

Los Alamos

NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: February 8, 2002
In Reply Refer To: ESH-18/WQ&H:02-053
Mail Stop: K497
Telephone: (505) 667-7969

OFFSITE

Mr. Stephen M. Yanicak
Natural Sciences Manager
New Mexico Environment Department
Department of Energy Oversight Bureau
P.O. Box 1663 MS J993
Los Alamos, New Mexico 87545

SUBJECT: DRINKING WATER QUALITY DATA, BUCKMAN WATER SUPPLY WELLS

Dear Mr. Yanicak:

Enclosed are two letters dated October 11, and December 21, 2001, from Los Alamos National Laboratory to Ms. Marlene Sundheimer, Water Division Director, City of Santa Fe, reporting the analytical results from sampling conducted at the City of Santa Fe's Buckman Water Supply Wells. On August 16 and October 31, 2001, personnel from the City of Santa Fe escorted a sampling team from Tech Law, a contractor to the EPA Region 6, and from the Laboratory to sample the Buckman Water Supply Wells. Personnel from the NMED/DOE Oversight Bureau were also invited to participate in these sampling events. Duplicate samples were collected by Tech Law and the Laboratory at most sampling locations. The Tech Law results have been provided to you through the EPA Region 6. The Laboratory results from the duplicate samples are being provided to your agency under this transmittal with the City of Santa Fe's permission. The City of Santa Fe is also permitting the Laboratory to post these data on the Water Quality and Hydrology Group's (ESH-18) web site.

In addition, the Laboratory and the City of Santa Fe Water Division have discussed additional sampling at the Buckman Water Supply Wells in 2002.

Please contact me at 667-7969 should you have questions regarding the attached water quality data.

Sincerely,



Bob Beers
Water Quality and Hydrology Group

BB/tml



4128

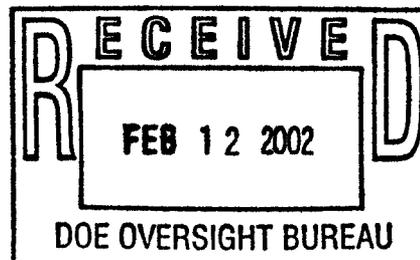
Mr. Stephen M. Yanicak
ESH-18/WQ&H:02-053

- 2 -

February 8, 2002

Enclosures: a/s

Cy: D. Doremus, City of Santa Fe, Santa Fe, New Mexico, w/enc.
A. Lewis, City of Santa Fe, Santa Fe, New Mexico, w/enc.
J. Parker, NMED/DOE/OB, Santa Fe, New Mexico, w/enc.
J. Vozella, DOE/OLASO, w/o enc., MS A316
M. Johansen, DOE/OLASO, w/o enc., MS A316
G. Turner, DOE/OLASO, w/o enc., MS A316
K. Agogino, DOE/ABQ, Albuquerque, New Mexico, w/o enc.
J. Holt, ADO, w/o enc., MS A104
L. McAtee, ESH-DO, w/o enc., MS K491
P. Thullen, ESH-DO, w/o enc., MS K491
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C. Nylander, ESH-18, w/o enc., MS K497
D. Rogers, ESH-18, w/o enc., MS K497
B. Gallaher, ESH-18, w/o enc., MS K497
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150



Los Alamos

NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: October 11, 2001
In Reply Refer To: ESH-18/WQ&H:01-348
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Marlene Sundheimer
Water Division Director
City of Santa Fe
801 West San Mateo
Santa Fe, New Mexico 87504

SUBJECT: DRINKING WATER QUALITY, BUCKMAN WATER SUPPLY WELLS

Dear Ms. Sundheimer:

On August 16, 2001, your staff escorted personnel from Tech Law, a subcontractor to the Environmental Protection Agency (EPA) Region 6, and personnel from Los Alamos National Laboratory during the sampling of Buckman Water Supply Well Nos. 1, 2 and 7. The EPA sampled these wells as part of their effort to characterize the quality of ground water in the vicinity of Los Alamos National Laboratory. These three Buckman Water Supply Wells were chosen by the EPA because of their proximity to the Rio Grande.

The Laboratory's Water Quality and Hydrology Group, in coordination with your staff, collected samples from Buckman Well Nos. 1, 2 and 7 with the EPA and submitted them to the following laboratories for analysis:

- General Engineering Laboratories (GEL), Inc., Charleston, SC, for nitrate/nitrite, perchlorate, high explosives (HE), Sr-90, and isotopic uranium;
- E.S. Babcock & Sons (Babcock), Riverside, CA, for perchlorate; and
- University of Miami's Tritium Laboratory, Miami, FL, for low-level tritium.

The attached Table 1.0 summarizes these analytical results and Attachments 1.0 through 3.0 are copies of the analytical reports. A discussion of the results follows.

Nitrate/Nitrite

Analytical results for nitrate/nitrite (as nitrogen) are:

- | | |
|---|-----------|
| • Buckman Well No. 1 | 1.17 mg/L |
| • Buckman Well No. 2 | 0.79 mg/L |
| • Buckman Well No. 7 | 1.42 mg/L |
| • Buckman Well No. 7 laboratory duplicate | 1.41 mg/L |

A field blank prepared for quality assurance purposes showed the presence of nitrate/nitrite at a concentration of 1.24 mg/L (as N). As a result, the nitrate/nitrite results for Buckman Wells Nos. 1, 2 and 7 should be qualified as nondetections (U flag) since the associated sample results were less than five times the field blank concentration.

Perchlorate

For quality assurance purposes, we submitted duplicate samples from Buckman Well Nos. 1, 2 and 7 to GEL and Babcock for perchlorate analysis. The results are:

	<u>GEL Results</u>	<u>Babcock Results</u>
• Buckman Well No. 1	Nondetect	Nondetect
• Buckman Well No. 2	Nondetect	Nondetect
• Buckman Well No. 7	0.999J $\mu\text{g/L}$	Nondetect
• Buckman Well No. 7 laboratory duplicate	Nondetect	No duplicate tested

The GEL result for Buckman Well No. 7 (0.999J $\mu\text{g/L}$) was qualified as an estimated detection (J flag) because the sample result was less than GEL's Reporting Limit (RL) of 4.00 $\mu\text{g/L}$, but greater than their Detection Limit (DL) of 0.958 $\mu\text{g/L}$. This detection was contradicted by a GEL laboratory duplicate analysis which yielded a non-detect result. The Babcock result for Buckman Well No. 7 was nondetect for perchlorate at a detection limit of 2 $\mu\text{g/L}$.

Perchlorate results below the reporting limit of 4.00 $\mu\text{g/L}$ have a high analytical uncertainty associated with them. We suspect that GEL's very low detection limit (0.958 $\mu\text{g/L}$) may be producing false positives. GEL's detection limit was determined using deionized water while the detection limit for a groundwater sample water may be higher due to interference from naturally occurring constituents. In an effort to gain a better understanding about possible matrix effects, the Laboratory asked GEL to rerun the Buckman Well No. 7 sample for perchlorate. Reanalysis will be conducted using the Method of Standard Additions. In this method an aliquot of the original sample is spiked with perchlorate then analyzed. This process is repeated four times with consecutively higher spike concentrations. We will provide these results to you as soon as they become available from GEL.

High Explosives

No high explosives were detected in any of the samples collected from Buckman Well Nos. 1, 2 and 7 at concentrations greater than GEL's Method Detection Limit (MDL). The results were confirmed through data validation.

Tritium

No tritium was detected in any of the samples collected from Buckman Well Nos. 1, 2 and 7. A detection for tritium is defined as an analytical result that is equal to or greater than three times the one sigma analytical uncertainty.

Sr-90

No Sr-90 was detected in any of the samples collected from Buckman Well Nos. 1, 2 and 7. A detection for Sr-90 is defined as an analytical result that is equal to or greater than three times the one sigma analytical uncertainty and greater than the Minimum Detectable Activity (MDA). Validation of the Sr-90 data from Buckman Well Nos. 1, 2 and 7 determined that the results should be qualified as "BD" (Below Detection) due to a low reported value (i.e., a value below GEL's Minimum Detectable Activity).

