
7440-62-2	Vanadium	30.1		X J	P
7440-66-6	Zinc	26.3		X J	P
7439-97-6	Mercury	0.036	U		CV

(R5)
4/19/06

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO

MEB-14-4-8

Lab Name: Mitkem Corporation

Contract: 36800318.

Lab Code: MITKEM

Case No.

SAS No.:

SDG No.: ME0140

Matrix (soil/water): SOIL

Lab Sample ID: E0140-10

Level (low/med): MED

Date Received: 02/08/06

% Solids: 86.0

2/23/06

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.0	U	X UJ	P
7440-38-2	Arsenic	1.9			P
7440-39-3	Barium	105		X J	P
7440-41-7	Beryllium	0.26	U		P
7440-43-9	Cadmium	0.51			P
7440-47-3	Chromium	25.9		X J	P
7440-50-8	Copper	14.7			P
7439-92-1	Lead	4.8		X J	P
7440-02-0	Nickel	7.5		X J	P
7782-49-2	Selenium	1.5	U	UJ	P
7440-22-4	Silver	1.5	U		P
7440-28-0	Thallium	1.0	U	UJ	P
7440-62-2	Vanadium	40.9		X J	P
7440-66-6	Zinc	37.2		X J	P
7439-97-6	Mercury	0.032	U		CV

(P5)
4/14/06

Comments:

U.S. EPA - CLP

1
INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO

MEK-10-4-8

Lab Name: Mitkem Corporation

Contract: 36800318.

Lab Code: MITKEM Case No.

SAS No.:

SDG No.: ME0140

Matrix (soil/water): SOIL

Lab Sample ID: E0140-02

Level (low/med): MED

Date Received: 02/09/06

% Solids: 78.0

⁸
2/23/06

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-36-0	Antimony	1.1	U	X UJ	P
7440-38-2	Arsenic	1.6			P
7440-39-3	Barium	33.9		X J	P
7440-41-7	Beryllium	0.26	U		P
7440-43-9	Cadmium	0.26	U		P
7440-47-3	Chromium	12.5		X J	P
7440-50-8	Copper	6.9			P
7439-92-1	Lead	2.3		X J	P
7440-02-0	Nickel	6.8		X J	P
7782-49-2	Selenium	1.6	U	UJ	P
7440-22-4	Silver	1.6	U		P
7440-28-0	Thallium	1.1	U	UJ	P
7440-62-2	Vanadium	14.6		X J	P
7440-66-6	Zinc	24.2		X J	P
7439-97-6	Mercury	0.039	U		CV

(R)
4/19/06

Comments:

Attachment III
Data Validation Worksheets

REGION I REVIEW OF INORGANIC
CONTRACT LABORATORY DATA PACKAGE

The hardcopied (laboratory name) Mithem data package received at Region I has been reviewed and the quality assurance and performance data summarized. The data review included:

Case No.	<u>E0140</u>	SAS No.	<u>—</u>	Sampling Date(s)	<u>2/8/06</u>
SDG. No.	<u>ME0140</u>	Matrix	<u>So:1</u>	Shipping Date(s)	<u>2/8/06</u>
No. of Samples	<u>10</u>			Date Rec'd by Lab	<u>2/8/06</u>

Traffic Report Nos: MEB-10-4-8, MEB-11-0.5-3, MEB-11-4-8, MEB-12-0.5-3, MEB-12-4-8, MEB-13-0-3, MEB-13-4-8, MEB-14-0-3, MEB-14-4-8, MEK-10-4-8

Trip Blank No.: NA
Equipment Blank No.: NA
Field Dup Nos: MEB-10-4-8, MEK-10-4-8
PE Sample Nos: NA

