

**Laboratory Data Consultants, Inc.
Data Validation Report**

Project/Site Name: Aerojet PGOU
Collection Date: June 21, 2006
LDC Report Date: September 22, 2006
Matrix: Soil
Parameters: Perchlorate
Validation Level: EPA Level III & IV equivalent
Laboratory: Test America - Irvine
Sample Delivery Group (SDG): S606440

Sample Identification

C41-SB09-0	C41-SB09-50
C41-SB09-2	C41-SB09-55
C41-SB09-5	C41-SB09-60
C41-SB09-15	C41-SB05-2
C41-SB09-20	C41-SB05-5
C41-SB09-25	C41-SB05-15
C41-SB09-30	C41-SB05-15MS
C41-SB09-35 **	C41-SB05-15MSD
C41-SB09-35D **	C41-SB05-20
C41-SB09-40	C41-SB05-20D
C41-SB09-45	

**Indicates sample underwent EPA Level IV review

Introduction

This data review covers 21 soil samples listed on the cover sheet including dilutions and reanalysis as applicable. The analyses were per EPA Method 314.0 for Perchlorate.

The review follows a modified outline of the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994) as there are no current guidelines for the methods stated above.

A table summarizing all data qualification is provided at the end of this report, if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

Blank results are summarized in Section III.

Field duplicates are summarized in Section IX.

Samples indicated by a double asterisk on the front cover underwent an EPA Level IV review. An EPA Level III review was performed on all of the other samples. Raw data were not evaluated for the samples reviewed by Level III criteria since this review is based on QC data.

The following are definitions of the data qualifiers:

- U Indicates the compound or analyte was analyzed for but not detected at or above the stated limit.
- J Indicates an estimated value.
- R Quality control indicates the data is not usable.
- N Presumptive evidence of presence of the constituent.
- UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.
- A Indicates the finding is based upon technical validation criteria.
- P Indicates the finding is related to a protocol/contractual deviation.
- None Indicates the data was not significantly impacted by the finding, therefore qualification was not required.

I. Technical Holding Times

All technical holding time requirements were met.

The chain-of-custodies were reviewed for documentation of cooler temperatures. All cooler temperatures met validation criteria.

II. Calibration

a. Initial Calibration

All criteria for the initial calibration were met.

b. Calibration Verification

Calibration verification frequency and analysis criteria were met.

The laboratory did not provide a summary of percent recovery (%R) values for the continuing calibration standards. However, the %R of concentrations in continuing calibration standards were re-calculated and were determined to be within the QC limits.

III. Blanks

Method blanks were reviewed for each matrix as applicable. No contaminant concentrations were found in the method blanks.

IV. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) samples were reviewed for each matrix as applicable. Percent recoveries (%R) and relative percent differences (RPD) were within the laboratory QC limits.

V. Duplicates

Duplicate (DUP) sample analyses were not preformed. Therefore, this parameter was not reviewed.

VI. Laboratory Control Samples

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within the laboratory QC limits.

VII. Sample Result Verification

All sample result verifications were within validation criteria for samples on which an EPA Level IV review was performed.

Raw data were not evaluated for the samples reviewed by Level III criteria.

VIII. Overall Assessment of Data

Data flags have been summarized at the end of the report, if data has been qualified.

IX. Field Duplicates

Sample C41-SB09-35D was identified as a field duplicate of C41-SB09-35 and sample C41-SB05-20D was identified as a field duplicate of C41-SB05-20. No perchlorate was detected in any of the samples with the following exceptions:

Analyte	Concentration (mg/kg)		RPD
	C41-SB09-35	C41-SB09-35D	
Perchlorate	0.078	0.053	38

**Aerojet PGOU
Perchlorate - Data Qualification Summary - SDG S606440**

No Sample Data Qualified in this SDG

**Aerojet PGOU
Perchlorate - Laboratory Blank Data Qualification Summary - SDG S606440**

No Sample Data Qualified in this SDG

ERM-West - Sacramento 2525 Natomas Park Dr., Ste. 350 Sacramento CA, 95833	Project: Aerojet PGOU Project Number: 20648.03 Project Manager: Bruce Lewis	S606440 Reported: 07/07/06 16:01
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INORGANICS
Del Mar Analytical - Irvine