Isotopic Uranium

Samples from Buckman Well Nos. 1, 2 and 7 were analyzed for isotopic uranium. Uranium isotopes $^{233/234}\text{U}$, $^{235/236}\text{U}$, and ^{238}U were detected in each sample at activities greater than the Minimum Detectable Activity (MDA). In addition, we calculated the concentration of total uranium in each sample using the following formula, which incorporates the specific activities for the isotopes. We assume that no ^{233}U or ^{236}U are present in the sample:

$$\text{Total Uranium } (\mu\text{g/L}) = (^{233/234}\text{U}/6250) + (^{235/236}\text{U}/2.16) + (^{238}\text{U}/0.336)$$

The calculated concentration of total uranium in Buckman Well Nos. 1, 2 and 7 are:

- Buckman Well No. 1 6.2 $\mu\text{g/L}$
- Buckman Well No. 1 laboratory duplicate 6.3 $\mu\text{g/L}$
- Buckman Well No. 2 222 $\mu\text{g/L}$
- Buckman Well No. 7 5.3 $\mu\text{g/L}$
- Buckman Well No. 7 laboratory duplicate 5.1 $\mu\text{g/L}$

Validation of the Buckman Well No. 1 isotopic uranium results determined that the reported values are acceptable. Validation of the Buckman Well No. 2 isotopic uranium results qualified the reported values with a "J+" flag (estimated value, with low bias) due to low tracer recoveries. Validation of the Buckman Well No. 7 isotopic uranium results qualified the reported values with a "J-" flag (estimated value, with high bias) due to high tracer recoveries.

Both the Buckman Well Nos. 1 and 7 results are below the new federal Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL) for uranium of 30 $\mu\text{g/L}$ (effective date: December 7, 2003).

The Buckman Well No. 2 result of 222 $\mu\text{g/L}$ is significantly higher than the new SDWA MCL of 30 $\mu\text{g/L}$. However, this result is consistent with previous uranium results from this well. The New Mexico Public Water System Sampling Results database for Buckman Well No. 2 shows total uranium in December, 1997, of 310 $\mu\text{g/L}$ and in October, 1999, of 170 $\mu\text{g/L}$. The 1999 result of 170 $\mu\text{g/L}$ is the same as the total uranium result reported in the City of Santa Fe's 2000 Water Quality Report (170 ppb).

The EPA has proposed additional groundwater sampling in the vicinity of Los Alamos National Laboratory and we are recommending to EPA that additional sampling be conducted at Buckman Well Nos. 1, 2 and 7 in order to provide additional data. We would appreciate the opportunity to split samples again with the EPA in coordination with the City of Santa Fe.

Please contact me at (505) 667-7969 should you have any questions regarding this matter.

Sincerely,



Bob Beers
Water Quality and Hydrology Group

BB/tml

Enclosures: a/s

Cy: D. Doremus, City of Santa Fe, Santa Fe, NM, w/enc.
J. Vozella, DOE/LAAO, w/enc., MS A316
M. Johansen, DOE/LAAO, w/enc., MS A316
K. Agogino, DOE/ABQ, Albuquerque, NM, w/enc.
J. Holt, ADO, w/enc., MS A104
L. McAtee, ESH-DO, w/enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
B. Gallaher, ESH-18, w/enc., MS K497
D. Rogers, ESH-18, w/enc., MS K497
C. Nylander, ESH-18, w/enc., MS K497
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

Table 1.0. Analytical Results, August 16, 2001, City of Santa Fe Buckman Water Supply Wells¹.

Buckman Wells	Nitrate (mg/L)	HE (ug/L)	Perchlorate (ug/L)		Tritium (pCi/L)			Sr-90 (pCi/L)			
	Result (as N)	Result	GEL	Babcock	Result	Uncertainty ⁴	Detect? ⁵ (Y/N)	Result	Uncertainty ⁴	MDA	Detect? ⁵ (Y/N)
#1	1.17 ²	U	<0.958	<2	0.00	0.29	N	-0.16 ⁶	0.0819	0.215	N
#2	0.79 ²	U	<0.958	<2	-0.19	0.29	N	0.133 ⁶	0.0598	0.151	N
#7	1.42 ²	U	0.999 ³	<2	0.22	0.29	N	-0.0114 ⁶	0.0578	0.159	N
#7 dup. ⁹	1.41	NA	<0.958	NA	NA			NA			

Buckman Wells	U-233/234 (pCi/L)				U-235/236 (pCi/L)				U-238 (pCi/L)				Total U (ug/L)	
	Result	Uncertainty ⁴	MDA	Detect? ⁵ (Y/N)	Result	Uncertainty ⁴	MDA	Detect? ⁵ (Y/N)	Result	Uncertainty ⁴	MDA	Detect? ⁵ (Y/N)	Result	Uncertainty ⁴
#1	3.49	0.269	0.0377	Y	0.144	0.0251	0.0258	Y	2.07	0.168	0.042	Y	6.23	0.50
#1 dup. ⁹	3.75	0.285	0.0092	Y	0.108	0.0222	0.0364	Y	2.09	0.169	0.0248	Y	6.27	0.50
#2	92.6 ⁷	6.99	0.141	Y	4.7 ⁷	0.402	0.0221	Y	73.7 ⁷	5.57	0.0753	Y	221.54	16.58
#7	5.12 ⁸	0.378	0.0232	Y	0.113 ⁸	0.019	0.0185	Y	1.76 ⁸	0.141	0.0232	Y	5.29	0.42
#7 dup. ⁹	5.01	0.369	0.0182	Y	0.149	0.0225	0.0231	Y	1.68	0.135	0.0349	Y	5.07	0.40

Notes:

¹ All analyses by General Engineering Laboratories (GEL) with the exception of duplicate perchlorate analyses by E.S. Babcock & Sons (Babcock) and low-level tritium by University of Miami.

² Validation of data qualified this result as "U" (compound not detected) due to field blank contamination.

³ J flag indicates an estimated detection. The result was greater than the MDL of 0.958 ppb, but less than the RL of 4.00 ppb.

⁴ Uncertainty means analytical uncertainty (+/-), expressed as one standard deviation (1s).

⁵ A detection is defined as a value that is equal to or greater than three times the uncertainty (i.e., three times one standard deviation or 3-sigma) and greater than the MDA (Minimum Detectable Activity).

⁶ Validation of data qualified this result as "BD" (Below Detection) due to a low reported value (ie, below Minimum Detectable Activity).

⁷ Validation of data qualified this result as "J+" due to low tracer recovery.

⁸ Validation of data qualified this result as "J-" due to high tracer recovery.

⁹ A duplicate sample prepared by GEL for QC purposes.

ATTACHMENT 1.0

ANALYTICAL REPORTS

**GENERAL ENGINEERING LABORATORIES
CHARLESTON, SC**

BUCKMAN WELLS #1, #2, #7

**NITRATE/NITRITE
PERCHLORATE
HIGH EXPLOSIVES
STRONTIUM-90
URANIUM**

SAMPLE DATE: AUGUST 16, 2001

BUCKMAN #1

Certificate of Analysis

Company : Los Alamos National Labs
Address : MS K497 ESH-18
Water Quality & Hydrology
Los Alamos, New Mexico 87545
Contact: Billy Turney
Project: Groundwater

Report Date: September 10, 2001

Page 1 of 1

Client Sample ID: GU01081BUCK1
Sample ID: 47702001
Matrix: Ground Water
Collect Date: 16-AUG-01
Receive Date: 17-AUG-01
Collector: Client
Project: LANL00701
Client ID: LANL003

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
<i>EPA 314.0 Perchlorate by IC</i>											
Perchlorate	U	ND	0.958	4.00	ug/L	1	RWS	09/06/01	1519	108098	1
TRAACS Nutrient Analysis Fed											
<i>EPA 353.1 Nitrogen, (NO3/NO2)</i>											
Nitrogen, Nitrate/Nitrite		1.17	0.0069	0.050	mg/L	1	THL	08/24/01	1318	105726	2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	08/21/01	1000	105072

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 314.0	
2	EPA 353.1	

Notes:

The Qualifiers in this report are defined as follows :

- ** Indicates the analyte is a surrogate compound.
- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

The above sample is reported on an "as received" basis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, Inc. standard operating procedures. Please direct any questions to your Project Manager, Edie Kent.