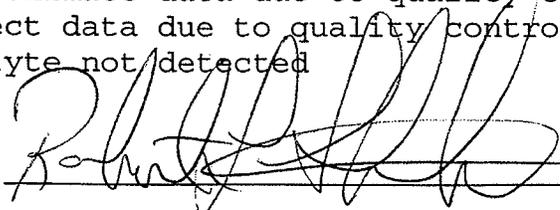
SOW No. SW-846
E0140
7471 requires that specific analytical work be done and that associated reports be provided by the laboratory to the Regions, EMSL-LV, and SMO. The general criteria used to determine the performance were based on an examination of:

- Data Completeness
- Holding Times
- Calibrations
- Blanks
- ICP Interference Check Results
- Matrix Spike Recoveries
- Laboratory Duplicates
- Field Duplicates
- Lab Control Sample Results
- Furnace AA Results
- ICP Serial Dilution Results
- Detection Limit Results
- Sample Quantitation

Overall Comments: _____

Definitions and Qualifiers:

- A - Acceptable Data
- J - Approximate data due to quality control criteria
- R - Reject data due to quality control criteria
- U - Analyte not detected

Reviewer:  Date: 4/13/06

REGION I
Data Review Worksheets

I. DATA COMPLETENESS

MISSING INFORMATION

DATE LAB CONTACTED

DATE REC'D

Case letter incorrectly lists client project as Aztec Industries - Hand Collected
Receipt date of time not on COC, but present on Sample Condition Form - Res. not required
Form 2A has incorrect control limits for Hg - res. not required

REGION I
Data Review Worksheets

II. HOLDING TIMES

Complete table for all samples and circle the Analysis date for samples not within criteria.

SAMPLE ID	DATE SAMPLED	HG DATE ANALYSIS	CYANIDE DATE ANALYSIS	OTHERS DATE ANALYSIS	pH	ACTION
MEB-10-4-8	2/8/06	2/15/06	NA	2/16/06 - 2/17/06	NA	No Action Necessary
MEB-11-0.5-3	↓	↓	↓	↓	↓	↓
MEB-11-4-8	↓	↓	↓	↓	↓	↓
MEB-12-0.5-3	↓	↓	↓	↓	↓	↓
MEB-12-4-8	↓	↓	↓	↓	↓	↓
MEB-13-0-3	↓	↓	↓	↓	↓	↓
MEB-13-4-8	↓	↓	↓	↓	↓	↓
MEB-14-0-3	↓	↓	↓	↓	↓	↓
MEB-14-4-8	↓	↓	↓	↓	↓	↓
MEB-10-4-8	↓	↓	↓	↓	↓	↓

METALS - 180 DAYS FROM SAMPLE COLLECTION
 MERCURY - 28 DAYS FROM SAMPLE COLLECTION
 CYANIDE - 14 DAYS FROM SAMPLE COLLECTION

cooling temp = 4°C

ACTION:

1. If holding times are exceeded all positive results are estimated (J) and non-detects are estimated (UJ).
2. If holding times are greatly exceeded, the reviewer may determine that non-detects are usable (R).

FEA/18/06

REGION I
Data Review Worksheets

All ICV/CCV recoveries 90-110%

III A. INSTRUMENT CALIBRATION (Section 1)

1. Recovery Criteria

List the analytes which did not meet the percent recovery (%R) criteria for Initial or Continuing Calibration.

<u>DATE</u>	<u>ICV/CCV#</u>	<u>ANALYTE</u>	<u>%R</u>	<u>ACTION</u>	<u>SAMPLES AFFECTED</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

ACTIONS:

If any analyte does not meet the %R criteria follow the actions stated below:

For positive results:

	<u>Accept</u>	<u>Estimate (J)</u>	<u>Reject (R)</u>
Metals	90-110%R	75-89%R, 111-125%R	<75%R, >125%R
Mercury	80-120%R	65-79%R, 121-135%R	<65%R, >135%R
Cyanide	85-115%R	70-84%R, 116-130%R	<70%R, >130%R

For Non-detected results

	<u>Accept</u>	<u>Estimate (UJ)</u>	<u>Reject (R)</u>
Metals	90-110%R	75-89%R, 111-125%R	<75%R, >125%R
Mercury	80-120%R	65-79%R, 121-135%R	<65%R, >135%R
Cyanide	85-115%R	70-84%R, 116-130%R	<70%R, >130%R