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C41-SB09-0 (S606440-01) Soil Sampled: 06/21/06 09:00 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 13:57	EPA 314.0 MOD.	
C41-SB09-2 (S606440-02) Soil Sampled: 06/21/06 09:02 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 14:19	EPA 314.0 MOD.	
C41-SB09-5 (S606440-03) Soil Sampled: 06/21/06 09:06 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 14:41	EPA 314.0 MOD.	
C41-SB09-15 (S606440-04) Soil Sampled: 06/21/06 09:22 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 15:02	EPA 314.0 MOD.	
C41-SB09-20 (S606440-05) Soil Sampled: 06/21/06 09:25 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 15:24	EPA 314.0 MOD.	
C41-SB09-25 (S606440-06) Soil Sampled: 06/21/06 09:39 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 15:46	EPA 314.0 MOD.	
C41-SB09-30 (S606440-07) Soil Sampled: 06/21/06 09:43 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 16:51	EPA 314.0 MOD.	
C41-SB09-35 (S606440-08) Soil Sampled: 06/21/06 10:32 Received: 06/21/06 16:42									
Perchlorate	0.078	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 17:13	EPA 314.0 MOD.	
C41-SB09-35D (S606440-09) Soil Sampled: 06/21/06 10:33 Received: 06/21/06 16:42									
Perchlorate	0.053	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 17:34	EPA 314.0 MOD.	

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9/7/06

ERM-West - Sacramento 2525 Natomas Park Dr., Ste. 350 Sacramento CA, 95833	Project: Aerojet PGOU Project Number: 20648.03 Project Manager: Bruce Lewis	S606440 Reported: 07/07/06 16:01
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INORGANICS
Del Mar Analytical - Irvine

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C41-SB09-40 (S606440-10) Soil Sampled: 06/21/06 10:35 Received: 06/21/06 16:42									
Perchlorate	0.076	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 17:56	EPA 314.0 MOD.	
C41-SB09-45 (S606440-11) Soil Sampled: 06/21/06 11:15 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 18:18	EPA 314.0 MOD.	
C41-SB09-50 (S606440-12) Soil Sampled: 06/21/06 11:17 Received: 06/21/06 16:42									
Perchlorate	0.050	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 18:39	EPA 314.0 MOD.	
C41-SB09-55 (S606440-13) Soil Sampled: 06/21/06 11:41 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 19:01	EPA 314.0 MOD.	
C41-SB09-60 (S606440-14) Soil Sampled: 06/21/06 11:43 Received: 06/21/06 16:42									
Perchlorate	0.061	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 19:23	EPA 314.0 MOD.	
C41-SB05-2 (S606440-15) Soil Sampled: 06/21/06 13:36 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 19:44	EPA 314.0 MOD.	
C41-SB05-5 (S606440-16) Soil Sampled: 06/21/06 13:39 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F26110	06/26/06	06/27/06 20:06	EPA 314.0 MOD.	
C41-SB05-15 (S606440-17) Soil Sampled: 06/21/06 13:52 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F27117	06/27/06	06/27/06 22:38	EPA 314.0 MOD.	
C41-SB05-20 (S606440-18) Soil Sampled: 06/21/06 13:55 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F27117	06/27/06	06/27/06 23:43	EPA 314.0 MOD.	

CJ
9/7/06

ERM-West - Sacramento 2525 Natomas Park Dr., Ste. 350 Sacramento CA, 95833	Project: Aerojet PGOU Project Number: 20648.03 Project Manager: Bruce Lewis	S606440 Reported: 07/07/06 16:01
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INORGANICS
Del Mar Analytical - Irvine

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
C41-SB05-20D (S606440-19) Soil Sampled: 06/21/06 13:57 Received: 06/21/06 16:42									
Perchlorate	ND	0.040	mg/kg	1	6F27117	06/27/06	06/28/06 00:04	EPA 314.0 MOD.	

CJ
9/7/06

LDC #: 0609-01C6
 SDG #: S606440
 Laboratory: Trual

VALIDATION COMPLETENESS WORKSHEET
X EPA Level III/IV

Date: 9/6/06
 Page: 1 of 1
 Reviewer: CA
 2nd Reviewer: LE

METHOD: EPA Method 314.0 (Perchlorate) _____

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Technical holding times	A	Sampling dates: 6/21/2006
IIa.	Initial calibration	A	
IIb.	Calibration verification	A	
III.	Blanks	A	
IVa.	Matrix Spike/(Matrix Spike) Duplicates	A	MS/MSD = 18/19
IVb.	Laboratory control samples	A	
V.	Sample result verification	A	Not reviewed for Level III validation.
VI.	Overall assessment of data	A	
VII.	Field duplicates	SW, NCA	60-8/9, 20/21
VIII.	Field blanks	N	