Reviewed by



Certificate of Analysis

Company : Los Alamos National Labs
 Address : MS K497 ESH-18
 Water Quality & Hydrology
 Los Alamos, New Mexico 87545
 Contact: Billy Turney
 Project: Groundwater

Report Date: September 10, 2001

Page 1 of 1

Client Sample ID: GU01081BUCK2
 Sample ID: 47702003
 Matrix: Ground Water
 Collect Date: 16-AUG-01
 Receive Date: 17-AUG-01
 Collector: Client

Project: LANL00701
 Client ID: LANL003

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Ion Chromatography Federal										
EPA 314.0 Perchlorate by IC										
Perchlorate	U	ND	0.958	4.00	ug/L	1	RWS 09/06/01	1559	108098	1
TRAACS Nutrient Analysis Fed										
EPA 353.1 Nitrogen, (NO3/NO2)										
Nitrogen, Nitrate/Nitrite		0.790	0.0069	0.050	mg/L	1	THL 08/24/01	1318	105726	2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	08/21/01	1000	105072

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 314.0	
2	EPA 353.1	

Notes:

The Qualifiers in this report are defined as follows :

- ** Indicates the analyte is a surrogate compound.
- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

The above sample is reported on an "as received" basis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, Inc. standard operating procedures. Please direct any questions to your Project Manager, Edie Kent.

Reviewed by

Certificate of Analysis

Company : Los Alamos National Labs
 Address : MS K497 ESH-18
 Water Quality & Hydrology
 Los Alamos, New Mexico 87545
 Contact: Billy Turney
 Project: Groundwater

Report Date: September 10, 2001

Page 1 of 1

Client Sample ID: GU01081BUCK7
 Sample ID: 47702004
 Matrix: Ground Water
 Collect Date: 16-AUG-01
 Receive Date: 17-AUG-01
 Collector: Client
 Project: LANL00701
 Client ID: LANL003

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
<i>EPA 314.0 Perchlorate by IC</i>											
Perchlorate	J	0.999	0.958	4.00	ug/L	1	RWS	09/06/01	1609	108098	1
TRAACS Nutrient Analysis Fed											
<i>EPA 353.1 Nitrogen, (NO3/NO2)</i>											
Nitrogen, Nitrate/Nitrite		1.42	0.0069	0.050	mg/L	1	THL	08/24/01	1318	105726	2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	08/21/01	1000	105072

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 314.0	
2	EPA 353.1	

Notes:

The Qualifiers in this report are defined as follows :

- ** Indicates the analyte is a surrogate compound.
- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

The above sample is reported on an "as received" basis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, Inc. standard operating procedures. Please direct any questions to your Project Manager, Edie Kent.

Reviewed by

BUCKMAN #1
FIELD BLANK

Certificate of Analysis

Company : Los Alamos National Labs
Address : MS K497 ESH-18
Water Quality & Hydrology
Los Alamos, New Mexico 87545
Contact: Billy Turney
Project: Groundwater

Report Date: September 10, 2001

Page 1 of 1

Client Sample ID: GU01081BUCK1-FLD
Sample ID: 47702002
Matrix: Ground Water
Collect Date: 16-AUG-01
Receive Date: 17-AUG-01
Collector: Client

Project: LANL00701
Client ID: LANL003

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
EPA 314.0 Perchlorate by IC											
Perchlorate	U	ND	0.958	4.00	ug/L	1	RWS	09/06/01	1549	108098	1
TRAACS Nutrient Analysis Fed											
EPA 353.1 Nitrogen, (NO3/NO2)											
Nitrogen, Nitrate/Nitrite		1.24	0.0069	0.050	mg/L	1	THL	08/24/01	1318	105726	2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	08/21/01	1000	105072

The following Analytical Methods were performed

Method	Description	Analyst	Comments
1	EPA 314.0		
2	EPA 353.1		

Notes:

The Qualifiers in this report are defined as follows :

- ** Indicates the analyte is a surrogate compound.
- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

The above sample is reported on an "as received" basis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, Inc. standard operating procedures. Please direct any questions to your Project Manager, Edie Kent.

Reviewed by



BUCKMAN #7
LAB DUPLICATES

QC Summary

Report Date: September 10, 2001
Page 1 of 2

Client : Los Alamos National Labs
MS K497 ESH-18
Water Quality & Hydrology
Los Alamos, New Mexico
Contact: Billy Turney
Workorder: 47702

Parmname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Ion Chromatography Federal										
Batch 108098										
QC1200078183 47476008 DUP										
Perchlorate		U ND U	ND	ug/L	N/A		(+-8.00)	RWS	09/06/01	18:38
QC1200078184 47702004 DUP										
Perchlorate		J 0.999 U	ND	ug/L	N/A ^		(+-4.00)		09/06/01	16:19
QC1200078185 47562017 DUP										
Perchlorate		U ND U	ND	ug/L	N/A		(+-20.0)		09/06/01	19:57
QC1200078186 47773015 DUP										
Perchlorate		U ND U	ND	ug/L	N/A		(+-4.00)		09/06/01	16:59
QC1200078696 47788001 DUP										
Perchlorate		U ND J	0.996	ug/L	N/A		(+-4.00)		09/06/01	12:41
QC1200078191 LCS	50.0			49.8	ug/L	100	(90%-110%)		09/06/01	12:11
Perchlorate	50.0			49.1	ug/L	1	98 (0%-20%)		09/06/01	12:21
QC1200078695 LCSD	50.0									
Perchlorate			U	ND	ug/L				09/06/01	12:01
QC1200078182 MB										
Perchlorate			U	ND	ug/L					
QC1200078187 47476008 PS	50.0	U	ND	53.8	ug/L	108	(70%-130%)		09/06/01	18:48
Perchlorate	50.0	J	0.999	52.4	ug/L	103	(70%-130%)		09/06/01	16:29
QC1200078188 47702004 PS	50.0									
Perchlorate	50.0	U	ND	54.8	ug/L	110	(70%-130%)		09/06/01	20:07
QC1200078189 47562017 PS	50.0									
Perchlorate	50.0	U	ND	51.3	ug/L	103	(70%-130%)		09/06/01	17:09
QC1200078190 47773015 PS	50.0									
Perchlorate	50.0	U	ND	51.1	ug/L	102	(70%-130%)		09/06/01	12:51
QC1200078697 47788001 PS	50.0	U	ND							
Perchlorate										
TRAACS Nutrient Analysis Fed										
Batch 105726										
QC1200072128 47562017 DUP										
Nitrogen, Nitrate/Nitrite			1.19	1.20	mg/L	1 ^	(+-1.10)	THL	08/24/01	13:18
QC1200072130 47702004 DUP										
Nitrogen, Nitrate/Nitrite			1.42	1.41	mg/L	1 ^	(+-1.10)			
QC1200072132 47773015 DUP										
Nitrogen, Nitrate/Nitrite			0.430	0.430	mg/L	0 ^	(+-1.10)			
QC1200072127 LCS	1.00			0.990	mg/L	99	(81%-121%)			
Nitrogen, Nitrate/Nitrite	1.00									
QC1200072126 MB				0.010	mg/L					
Nitrogen, Nitrate/Nitrite										
QC1200072129 47562017 PS	1.00		1.19	1.79	mg/L	60*	(61%-134%)			
Nitrogen, Nitrate/Nitrite	1.00									
QC1200072131 47702004 PS	1.00		1.42	2.34	mg/L	92	(61%-134%)			
Nitrogen, Nitrate/Nitrite	1.00									
QC1200072133 47773015 PS	1.00		0.430	1.31	mg/L	88	(61%-134%)			
Nitrogen, Nitrate/Nitrite	1.00									