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2/17/06

REGION I
Data Review Worksheets

III B. INSTRUMENT CALIBRATION (Section 2)

2. Analytical Sequence

- A. Did the laboratory use the proper number of Standards for calibration as described in the SOW? Yes or No
- B. Were calibrations performed at the beginning of Each analysis? Yes or No
- C. Were calibration standards analyzed at the beginning of sample analysis and at a minimum frequency of ten percent or every two hours during analysis, whichever is more frequent? Yes or No
- D. Were the correlation coefficients for the calibration curves for ~~AA~~ Hg, and ~~CN~~ ^{Call ICP metals} ≥ 0.995 ? Yes or No
- E. Was a standard at CRQL analyzed for all ICP analyses? - Not required for 6010B & 7470 Yes or No
inv standard & RL

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

12/13/06

REGION I
Data Review Worksheets

IV A. BLANK ANALYSIS RESULTS (Section 1-3)

List the blank contamination in Sections 1 & 2 below. A separate worksheet should be used for soil and water samples.

1. Laboratory Blanks - see attached MATRIX: Soil

<u>DATE</u>	<u>ICB/CCB#</u>	<u>PREP BL</u>	<u>ANALYTE</u>	<u>CONC./UNITS</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2. Equipment/Trip Blanks Not Applicable

<u>DATE</u>	<u>EQUIP BL#</u>	<u>ANALYTE</u>	<u>CONC./UNITS</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

3. Frequency Requirements
- A. Was a preparation blank analyzed for each matrix for every 20 samples and for each digestion batch? (Yes or No)
 - B. Was a calibration blank run every 10 samples or every 2 hours whichever is more frequent? (Yes or No)

If No,
The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below, and list the samples affected.

1/27/04

U.S. EPA - CLP

3
BLANKS

Lab Name: Mitkem Corporation

Contract: 36800318.00062...

Lab Code: MITKEM

Case No.

SAS No.:

SDG No.: ME0140

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)		Continuing Calibration Blank (ug/L)						Preparation Blank		M
		C	1	C	2	C	3	C		C	
Antimony	6.9	B	5.1	B	2.9	B	4.1	B	0.138	B	
Arsenic	1.6	U	1.6	U	1.6	U	1.6	U	-0.113	B	
Barium	5.0	B	3.3	B	2.1	U	2.1	U	0.347	B	
Beryllium	0.2	U	0.2	U	0.2	U	0.2	U	0.006	U	
Cadmium	0.1	U	0.2	B	0.1	U	0.1	U	0.005	U	
Chromium	0.7	B	0.4	U	0.4	U	0.4	U	0.056	B	
Copper	6.3	U	6.3	U	6.3	U	6.3	U	0.575	B	
Lead	0.5	U	0.5	U	0.6	B	1.1	B	0.041	U	
Nickel	1.4	B	1.8	B	0.6	U	1.3	B	0.028	B	
Selenium	-3.0	B	-3.3	B	-2.9	B	-2.8	B	0.140	B	
Thallium	1.2	B	1.2	U	1.2	U	4.5	B	-0.128	B	
Vanadium	1.4	B	1.2	B	0.5	U	0.7	B	0.021	U	
Zinc	16.9	B	12.4	B	3.9	B	5.8	B	1.302	B	

U.S. EPA - CLP

3
BLANKS

Lab Name: Mitkem Corporation

Contract: 36800318.00062...

Lab Code: MITKEM Case No.