Note: A = Acceptable ND = No compounds detected D = Duplicate
 N = Not provided/applicable R = Rinsate TB = Trip blank
 SW = See worksheet FB = Field blank EB = Equipment blank

Validated Samples: ** Indicates sample underwent Level IV validation

1	C41-SB09-0	11	C41-SB09-45	21	CA-41-SB05-20D	31	
2	C41-SB09-2	12	C41-SB09-50	22		32	
3	C41-SB09-5	13	C41-SB09-55	23		33	
4	C41-SB09-15	14	C41-SB09-60	24		34	
5	C41-SB09-20	15	C41-SB05-2	25		35	
6	C41-SB09-25	16	C41-SB05-5	26		36	
7	C41-SB09-30	17	C41-SB05-15	27		37	
8	C41-SB09-35 **	18	C41-SB05-15MS	28		38	
9	C41-SB09-35D **	19	C41-SB05-15MSD	29		39	
10	C41-SB09-40	20	CA41-SB05-20	30		40	

Notes: _____

Method: Perchlorate by IC (EPA Method 314.0)

Validation Area	Yes	No	NA	Findings/Comments
I. Technical holding times				
All technical holding times were met.	✓			
Cooler temperature criteria was met.	✓			
II. Calibration				
Were all instruments calibrated daily, each set-up time?	✓			
Were the proper number of standards used?	✓			
Were all initial calibration correlation coefficients ≥ 0.995 ?	✓			
Were all initial and continuing calibration verification %Rs within the 90-110% QC limits?	✓			see criteria on cont cal worksheet
Were titrant checks performed as required? (Level IV only)			✓	
Were balance checks performed as required? (Level IV only)			✓	
III. Blanks				
Was a method blank associated with every sample in this SDG?	✓			
Was there contamination in the method blanks? If yes, please see the Blanks validation completeness worksheet.		✓		
IV. Matrix spike/Matrix spike duplicates and Duplicates				
Were a matrix spike (MS) and duplicate (DUP) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD or MS/DUP. Soil / Water.	✓			
Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the 75-125 QC limits? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.	✓			85-115%
Were the MS/MSD or duplicate relative percent differences (RPD) $\leq 20\%$ for waters and $\leq 35\%$ for soil samples? A control limit of $\leq \text{CRDL} (\leq 2X \text{ CRDL for soil})$ was used for samples that were $\leq 5X$ the CRDL, including when only one of the duplicate sample values were $\leq 5X$ the CRDL.	✓			20% RPD
V. Laboratory control samples				
Was an LCS analyzed for this SDG?	✓			
Was an LCS analyzed per extraction batch?	✓			
Were the LCS percent recoveries (%R) and relative percent difference (RPD) within the 80-120% (85-115% for Method 300.0) QC limits?	✓			85-115%
VI. Regional Quality Assurance and Quality Control				
Were performance evaluation (PE) samples performed?		✓		
Were the performance evaluation (PE) samples within the acceptance limits?			✓	

VALIDATION FINDINGS CHECKLIST

Validation Area	Yes	No	NA	Findings/Comments
VII. Sample Result Verification				
Were RLs adjusted to reflect all sample dilutions and dry weight factors applicable to level IV validation?	✓			
Were detection limits < RL?	✓			
VIII. Overall assessment of data				
Overall assessment of data was found to be acceptable.	✓			
IX. Field duplicates				
Field duplicate pairs were identified in this SDG.	✓			
Target analytes were detected in the field duplicates.	✓			
X. Field blanks				
Field blanks were identified in this SDG.		✓		
Target analytes were detected in the field blanks.			✓	

VALIDATION FINDINGS WORKSHEET
Technical Holding Times

All circled dates have exceeded the technical holding time.

Y N N/A Were all samples preserved as applicable to each method ?