BUCKMAN #1

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01081BUCK1

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 47702

Matrix: (soil/water) WATER Lab Sample ID: 47702001

Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2H2210

Level: (low/med) LOW Date Received: 08/17/01

% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 08/21/01

Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 08/22/01

Injection Volume: 0.100 (mL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L Q

2691-41-0	-----HMX	0.10	U
121-82-4	-----RDX	0.10	U
99-35-4	-----1,3,5-Trinitrobenzene	0.10	U
99-65-0	-----1,3-Dinitrobenzene	0.10	U
98-95-3	-----Nitrobenzene	0.10	U
479-45-8	-----Tetryl	0.10	U
118-96-7	-----2,4,6-Trinitrotoluene	0.10	U
35572-78-2	-----2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0	-----4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2	-----2,4-Dinitrotoluene	0.10	U
606-20-2	-----2,6-Dinitrotoluene	0.10	U
88-72-2	-----2-Nitrotoluene	0.10	U
99-99-0	-----4-Nitrotoluene	0.10	U
99-08-1	-----3-Nitrotoluene	0.10	U

BUCKMAN #2

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01081BUCK2

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 47702

Matrix: (soil/water) WATER Lab Sample ID: 47702003

Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2H2212

Level: (low/med) LOW Date Received: 08/17/01

% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 08/21/01

Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 08/22/01

Injection Volume: 0.100 (mL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L Q

2691-41-0-----	HMX	0.10	U
121-82-4-----	RDX	0.10	U
99-35-4-----	1,3,5-Trinitrobenzene	0.10	U
99-65-0-----	1,3-Dinitrobenzene	0.10	U
98-95-3-----	Nitrobenzene	0.10	U
479-45-8-----	Tetryl	0.10	U
118-96-7-----	2,4,6-Trinitrotoluene	0.10	U
35572-78-2-----	2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0-----	4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2-----	2,4-Dinitrotoluene	0.10	U
606-20-2-----	2,6-Dinitrotoluene	0.10	U
88-72-2-----	2-Nitrotoluene	0.10	U
99-99-0-----	4-Nitrotoluene	0.10	U
99-08-1-----	3-Nitrotoluene	0.10	U

BUCKMAN #7

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01081BUCK7

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A
 Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 47702
 Matrix: (soil/water) WATER Lab Sample ID: 47702004
 Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2H2215
 Level: (low/med) LOW Date Received: 08/17/01
 % Moisture: _____ decanted: (Y/N) _____ Date Extracted: 08/21/01
 Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 08/23/01
 Injection Volume: 0.100 (mL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
2691-41-0	-----HMX	0.10	U
121-82-4	-----RDX	0.10	U
99-35-4	-----1,3,5-Trinitrobenzene	0.10	U
99-65-0	-----1,3-Dinitrobenzene	0.10	U
98-95-3	-----Nitrobenzene	0.10	U
479-45-8	-----Tetryl	0.10	U
118-96-7	-----2,4,6-Trinitrotoluene	0.10	U
35572-78-2	-----2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0	-----4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2	-----2,4-Dinitrotoluene	0.10	U
606-20-2	-----2,6-Dinitrotoluene	0.10	U
88-72-2	-----2-Nitrotoluene	0.10	U
99-99-0	-----4-Nitrotoluene	0.10	U
99-08-1	-----3-Nitrotoluene	0.10	U

BUCKMAN #1
FIELD BLANK

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01081B
UCK1-FLD

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 47702

Matrix: (soil/water) WATER Lab Sample ID: 47702002

Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2H2211

Level: (low/med) LOW Date Received: 08/17/01

% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 08/21/01

Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 08/22/01

Injection Volume: 0.100 (mL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L Q

2691-41-0-----	HMX	0.10	U
121-82-4-----	RDX	0.10	U
99-35-4-----	1,3,5-Trinitrobenzene	0.10	U
99-65-0-----	1,3-Dinitrobenzene	0.10	U
98-95-3-----	Nitrobenzene	0.10	U
479-45-8-----	Tetryl	0.10	U
118-96-7-----	2,4,6-Trinitrotoluene	0.10	U
35572-78-2-----	2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0-----	4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2-----	2,4-Dinitrotoluene	0.10	U
606-20-2-----	2,6-Dinitrotoluene	0.10	U
88-72-2-----	2-Nitrotoluene	0.10	U
99-99-0-----	4-Nitrotoluene	0.10	U
99-08-1-----	3-Nitrotoluene	0.10	U

BUCKMAN #1



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Certificate of Analysis

Company : Los Alamos National Labs
Address : MS K497 ESH-18
Water Quality & Hydrology
Los Alamos, New Mexico 87545
Contact: Billy Turney
Project: Groundwater

Report Date: September 10, 2001

Page 1 of 2

Client Sample ID: GU01081BUCK1
Sample ID: 47702001
Matrix: Ground Water
Collect Date: 16-AUG-01
Receive Date: 17-AUG-01
Collector: Client
Project: LANL00701
Client ID: LANL003

Parameter	Qualifier	Result	TPU	Units	DF	AnalystDate	Time	Batch Mtd.
Rad Alpha Spec								
<i>Alphaspec U, liquid</i>								
Uranium-233/234		3.49	0.0377	0.269	0.100	pCi/L	HOT1 09/05/01 2049	107157 1
Uranium-235/236		0.144	0.0258	0.0251	0.100	pCi/L		
Uranium-238		2.07	0.042	0.168	0.100	pCi/L		
Rad Gas Flow								
<i>GFPC, Sr90, liquid</i>								
Strontium-90		-0.16	0.215	0.0819	0.200	pCi/L	LOM1 09/01/01 1220	104612 2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	08/21/01	1000	105072

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

The Qualifiers in this report are defined as follows :

- ** Indicates the analyte is a surrogate compound.
- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

The above sample is reported on an "as received" basis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, Inc. standard operating procedures. Please direct any questions to your Project Manager, Edie Kent.

M. Nune

BUCKMAN #1
LAB DUPLICATE



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

QC Summary

Report Date: September 10, 2001
Page 1 of 2

Client: Los Alamos National Labs
MS K497 ESH-18
Water Quality & Hydrology
Los Alamos, New Mexico

Contact: Billy Turney

Workorder: 47702

Paramname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anist	Date Time
• BUCKMAN #1 LAB DUPLICATE •									
Rad Alpha Spec Batch 107157									
QC1200075648 47702001 DUP			3.49	3.75	pCi/L	7	(0%-20%)	HOT1	09/05/01 20:49
Uranium-233/234		TPU:	0.269	0.285					
			0.144	0.108	pCi/L	29 ^	(-0.100)		
Uranium-235/236		TPU:	0.0251	0.0222					
			2.07	2.09	pCi/L	1	(0%-20%)		
Uranium-238		TPU:	0.168	0.169					
QC1200075649 LCS				5.23	pCi/L		(75%-125%)		09/06/01 09:57
Uranium-233/234		TPU:		0.531			(75%-125%)		
Uranium-235/236		TPU:		0.154	pCi/L				
Uranium-238	6.12	TPU:		0.0544		96	(75%-125%)		
				5.86	pCi/L				
		TPU:		0.585					09/05/01 20:49
QC1200075647 MB				0.0218	pCi/L				
Uranium-233/234		TPU:		0.0127					
Uranium-235/236		TPU:		0.0073	pCi/L				
Uranium-238		TPU:		0.00519					
				0.0109	pCi/L				
		TPU:		0.00818					
Rad Gas Flow Batch 104612									
QC1200069185 47562017 DUP				13.5	pCi/L		(0%-20%)	LOM1	09/01/01 12:12
Strontium-90		TPU:		1.90					
QC1200069187 LCS		20.5		19.1	pCi/L	93	(75%-125%)		09/03/01 12:25
Strontium-90		TPU:		2.99					09/01/01 12:12
QC1200069184 MB				-0.006	pCi/L				
Strontium-90		TPU:		0.0607					
QC1200069186 47562017 MS		116		132	pCi/L	103	(75%-125%)		09/03/01 12:25
Strontium-90		TPU:		20.1					