SAS No.:

SDG No.: ME0140

Preparation Blank Matrix (soil/water):

Preparation Blank Concentration Units (ug/L or mg/kg):

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Prepa- ration Blank		C	M
			1	C	2	C	3	C				
Antimony			3.2	B	3.5	B						P
Arsenic			1.6	U	1.6	U						P
Barium			2.1	U	2.1	U						P
Beryllium			0.2	U	0.2	U						P
Cadmium			0.1	U	0.1	U						P
Chromium			0.4	U	0.4	U						P
Copper			6.3	U	6.3	U						P
Lead			0.5	U	0.7	B						P
Nickel			0.6	U	1.1	B						P
Selenium			-2.3	B	1.0	U						P
Thallium			1.2	U	1.2	U						P
Vanadium			0.7	B	0.8	B						P
Zinc			3.2	B	5.2	B						P

REGION I
Data Review Worksheets

IV B. BLANK ANALYSIS RESULTS (Section 4)

4. Blank Actions

The Action Levels for any analyte is equal to five times the highest concentration of that element's contamination in any blank. The action level for samples which have been concentrated or diluted should be multiplied by the concentration/dilution factor. No positive sample result should be reported unless the concentration of the analyte in the sample exceeds the Action Level (AL). Specific actions are as follows:

1. When the concentration is greater than the MDL, but less than the CRQL and Action Level, report the CRQL with a U.
2. When the concentration is greater than the CRQL, but less than the Action Level, report the sample concentration detected with a U.
3. When the sample concentration is greater than the Action Level, report the sample concentration unqualified.

MATRIX: Soil

MATRIX: Soil

<u>ELEMENT</u>	<u>MAX CONC./</u> <u>UNITS</u>	<u>AL/</u> <u>UNITS</u>	<u>ELEMENT</u>	<u>MAX CONC./</u> <u>UNITS</u>	<u>AL/</u> <u>UNITS</u>
<u>Sb</u>	<u>6.9 ug/L</u>	<u>34.5 ug/L</u>	<u>Ni</u>	<u>1.8 ug/L</u>	<u>9.0 ug/L</u>
<u>As</u>	<u>-0.113 mg/kg</u>	<u>0.57 mg/kg</u>	<u>Se</u>	<u>-3.3 ↓</u>	<u>16.5 ug/L</u>
<u>Ba</u>	<u>5.0 ug/L</u>	<u>25.0 ug/L</u>	<u>Se</u>	<u>0.140 mg/kg</u>	<u>0.70 mg/kg</u>
<u>Cd</u>	<u>0.2 ↓</u>	<u>1.0 ug/L</u>	<u>TR</u>	<u>4.5 ug/L</u>	<u>22.5 ug/L</u>
<u>Cr</u>	<u>0.7 ↓</u>	<u>3.5 ug/L</u>	<u>TR</u>	<u>-0.128 mg/kg</u>	<u>0.64 mg/kg</u>
<u>Cu</u>	<u>0.575 mg/kg</u>	<u>2.9 mg/kg</u>	<u>V</u>	<u>1.4 ug/L</u>	<u>7.0 ug/L</u>
<u>Pb</u>	<u>1.1 ug/L</u>	<u>7.5 ug/L</u> <u>5.5 ug/L</u>	<u>Zn</u>	<u>16.9 ↓</u>	<u>84.5 ug/L</u>

NOTE: Blanks analyzed during a soil case must be converted to mg/kg in order to compare them with the sample results.

$$\text{Conc. in ug/L} \times \frac{\text{Volume digested to (200ml)}}{\text{Weight digested (1gram)}} \times \frac{1\text{L}}{1000\text{ml}} \times \frac{1000\text{gm}}{1\text{kg}} \times \frac{1\text{mg}}{1000\text{ug}} = \text{mg/kg}$$

Multiplying this result by 5 to arrive at the action level gives a final result in mg/kg which can then be applied to sample results.

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REGION I

Data Review Worksheets

V A. ICP INTERFERENCE CHECK SAMPLE (Sections 1 & 2)

All criteria met

1. Recovery Criteria

List any elements in the ICS AB solution which did not meet the criteria for %R.