Y N N/A Were all cooler temperatures within validation criteria? 2.3°C (Sacramento) 4.0°C (Irvine)

Methods:		Method 314.0				
Parameters:		Perchlorate				
Technical holding time:		28 Days				
Sample ID	Sampling date	Analysis date	Analysis date	Analysis date	Analysis date	Qualifier
C41-SB09-0	6/21/2006	6/27/2006				None
C41-SB09-2	6/21/2006	6/27/2006				None
C41-SB09-5	6/21/2006	6/27/2006				None
C41-SB09-15	6/21/2006	6/27/2006				None
C41-SB09-20	6/21/2006	6/27/2006				None
C41-SB09-25	6/21/2006	6/27/2006				None
C41-SB09-30	6/21/2006	6/27/2006				None
C41-SB09-35	6/21/2006	6/27/2006				None
C41-SB09-35D	6/21/2006	6/27/2006				None
C41-SB09-40	6/21/2006	6/27/2006				None
C41-SB09-45	6/21/2006	6/27/2006				None
C41-SB09-50	6/21/2006	6/27/2006				None
C41-SB09-55	6/21/2006	6/27/2006				None
C41-SB09-60	6/21/2006	6/27/2006				None
C41-SB05-2	6/21/2006	6/27/2006				None
C41-SB05-5	6/21/2006	6/27/2006				None
C41-SB05-15	6/21/2006	6/27/2006				None
C41-SB05-15MS	6/21/2006	6/27/2006				None
C41-SB05-15MSD	6/21/2006	6/27/2006				None
C41-SB05-20	6/21/2006	6/27/2006				None
C41-SB05-20D	6/21/2006	6/28/2006				None

Method: EPA Method 314.0 (Perchlorate)

Calibration Date	Column	Compound	Standard	(Y) Response	(X) Concentration	(X ²) Concentration
6/23/2006	primary	Perchlorate	Point 0	6433.60	0	0
			Point 1	34974.90	1	1
			Point 2	69214.28	2	4
			Point 3	114045.20	4	16
			Point 4	312241.38	10	100
			Point 5	726234.62	25	625
			Point 6	1463464.00	50	2500
			Point 7	3048371.20	100	10000

Regression Output

Constant	c	10848.378
Std Err of Y Est		
R Squared		0.999933
Degrees of Freedom		
X Coefficient(s)	a	b
Std Err of Coef.	27988.235	23.739
Correlation Coefficient		0.99997
Coefficient of Determination (r ²)		0.99993

METHOD: Perchlorate by IC (EPA method 314.0)

The percent recoveries (%R) of the calibration standards were calculated for the analytes identified below using the following calculation:

$$\%R = (AF * 100)/AS$$

Where:

AF = Analyte Found

AS = Analyte Spiked

Type of Analysis	Analyte	Standard ID	Found (peak area)	Spiked (Amount)	Percent Recovery		Accept? (Y/N)	Limits
					Reported	Calc'd		
Calibration Verification Low Level PQL Std. 6/26/06 (10:45)	Perchlorate	ICCS	3.4567	4.0	NA	86	Y	75-125%
Calibration Verification 6/26/06 (11:06)	Perchlorate	IPC	25.7789	25.0	NA	103	Y	90-110%
Calibration Verification 6/26/06 (11:28)	Perchlorate	IPC-MA	25.4084	25.0	NA	102	Y	80-120%
Calibration Verification 6/26/06 (16:39)	Perchlorate	CCV	25.3258	25.0	NA	101	Y	85-115%
Calibration Verification 6/26/06 (21:00)	Perchlorate	CCV	78.5314	75.0	NA	105	Y	85-115%

METHOD: Perchlorate by IC (EPA method 314.0)

The percent recoveries (%R) of the calibration standards were calculated for the analytes identified below using the following calculation:
 $\%R = (AF \cdot 100) / AS$

Where:

AF = Analyte Found

AS = Analyte Spiked

Type of Analysis	Analyte	Standard ID	Found (peak area)	Spiked (Amount)	Percent Recovery		Accept? (Y/N)	Limits
					Reported	Calc'd		
Calibration Verification Low Level PQL Std. 6/27/06 (10:39)	Perchlorate	ICCS	4.4428	4.0	NA	111	Y	75-125%
Calibration Verification 6/27/06 (11:00)	Perchlorate	IPC	26.6066	25.0	NA	106	Y	90-110%
Calibration Verification 6/27/06 (11:22)	Perchlorate	IPC-MA	26.9249	25.0	NA	108	Y	80-120%
Calibration Verification 6/27/06 (16:07)	Perchlorate	CCV	27.0829	25.0	NA	108	Y	85-115%
Calibration Verification 6/27/06 (20:28)	Perchlorate	CCV	79.9419	75.0	NA	107	Y	85-115%
Calibration Verification 6/28/06 (00:48)	Perchlorate	CCV	26.0091	25.0	NA	104	Y	85-115%

METHOD: Perchlorate by IC (EPA method 314.0)

The percent recoveries (%R) of the calibration standards were calculated for the analytes identified below using the following calculation:
 $\%R = (AF \cdot 100) / AS$