Notes:

The Qualifiers in this report are defined as follows:

- Indicates the analyte is a surrogate compound.
- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- E Concentration exceeds instrument calibration range



GENERAL ENGINEERING LABORATORIES

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BUCKMAN #2

Certificate of Analysis

Company : Los Alamos National Labs
 Address : MS K497 ESH-18
 Water Quality & Hydrology
 Los Alamos, New Mexico 87545
 Contact: Billy Turney
 Project: Groundwater

Report Date: September 10, 2001

Page 1 of 1

Client Sample ID: GU01081BUCK2
 Sample ID: 47702003
 Matrix: Ground Water
 Collect Date: 16-AUG-01
 Receive Date: 17-AUG-01
 Collector: Client
 Project: LANL00701
 Client ID: LANL003

Parameter	Qualifier	Result	TPU	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec										
<i>Alphaspec U, liquid</i>										
Uranium-233/234		92.6	0.141	6.99	0.100					
Uranium-235/236		4.70	0.0221	0.402	0.100					
Uranium-238		73.7	0.0753	5.57	0.100					
Rad Gas Flow										
<i>GFPC, Sr-90, liquid</i>										
Sr-90		0.133	0.151	0.0598	0.200					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	08/21/01	1000	105072

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

The Qualifiers in this report are defined as follows :

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- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

The above sample is reported on an "as received" basis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, Inc. standard operating procedures. Please direct any questions to your Project Manager, Edie Kent.

M. Moore

Reviewed by

BUCKMAN #7



GENERAL ENGINEERING LABORATORIES

Meeting today's needs with a vision for tomorrow.

Certificate of Analysis

Company: Los Alamos National Labs
Address: MS K497 ESH-18
Water Quality & Hydrology
Los Alamos, New Mexico 87545
Contact: Billy Turney
Project: Groundwater

Report Date: September 10, 2001

Page 1 of 1

Client Sample ID: GU01081BUCK7
Sample ID: 47702004
Matrix: Ground Water
Collect Date: 16-AUG-01
Receive Date: 17-AUG-01
Collector: Client
Project: LANL00701
Client ID: LANL003

Parameter	Qualifier	Result	TPU	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Gas Flow										
GFPC, Sr90, liquid										
Sr-90		-0.0114	0.159	0.0578	0.200	pCi/L	LOM109/01/01	1212	104612	1

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	08/21/01	1000	105072

The following Analytical Methods were performed

Method	Description
1	EPA 905.0

Notes:

The Qualifiers in this report are defined as follows :

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- > Actual result is greater than amount reported
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

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Reviewed by

BUCKMAN #7



GENERAL ENGINEERING LABORATORIES

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Certificate of Analysis

Company : Los Alamos National Labs
Address : MS K497 ESH-18
Water Quality & Hydrology
Los Alamos, New Mexico 87545
Contact: Billy Turney
Project: Groundwater

Report Date: September 24, 2001

Page 1 of 1

Client Sample ID: GU01081BUCK7
Sample ID: 49172001
Matrix: Ground Water
Collect Date: 16-AUG-01
Receive Date: 19-SEP-01
Collector: Client
Project: LANL00701
Client ID: LANL003

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec												
<i>Alphaspec U, Liquid</i>												
Uranium-233/234		5.12	0.0232	0.378	0.100	pCi/L						
Uranium-235/236		0.113	0.0185	0.019	0.100	pCi/L						
Uranium-238		1.76	0.0232	0.141	0.100	pCi/L						

SWM 09/21/01 1825 110579 1

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300

Notes:

The Qualifiers in this report are defined as follows :

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- > Actual result is greater than amount reported
- E Concentration exceeds instrument calibration range
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Reviewed by





GENERAL ENGINEERING LABORATORIES

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*BUCKMAN #7
LAB DUPLICATE*

QC Summary

Report Date: September 24, 2001
Page 1 of 1

Client : Los Alamos National Labs
MS K497 ESH-18
Water Quality & Hydrology
Los Alamos, New Mexico
Contact: Billy Turney
Workorder: 49172

Paramname	NOM	Sample Qual	QC	Units	RPD%	REC%	Range	Anist	Date Time
<i>• BUCKMAN #7 LAB DUPLICATE •</i>									
Rad Alpha Spec Batch 110579									
QC1200084203 49172001 DUP									
Uranium-233/234		5.12	5.01	pCi/L	2		(0%-20%) SWM		09/21/01 18:25
		TPU: 0.378	0.369						
Uranium-235/236		0.113	0.149	pCi/L	28	^	(+/-0.100)		
		TPU: 0.019	0.0225						
Uranium-238		1.76	1.68	pCi/L	5		(0%-20%)		
		TPU: 0.141	0.135						
QC1200084204 LCS			3.40	pCi/L			(75%-125%)		
Uranium-233/234			0.263						
		TPU: 0.674	0.674	pCi/L			(75%-125%)		
Uranium-235/236			0.067						
		TPU: 3.23	3.23	pCi/L		79	(75%-125%)		
Uranium-238	4.08		0.251						
		TPU: 0.0242	0.0242	pCi/L					
QC1200084202 MB			0.00984						
Uranium-233/234			-0.00809	pCi/L					
		TPU: 0.00606	0.00606	pCi/L					
Uranium-235/236			0.00						
		TPU: 1.00	1.00	pCi/L					
Uranium-238									
		TPU: 1.00	1.00						

Notes:

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- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
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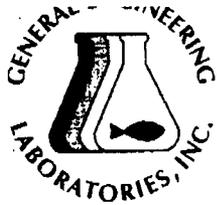
N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more.
 ^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
 For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

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GENERAL ENGINEERING LABORATORIES

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BUCKMAN #1
FIELD BLANK

Certificate of Analysis

Company : Los Alamos National Labs
 Address : MS K497 ESH-18
 Water Quality & Hydrology
 Los Alamos, New Mexico 87545
 Contact: Billy Turney
 Project: Groundwater

Report Date: September 10, 2001

Page 1 of 1

Client Sample ID: GU01081BUCK1-FLD
 Sample ID: 47702002
 Matrix: Ground Water
 Collect Date: 16-AUG-01
 Receive Date: 17-AUG-01
 Collector: Client
 Project: LANL00701
 Client ID: LANL003

Parameter	Qualifier	Result	TPU	Units	DF	AnalystDate	Time	Batch	Mtd.
Rad Alpha Spec									
<i>Alphaspec U, liquid</i>									
Uranium-233/234		-0.0073	0.0579	0.0137	0.100	pCi/L	HOT1 09/05/01	2049	107157 1
Uranium-235/236		-0.011	0.061	0.0142	0.100	pCi/L			
Uranium-238		0.0073	0.0478	0.0127	0.100	pCi/L			
Rad Gas Flow									
<i>GFPC, Sr90, liquid</i>									
Strontium-90		-0.0437	0.181	0.0661	0.200	pCi/L	LOM1 09/01/01	1220	104612 2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	08/21/01	1000	105072

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

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- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
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M. Moore