DATE	ELEMENT	%R	ACTION	SAMPLES AFFECTED
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

ACTIONS:

If an element does not meet the %R criteria, follow the actions stated below:

	PERCENT RECOVERY		
	<50%	50-79%	>120%
Positive Sample Results	R	J	J
Non-detected Sample Results	R	UJ	A

2. Frequency Requirements

Were Interference QC samples run at the beginning and end of each sample analysis run or a minimum of twice per 8 hour working shift, whichever is more frequent?

Yes or No

If No,

The data may be affected. Use professional judgement to determine the severity of the effect and qualify the data accordingly. Discuss any actions below and list the samples affected.

RA/12/06

REGION I
Data Review Worksheets

*Not Evaluated
how data not
provided.*

V B. ICP INTERFERENCE CHECK SAMPLE (Section 3)

1. Report the concentration of any element detected in the ICS A solution >MDL that should not be present.

ELEMENT	CONC. DETECTED IN THE ICS	CONC. OF INTERFERENTS IN THE ICS			
		AL	CA	FE	MG
		_____	_____	_____	_____
_____	_____	_____	_____	_____	
_____	_____	_____	_____	_____	
_____	_____	_____	_____	_____	
_____	_____	_____	_____	_____	

Estimate the concentration produced by the interfering element in all affected samples. See guidelines for examples. List the samples affected by interferences below:

SAMPLE AFFECTED	ELEMENT AFFECTED	SAMPLE CONC. (ug/L)	SAMPLE INTERFERENT CONC.				ESTIMATED INTERF. (ug/L)
			AL	CA	FE	MG	
_____	_____	_____	_____	_____	_____	_____	
_____	_____	_____	_____	_____	_____	_____	
_____	_____	_____	_____	_____	_____	_____	
_____	_____	_____	_____	_____	_____	_____	

ACTIONS:

1. In general, the sample data can be accepted without qualification if the sample concentrations of Al, Ca, Fe, Mg are less than 50% of their respective levels in the ICS solution.
2. Estimate (J) positive results for affected elements for samples with levels of interferences 50% or more of that in the ICS solution.
3. Reject (R) positive results if the reported concentration is due entirely to the interfering element.
4. Estimate (UJ) non-detected results for which false negatives are suspect.

Give explanations for any actions taken below:

_____ *2/17/06*

REGION I
Data Review Worksheets

VI. MATRIX SPIKE

TR # MEB-10-4-8

MATRIX: Soil

1. Recovery Criteria

List the percent recoveries for analytes which did not meet the required criteria.

S - amount of spike added
SSR - spiked sample result
SR - sample result

Analyte	SSR	SR	S	%R	Action
<u>Antimony</u>	<u>11.5011</u>	<u>1.1000</u>	<u>25.01</u>	<u>46.0</u>	<u>J/UJ</u>

Matrix Spike Actions apply to all samples of the same matrix.

ACTIONS:

- If the sample concentration exceeds the spike concentration by a factor of 4 or more, no action is taken.
- If any analyte does not meet the %R criteria, follow the actions stated below:

	PERCENT RECOVERY		
	<30%	30%-74%	>125%
Positive Samples Results	J	J	J
Non-detected Results	R	<u>UJ</u>	A

2. Frequency Criteria

- Was a matrix spike prepared at the required frequency? Yes or No
- Was a post digestion spike analyzed for elements that did not meet required criteria for matrix spike recovery? Yes or No

A separate worksheet should be used for each matrix spike pair.

Real 1/27/06

✓ All criteria Met

VII. LABORATORY DUPLICATES

List the concentrations of any analytes not meeting the criteria for duplicate precision. For soil duplicates, calculate the CRQL in mg/kg using the sample weight, volume and percents solids data for the sample. Indicate what criterion was used to evaluate precision by circling either the RPD or CRQL for each element.