Where:

AF = Analyte Found

AS = Analyte Spiked

Type of Analysis	Analyte	Standard ID	Found (peak area)	Spiked (Amount)	Percent Recovery		Accept? (Y/N)	Limits
					Reported	Calc'd		
Calibration Verification Low Level PQL Std. 6/28/06 (9:22)	Perchlorate	ICCS	3.2576	4.0	NA	81	Y	75-125%
Calibration Verification 6/28/06 (9:44)	Perchlorate	IPC	25.8432	25.0	NA	103	Y	90-110%
Calibration Verification 6/28/06 (10:06)	Perchlorate	IPC-MA	25.7006	25.0	NA	103	Y	80-120%
Calibration Verification 6/28/06 (16:47)	Perchlorate	CCV	76.9992	75.0	NA	103	Y	85-115%
Calibration Verification 6/28/06 (21:07)	Perchlorate	CCV	25.5237	25.0	NA	102	Y	85-115%
Calibration Verification 6/29/06 (1:27)	Perchlorate	CCV	77.0024	75.0	NA	103	Y	85-115%

METHOD: Perchlorate by IC (EPA method 314.0)

The percent recoveries (%R) relative percent differences (RPD) of the matrix spike and matrix spike duplicate were calculated for perchlorate below using the following calculation:

$$\% \text{Recovery} = 100 * (SSC - SC) / SA$$

Where: SSC = Spiked concentration SC = Sample concentration
SA = Spike added

$$RPD = |MS - MSD| * 2 / (MS + MSD)$$

MS = Matrix spike recovery MSD = Matrix spike duplicate recovery

MS/MSD samples: C41-SB05-15MS & C41-SB05-15MSD

Compound	Spike Added (mg/kg)		Sample Concentration (mg/kg)	Spiked Sample Concentration (mg/kg)		MS		MSD			
	MS	MSD		MS	MSD	Percent Recovery Reported	Percent Recovery Recalc.	Percent Recovery Reported	Percent Recovery Recalc.		
Perchlorate	0.499	0.500	0.036	0.557	0.567	104	104	106	106	2	2

METHOD: Perchlorate by IC (EPA method 314.0)

The percent recoveries (%R) of the laboratory control sample were calculated for perchlorate below using the following calculation:

$$\% \text{Recovery} = 100 * (\text{SSC} - \text{SC}) / \text{SA}$$

Where: SSC = Spiked concentration SC = Sample concentration
 SA = Spike added

$$\text{RPD} = | \text{LFB} - \text{LFBBD} | * 2 / (\text{LFB} + \text{LFBBD})$$

LFB = Laboratory Fortified Blank
 LFBBD = Laboratory Fortified Blank duplicate recovery

LFB sample: 6F26110-BS1

Compound	Spike Added (mg/kg)		Sample Concentration (mg/kg)	Spiked Sample Concentration (mg/kg)		LFB		LFBBD				
	LFB	LFBBD		LFB	LFBBD	Reported	Recalc.	Reported	Recalc.			
Perchlorate	0.500	NA	---	0	0.537	NA	107	107	NA	NA	NA	NA
							Percent Recovery	Percent Recovery	Reported	Recalc.	Reported	Recalc.

LFB sample: 6F27117-BS1

Compound	Spike Added (mg/kg)		Sample Concentration (mg/kg)	Spiked Sample Concentration (mg/kg)		LFB		LFBBD				
	LFB	LFBBD		LFB	LFBBD	Reported	Recalc.	Reported	Recalc.			
Perchlorate	0.500	NA	---	0	0.544	NA	109	109	NA	NA	NA	NA
							Percent Recovery	Percent Recovery	Reported	Recalc.	Reported	Recalc.

LDC #: 0609-0106
 SDG #: S606440

VALIDATION FINDING WORKSHEET
Field Duplicates

Page: 1 of 1
 Reviewer: CT
 2nd reviewer: KE

METHOD: Perchlorate by IC (EPA method 314.0)

Y N NA Were field duplicate pairs identified in this SDG?

Y N NA Were target analytes detected in the field duplicate pairs?

Analyte	Concentration (mg/kg)		RPD	Qualifications
	C41-SB09-35	C41-SB09-35D		
Perchlorate	0.078	0.053	38	

Analyte	Concentration (mg/kg)		RPD	Qualifications
	C41-SB05-20	C41-SB05-20D		
Perchlorate	ND	ND	NA	