Reviewed by

ATTACHMENT 2.0

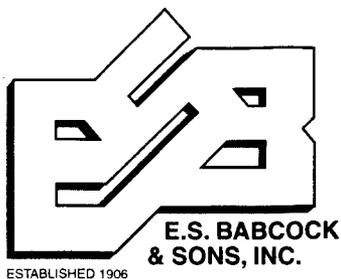
ANALYTICAL REPORTS

**E.S. BABCOCK & SONS, INC.
RIVERSIDE, CA**

BUCKMAN WELLS #1, #2, #7

PERCHLORATE

SAMPLE DATE: AUGUST 16, 2001



Environmental Laboratory Certification #1156
6100 Quail Valley Court Riverside, CA 92507-0704
P.O. Box 432 Riverside, CA 92502-0432
PH (909) 653-3351 FAX (909) 653-1662
e-mail: esbsales@aol.com
www.babcocklabs.com

BUCKMAN #1

Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01081 BUCK1
Site: LANL
Description:

Matrix: grndwater

Page: 1 of Lab No.: L88699-001

Date Reported: 08/29/2001

Collected By: RB
Date: 08/17/2001
Time: 0945
Submitted By: Fed Ex
Date: 08/17/2001
Time: 0910

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	010824/KO

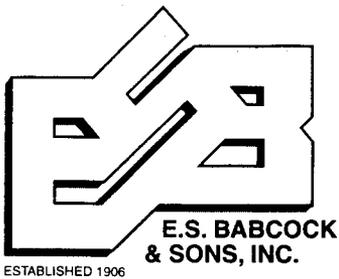
ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace(Less than RL, above MDL), value estimated

CC:



ESB Project Reviewer



Environmental Laboratory Certification #1156
6100 Quail Valley Court Riverside, CA 92507-0704
P.O. Box 432 Riverside, CA 92502-0432
PH (909) 653-3351 FAX (909) 653-1662
e-mail: esbsales@aol.com
www.babcocklabs.com

BUCKMAN #2

Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01081 BUCK2
Site: LANL
Description:

Matrix: grndwater

Page: 1 of 1
Lab No.: L88699-004

Date Reported: 08/29/01

Collected By: RB
Date: 08/17/01
Time: 1140
Submitted By: Fed Ex
Date: 08/17/01
Time: 0910

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	16.	010827/KOS

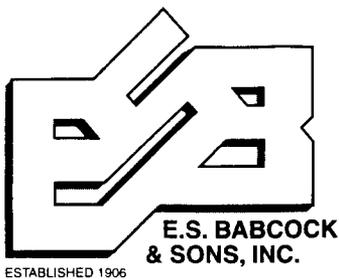
ND = None detected at RL (Reporting Limit). RL units same as result.

J=Trace (Less than RL, above MDL), value estimated Perchlorate sample diluted 4X due to matrix. MDL not adjusted for dilution.

cc:



ESB Project Reviewer



Environmental Laboratory Certification #1156
6100 Quail Valley Court Riverside, CA 92507-0704
P.O. Box 432 Riverside, CA 92502-0432
PH (909) 653-3351 FAX (909) 653-1662
e-mail: esbsales@aol.com
www.babcocklabs.com

BUCKMAN #7

Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01081 BUCK7
Site: LANL
Description:

Matrix: grndwater

Page: 1 of
Lab No.: L88699-003

Date Reported: 08/29/2001

Collected By: RB
Date: 08/17/2001
Time: 1045
Submitted By: Fed Ex
Date: 08/17/2001
Time: 0910

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	010824/KO

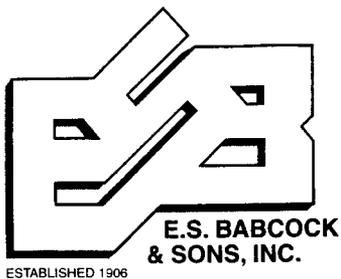
ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace(Less than RL, above MDL), value estimated

CC:



ESB Project Reviewer



Environmental Laboratory Certification #1156
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e-mail: esbsales@aol.com
www.babcocklabs.com

*BUCKMAN #1
FIELD BLANK*

Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01081 BUCK1-FLD
Site: LANL
Description:

Matrix: grndwater

Page: 1 of
Lab No.: L88699-002

Date Reported: 08/29/2001

Collected By: RB
Date: 08/17/2001
Time: 0945
Submitted By: Fed Ex
Date: 08/17/2001
Time: 0910

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	010824/KO

ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace(Less than RL, above MDL), value estimated

CC:

ESB Project Reviewer

ATTACHMENT 3.0

ANALYTICAL REPORTS

**UNIVERSITY OF MIAMI
TRITIUM LABORATORY
MIAMI, FL**

BUCKMAN WELLS #1, #2, #7

TRITIUM

SAMPLE DATE: AUGUST 16, 2001



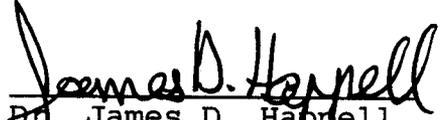
September 20, 2001

TRITIUM LABORATORY

Data Release #01-099
Job # 1525

LOS ALAMOS NATIONAL LABORATORY
TRITIUM SAMPLES

Purchase Order 13004-001-00-8H


Dr. James D. Happell
Assistant Research Professor

Distribution:

William R. Turney
University of California, LANL
MS K497
Los Alamos, New Mexico 87545

Rosenstiel School of Marine and Atmospheric Science
Tritium Laboratory
4600 Rickenbacker Causeway
Miami, FL 33149-1098
Phone: (305) 361-4100
Fax: (305) 361-4112
email: tritium@rsmas.miami.edu

Revised 17 July 2001

GENERAL COMMENTS ON TRITIUM RESULTS

Tritium Scale

Tritium concentrations are expressed in TU, where 1 TU indicates a Tritium/Hydrogen ratio of 10^{-18} . The values refer to the tritium scale of U.S. National Institute of Science and Technology (formerly NBS), and based on their tritium water standard #4926. Age corrections and conversions are made using the half-life of **12.43 years**, i.e., $\lambda = 5.576\% \text{ year}^{-1}$. In this scale, 1 TU is 7.088 dpm/kg H₂O, or 3.193 pCi/kg H₂O, or 0.1181 Bq/kg H₂O (Bq = disint/sec).

TU values are calculated for the date of sample collection, REFDATE in the table, as provided by the submitter. If no such date is available, the date of the sample's arrival at our laboratory is used.

The stated errors, eTU, are one standard deviation (1 sigma), including all conceivable contributions. In the table, QUANT is the quantity of sample received, and ELYS is the amount of water taken for electrolytic enrichment. DIR means direct run (no enrichment).

Remark: A revised value for the half-life, 12.32 years, has recently been recommended by the International Atomic Energy Agency. The use of this number (instead of 12.43 years) would, in practice, only affect the conversion of dpm to TU, and the correction would amount to 0.9 % in reported TU-values. This is insignificant since our reported values carry 1 sigma uncertainties of 3 % or more. We are, therefore, NOT changing our reporting standard for the time being. (It is interesting to note that before 1982 the recommended value was 12.26 years)

Very low tritium values

In some cases, negative TU values are listed. Such numbers can occur because the net tritium count rate is, in principle, the difference between the count rate of the sample and that of a tritium-free sample (background count or blank sample). Given a set of "unknown" samples with no tritium, the distribution of net results should become symmetrical around 0 TU. The negative values are reported as such for the benefit of allowing the user unbiased statistical treatment of sets of the data. For other applications, 0 TU should be used.

Additional information

Refer to Services Rendered (Tritium), Section II.8, in the "Tritium Laboratory Price Schedule; Procedures and Standards; Advice on Sampling", at our Web-site www.miami.rsmas.edu/groups/tritium.

Tritium efficiencies and background values are somewhat different in each of the nine counters and values are corrected for cosmic ray intensity, gas pressure and other parameters. For tritium, the efficiency is typically 1.00 cpm per 100 TU (direct counting). At 50x enrichment, the efficiency is equivalent to 1.00 cpm per 2.4 TU. The background is typically 0.3 cpm, known to about ± 0.02 cpm. Our reported results include not only the Poisson statistics, but also other experimental uncertainties such as enrichment error, etc.