MATRIX: Soil

Element	CRQL		Sample # <u>MEB-10-4-7</u>	Duplicate# <u>MEB-10-4-8D</u>	RPD	Action
	water ug/L	soil mg/kg				
Aluminum	200					
Antimony	60					
Arsenic	10					
Barium	200					
Beryllium	5					
Cadmium	5					
Calcium	5000					
Chromium	10					
Cobalt	50					
Copper	25					
Iron	100					
Lead	5					
Magnesium	5000					
Manganese	15					
Mercury	0.2					
Nickel	40					
Potassium	5000					
Selenium	5					
Silver	10					
Sodium	5000					
Thallium	10					
Vanadium	50					
Zinc	20					
Cyanide	10					

Laboratory Duplicate Actions should be applied to all other samples of the same matrix type.

ACTIONS:

1. Estimate (J) positive results for elements which have an RPD >20% for waters and >35% for soils.
2. If sample results are less than 5x the CRQL, estimate (J) positive results for elements whose absolute difference is >CRQL, (2xCRQL for soil). If both samples are non-detected the RPD is not calculated (NC).

24/13/06

REGION I
Data Review Worksheets

✓ All criteria met

VIII. FIELD DUPLICATES

List the concentrations of all analytes in the field duplicate pair. For soil duplicates, calculate the CRQL in mg/kg using the sample weight, volume and percents solids data for the sample. Indicate what criteria was used to evaluate precision by circling either the RPD or CRQL for each element.

MATRIX: Soil

Element	CRQL		Sample # <u>MEB-10-4-8</u>	Duplicate# <u>MEB-10-4-8</u>	RPD	Action
	water ug/L	soil mg/kg				
Aluminum	200					
Antimony	60	<u>1.0</u>	1.1U	1.1U	NC	↓ No Action necessary
Arsenic	10	<u>1.0</u>	1.5	1.6	6.5	
Barium	200	<u>1.0</u>	29.0	33.9	<u>15.6</u>	
Beryllium	5	<u>0.25</u>	0.27U	0.26U	NC	
Cadmium	5	<u>0.25</u>	0.27U	0.26U	NC	
Calcium	5000					
Chromium	10	<u>1.0</u>	10.7	12.5	<u>15.5</u>	
Cobalt	50					
Copper	25	<u>1.5</u>	6.3	6.9	9.1	
Iron	100					
Lead	5	<u>0.50</u>	2.2	2.3	<u>4.4</u>	
Magnesium	5000					
Manganese	15					
Mercury	0.2	<u>0.03</u>	0.033U	0.039U	NC	
Nickel	40	<u>2.5</u>	5.8	6.8	16	
Potassium	5000					
Selenium	5	<u>1.5</u>	1.6U	1.6U	NC	
Silver	10	<u>1.5</u>	1.6U	1.6U	NC	
Sodium	5000					
Thallium	10	<u>1.0</u>	1.1U	1.1U	NC	
Vanadium	50	<u>2.5</u>	12.5	14.6	<u>15.5</u>	
Zinc	20	<u>2.5</u>	21.3	24.2	<u>12.8</u>	
Cyanide	10					

Field Duplicate Actions should be applied to all other samples of the same matrix type.

ACTIONS:

1. Estimate (J) positive results for elements which have an RPD >30% for waters and >50% for soils.
2. If sample results are less than 5x the CRQL, estimate (J) positive results and (UJ) nondetected results for elements whose absolute difference is >2xCRQL, (4xCRQL for soil). If both samples are non-detected the RPD is not calculated (NC).

Real/3/06

REGION I
Data Review Worksheets

IX. LABORATORY CONTROL SAMPLE

1. Aqueous LCS - NA

List any LCS recoveries not within the 80-120% criteria and the samples affected.

<u>DATE</u>	<u>ELEMENT</u>	<u>%R</u>	<u>ACTION</u>	<u>SAMPLES AFFECTED</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2. Solid LCS ✓ All criteria met for LCS & LCSD

List any analytes that were not within the control windows set by the EPA for the solids LCS sample. The 80-120% criteria is not used to evaluate solid LCS results.