End

Client: LOS ALAMOS NATIONAL LAB - BEERS
Recvd : 01/08/13
Job# : 1525
Final : 01/09/19

Pur. Order: 13004 7C18/W5R5 1802
Contact: Bob Beers, 505/667-7969
ESH-18, MS K497 (F) 665-9344
Los Alamos, NM 87545

Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
LANL-BEERS- UU01081G10W	1525.01	010808	1000	275	9.8	0.3
LANL-BEERS- UU01081G1RG	1525.02	010808	1000	238	-0.03*	0.09
LANL-BEERS- UU01082G1RG	1525.03	010808	1000	275	0.05	0.09
① LANL-BEERS- UU0108BUCK1	1525.04	010816	1000	276	0.00	0.09
② LANL-BEERS- UU01081BUCK1-FLD	1525.05	010816	1000	275	0.35*	0.09
③ LANL-BEERS- UU01081BUCK7	1525.06	010816	1000	275	0.07*r	0.09
④ LANL-BEERS- UU01081BUCK2	1525.07	010816	1000	275	-0.06	0.09

* Average of duplicate runs
r RERUN in progress

- ① BUCKMAN #1
- ② BUCKMAN #1 FIELD BLANK
- ③ BUCKMAN #7
- ④ BUCKMAN #2

NOTE: 1 TU = 3.193 pCi/L

Los Alamos

NATIONAL LABORATORY

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

Date: December 21, 2001
In Reply Refer To: ESH-18/WQ&H:01-418
Mail Stop: K497
Telephone: (505) 667-7969

Ms. Marlene Sundheimer
Water Division Director
City of Santa Fe
801 West San Mateo
Santa Fe, New Mexico 87504

SUBJECT: DRINKING WATER QUALITY, BUCKMAN WATER SUPPLY WELLS

Dear Ms. Sundheimer:

On October 31, 2001, your staff escorted personnel from Tech Law, a subcontractor to the Environmental Protection Agency (EPA) Region 6, and personnel from Los Alamos National Laboratory (Laboratory) during the sampling of Buckman Water Supply Well Nos. 1, 2, 3, 4, 6, 7, and 8 (Note: Buckman Well No. 5 was out-of-service at the time of sampling). Duplicate samples were collected by EPA and the Laboratory in coordination with you and your staff. Samples were submitted to the following analytical laboratories for analysis:

- General Engineering Laboratories (GEL), Inc., Charleston, SC, for general water chemistry, nitrate/nitrite, perchlorate, high explosives (HE), Sr-90, and isotopic uranium;
- E.S. Babcock & Sons (Babcock), Riverside, CA, for perchlorate;
- University of Miami's Tritium Laboratory, Miami, FL, for low-level tritium;
- Acculabs, Inc., Golden, CO, for perchlorate; and
- Los Alamos National Laboratory, Chemistry Division, Isotope and Nuclear Chemistry Group (C-INC), for isotopic uranium.

The attached Tables 1.0, 2.0, and 3.0 summarize these analytical results and Attachments 1.0 through 5.0 are copies of the analytical reports. The general chemistry data requested by your staff has been provided in Attachment 1.0. A discussion of the nitrate/nitrite, perchlorate, HE, tritium, Sr-90, and uranium results follows.

Nitrate/Nitrite

Analytical results for nitrate/nitrite (as nitrogen) are:

- | | |
|-----------------|-----------|
| • Buckman No. 1 | 1.13 mg/L |
| • Buckman No. 2 | 1.18 mg/L |
| • Buckman No. 3 | 1.60 mg/L |
| • Buckman No. 4 | 1.40 mg/L |
| • Buckman No. 6 | 1.50 mg/L |
| • Buckman No. 7 | 1.55 mg/L |
| • Buckman No. 8 | 0.62 mg/L |

The above results are consistent with the nitrate/nitrite results obtained from Buckman Well Nos. 1, 2, and 7 collected on August 16, 2001.

Perchlorate

For quality assurance purposes, duplicate samples from Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8 were submitted to three different laboratories for perchlorate analysis: GEL, Babcock, and Acculabs. The analytical results are summarized below.

	<u>GEL Results</u>	<u>Acculabs Results</u>	<u>Babcock Results</u>
• Buckman No. 1	U	0.26J ppb	Nondetect
• Buckman No. 1 dupe	Nondetect	NA	NA
• Buckman No. 2	U	Nondetect	Nondetect
• Buckman No. 3	Nondetect	Nondetect	Nondetect
• Buckman No. 4	Nondetect	Nondetect	Nondetect
• Buckman No. 4 dupe	NA	NA	Nondetect
• Buckman No. 6	Nondetect	Nondetect	Nondetect
• Buckman No. 7	Nondetect	Nondetect	Nondetect
• Buckman No. 8	U	0.25J ppb	Nondetect
• Buckman No. 8 dupe	U	NA	NA

A discussion of these results follows:

- **GEL.** All GEL perchlorate results were reported as nondetect with the exception of estimated detections (J flag) at Buckman Well Nos. 1, 2, and 8. However, an independent validation of the GEL results by Analytical Quality Associates (AQA), Inc., Albuquerque, NM, discovered perchlorate in an associated blank sample. As a result, the GEL perchlorate results for Buckman Well Nos. 1, 2, 8, and 8-dupe were qualified by AQA as U or nondetect.

As you may recall, GEL reported an estimated detection for perchlorate at Buckman Well No. 7 from the August 16th sampling event (estimated detection of 0.999J ppb). No perchlorate was detected in Buckman Well No. 7 by GEL during this sampling event.

In response to a Department of Energy (DOE) audit, GEL has recommended that their current Method Detection Limit (MDL) for perchlorate of 0.958 ppb be raised to 4 ppb. GEL's recommendation is based upon their discovery that significant random variations in background (i.e., noise) are leading to the reporting of periodic false positives. In January 2002, the DOE will initiate an effort to formally adopt a 4 ppb MDL for perchlorate by ion chromatography under 40CFR 136.

- **Acculabs.** All Acculabs perchlorate results were reported as nondetect with the exception of two estimated detections at Buckman Well Nos. 1 and 8. These detections were reported as estimated (J flag) because the sample results were less than Acculabs' RL of 0.50 µg/L, but greater than their MDL of 0.25 µg/L. It should be noted, however, that Acculabs reported a nondetect result for a duplicate sample submitted by EPA from Buckman Well No. 1.

Acculabs claims to achieve a lower detection limit than GEL and Babcock by using a new, experimental analytical method, LC/MS/MS (liquid chromatography/mass spectrometry/mass spectrometry). Other work we have done with spiked samples submitted to Acculabs suggests their RL and MDL may be optimistically low. Because it is so new, EPA has not approved LC/MS/MS for perchlorate analysis. GEL and Babcock use the EPA approved method, ion chromatography. Because the two estimated detections (0.26J ppb and 0.25J ppb) are so close to the MDL, the uncertainty associated with these measurements is very high.

- **Babcock.** All Babcock perchlorate results were reported as nondetect. Babcock's RL is 4 ppb and their MDL is 2 ppb.

In summary, following data validation, all GEL and Babcock results were nondetect for perchlorate at Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8. Acculabs reported an estimated detection at Buckman Well No. 1 (0.26J ppb), but that result conflicts with the nondetect result received by the EPA at the same location. The estimated detection at Buckman Well No. 8 (0.25J ppb) is right at Acculabs's MDL of 0.25 ppb resulting in a very high level of uncertainty and an inconclusive result.

High Explosives (HE)

Samples from Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8 were submitted to GEL for HE analysis. None of the 14 HE compounds analyzed for were detected in any of the samples at concentrations greater than GEL's Method Detection Limit (MDL). The results were confirmed through data validation.

Tritium

No tritium was detected in any of the samples collected from Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8. A detection for tritium is defined as an analytical result that is equal to or greater than three times the one sigma analytical uncertainty and greater than the University of Miami's Minimum Detectable Activity (MDA) of 0.32 pCi/L.