<u>ELEMENT</u>	<u>LCS CONC.</u>	<u>CONTROL WINDOWS</u>	<u>ACTION</u>	<u>SAMPLES AFFECTED</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

ACTIONS:

<u>AQUEOUS LCS</u>	<u>Percent Recovery</u>		
	<u><50%</u>	<u>51-79%</u>	<u>>120%</u>
Positive Results	R	J	A
Non-detected Results	R	J	A

<u>SOLID LCS</u>	<u><EPA Control Windows</u>	<u>>EPA Control Windows</u>
	Positive Results	J
Non-detected Results	UJ	A

3. Frequency Criteria

A. Was an LCS analyzed for every matrix, every digestion batch, and every 20 samples?

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Yes or No

REGION I

Data Review Worksheets

XI. INDUCTIVELY COUPLED PLASMA (ICP) SERIAL DILUTION ANALYSIS

Serial dilutions were performed for each matrix and results of the diluted sample analysis agreed within 10% of the original undiluted analysis, for concentrations greater than 50x MDL.

Serial dilutions were not performed for the following:

Serial dilutions were performed, but analytical results did not agree within 10% for analyte concentrations greater than 50x MDL before dilution.

Report all results below that do not meet the required laboratory criteria for ICP serial dilution analysis.

MATRIX: Soil

ELEMENT	MDL	50xMDL	SAMPLE RESULT	SERIAL DILUTION	%D	ACTION
Aluminum						
Antimony						
Arsenic						
Barium	2.1	105	528.16	629.46	19.2	J/05
Beryllium						
Cadmium						
Calcium						
Chromium	0.38	19	193.93	234.25	20.8	J/05
Cobalt						
Copper						
Iron						
Lead	0.46	23	40.79	49.44	21.2	J/05
Magnesium	0.59	29.5	104.74	127.34	21.6	J/05
Manganese						
Nickel						
Potassium						
Selenium						
Silver						
Sodium						
Thallium						
Vanadium	0.47	23.5	227.07	278.17	22.5	J/05
Zinc	2.3	115	386.87	469.72	21.4	J/05

Actions apply to all samples of the same matrix.

ACTIONS:

- Estimate (J) positive results if %D > 15.

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REGION I
Data Review Worksheets

XII. DETECTION LIMIT ANALYSIS

1. Method Detection Limits

Method Detection Limit results were present and found to be less than the Contract Required Quantitation Limits.

MDLs were not included in the data package on Form 9.

MDLs were present, but the criteria was not met for the following elements: _____

2. Reporting Requirements

Were sample results on Form I reported down to the ~~MDL~~ ~~not the~~ CRQL for all analytes? Yes No

Were sample results that were analyzed for ICP for Se, Tl, As, or Pb at least 5x IDL. NA Yes No

Were sample weights, volumes, and dilutions taken into account when reporting detection limits on Form I. Yes No

If No, the reported results may be inaccurate. Make the necessary changes on the data summary tables and request that the laboratory resubmit the corrected data.

3. Estimated Results - *Not Applicable*

List the samples and elements that had concentrations that were qualified as estimated (J and UJ) for being greater than the MDL but less than the CRQL. Include blank-qualified results.

Element	Sample(s)

Real 1/27/06

REGION I
Data Review Worksheets

XIII. SAMPLE QUANTITATION

✓

Sample results fall within the linear range for ICP and within the calibrated range for all other parameters.

Sample results were beyond the linear range/calibration range of the instrument for the following elements:

In the space below, please show a minimum of one sample calculation per method:

ICP

No Raw Data Provided

FURNACE

MERCURY

CYANIDE

For soil samples, the following equation may be necessary to convert raw data values (usually reported in ug/L) to actual sample concentrations (mg/kg):

$$C \times \frac{V}{W \times S} \times \frac{1L}{1000mL} \times DF \times \frac{1mg}{1000ug} \times \frac{1000g}{1kg} = \frac{mg}{kg} \text{ (dry weight)}$$

Where,

C = concentration, ug/L

V = final sample volume, mL

W = wet sample weight, g

S = percent solids

DF = dilution factor

RA-1/18/06

APPENDIX F

Laboratory Data – Groundwater, M&E Investigation