Sr-90

No Sr-90 was detected in any of the samples collected from Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8. A detection for Sr-90 is defined as an analytical result that is equal to or greater than three times the one sigma analytical uncertainty and greater than GEL's Minimum Detectable Activity (MDA) of 0.2 pCi/L. Validation of the Sr-90 data determined that the results should be qualified as "BD" (Below Detection) due to a low reported value (i.e., a value below GEL's MDA).

Isotopic Uranium

Samples from Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8 were analyzed for isotopic uranium using two different analytical methods: Alpha Spectroscopy (alpha spec) and Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). The results are discussed below.

- **Alpha Spec Uranium.** Alpha spec is an analytical method to indirectly measure the alpha activity in a sample. Using alpha spec, uranium isotopes $^{233/234}\text{U}$, $^{235/236}\text{U}$, and ^{238}U were measured by GEL. The concentration of total uranium in each sample was calculated using the following formula, which incorporates the specific activities for the isotopes. We assume that no ^{233}U or ^{236}U are present in the sample.

$$\text{Total Uranium } (\mu\text{g/L}) = (^{233/234}\text{U}/6250) + (^{235/236}\text{U}/2.16) + (^{238}\text{U}/0.336)$$

The calculated concentration of total uranium at Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8 using GEL's alpha spec results are as follows. The total uranium results from the August 16, 2001, sampling event have been included for comparison.

	<u>Total Uranium – Oct. 31, '01</u>	<u>Total Uranium – Aug. 16, '01</u>
• Buckman No. 1	15.9 $\mu\text{g/L}$	6.2 $\mu\text{g/L}$
• Buckman No. 2	20.4 $\mu\text{g/L}$	222 $\mu\text{g/L}$
• Buckman No. 3	8.6 $\mu\text{g/L}$	
• Buckman No. 4	9.1 $\mu\text{g/L}$	
• Buckman No. 6	5.1 $\mu\text{g/L}$	
• Buckman No. 7	5.7 $\mu\text{g/L}$	5.3 $\mu\text{g/L}$
• Buckman No. 8	12.5 $\mu\text{g/L}$	

- **ICP-MS Uranium.** ICP-MS is an analytical method that directly measures the mass of uranium in a sample. Samples from Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8 were submitted to both GEL and LANL's C-INC Group for analysis by ICP-MS for uranium isotopes ^{235}U and ^{238}U . Total uranium, the sum of isotopes ^{234}U , ^{235}U , and ^{238}U , was calculated by adding the ^{235}U and ^{238}U measurements (Note: ^{234}U concentrations were not measured and were derived from ^{238}U concentrations assuming natural abundance of 0.0055%). Three replicate analyses were performed for each sample. Below, is the average total uranium result for each Buckman well.

	<u>GEL Total Uranium</u>	<u>LANL Total Uranium</u>
• Buckman No. 1	17.81 $\mu\text{g/L}$	17.69 $\mu\text{g/L}$
• Buckman No. 2	22.63 $\mu\text{g/L}$	23.69 $\mu\text{g/L}$
• Buckman No. 3	9.01 $\mu\text{g/L}$	9.42 $\mu\text{g/L}$
• Buckman No. 4	10.18 $\mu\text{g/L}$	10.39 $\mu\text{g/L}$
• Buckman No. 6	6.31 $\mu\text{g/L}$	6.13 $\mu\text{g/L}$
• Buckman No. 7	6.13 $\mu\text{g/L}$	5.96 $\mu\text{g/L}$
• Buckman No. 8	14.03 $\mu\text{g/L}$	14.83 $\mu\text{g/L}$

All of the alpha spec and ICP-MS results for total uranium are below the new federal Safe Drinking SDWA MCL for uranium of 30 $\mu\text{g/L}$ (effective date: December 7, 2003).

When the total uranium results presented above are compared with the August 16, 2001, results the following observations can be made:

1. The total uranium concentration at Buckman Well No. 1 increased from approximately 6 $\mu\text{g/L}$ to approximately 17-18 $\mu\text{g/L}$ from August 16th to October 31st. The TDS concentration at Buckman Well No. 1 also increased from 252 ppm (August 16, 2001, EPA result) to 306 ppm (October 31, 2001, LANL result).
 2. The total uranium concentration at Buckman Well No. 2 decreased from approximately 222 $\mu\text{g/L}$ to approximately 20-23 $\mu\text{g/L}$ from August 16th to October 31st. The TDS concentration at Buckman Well No. 2 also decreased from 773 ppm (August 16, 2001, EPA result) to 475 ppm (October 31, 2001, LANL result). During sampling at Buckman Well No. 2 the sampling team was informed by Ira Alleman (City of Santa Fe) that the well was experiencing pump problems and, as a result, the well was producing only 300 gallons per minute (gpm), less than half the normal production capacity of the well. In addition, it was my understanding that Buckman Well No. 2 had not been used routinely in the days leading up to October 31st sampling and had only been running for approximately 3.5 hours prior to sampling. This suggests that total time of operation has an effect on water quality for this well.
 3. The total uranium concentration at Buckman Well No. 7 remained relatively constant from August 16th to October 31st at approximately 5-6 $\mu\text{g/L}$.
- **ICP-MS $^{238}\text{U}/^{235}\text{U}$ Ratios.** By comparing the ratio of the uranium isotopes ^{238}U and ^{235}U in each sample it is possible to determine if it differs from the $^{238}\text{U}/^{235}\text{U}$ ratio found in natural uranium: 137.88. A ratio different from 137.88 may signify the presence of uranium enriched or depleted in ^{235}U . GEL and LANL C-INC calculated an average $^{238}\text{U}/^{235}\text{U}$ ratio for Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8 from each of the replicate results they generated. These ratios were averaged to produce a single $^{238}\text{U}/^{235}\text{U}$ ratio for each Buckman well. All of the ratios presented below indicate that the uranium in Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8 are statistically similar to natural uranium.

	<u>$^{238}\text{U}/^{235}\text{U}$ Ratio</u>	<u>Natural Uranium?</u>
• Buckman No. 1	137.54	Yes
• Buckman No. 2	137.17	Yes
• Buckman No. 3	137.36	Yes
• Buckman No. 4	136.89	Yes
• Buckman No. 6	135.96	Yes
• Buckman No. 7	138.77	Yes
• Buckman No. 8	138.89	Yes

Ms. Marlene Sundheimer
ESH-18/WQ&H:01-418

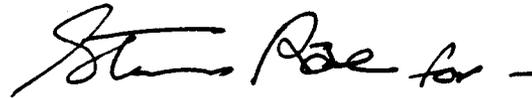
- 6 -

December 21, 2001

In closing, the analytical results presented here confirm that no HE, tritium, Sr-90, or non-natural uranium compositions are present in samples collected from Buckman Well Nos. 1, 2, 3, 4, 6, 7, and 8. Also, the data confirms that no perchlorate is present in samples collected from the Buckman Wells by using the EPA-approved ion chromatography method or at concentrations greater than the RL (reporting limit) of 0.50 ppb using the LC/MS/MS method.

Please contact me at (505) 667-7969 should you have any questions regarding this matter.

Sincerely,



Bob Beers
Water Quality and Hydrology Group

BB/am

Enclosures: a/s

Cy: D. Doremus, City of Santa Fe, Santa Fe, NM, w/enc.
A. Lewis, City of Santa Fe, Santa Fe, NM, w/enc.
J. Vozella, DOE/LAAO, w/enc., MS A316
M. Johansen, DOE/LAAO, w/enc., MS A316
K. Agogino, DOE/ABQ, Albuquerque, NM, w/enc.
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L. McAtee, ESH-DO, w/enc., MS K491
P. Thullen, ESH-DO, w/enc., MS K491
D. Stavert, ESH-DO, w/enc., MS K491
S. Rae, ESH-18, w/enc., MS K497
B. Gallaher, ESH-18, w/enc., MS K497
D. Rogers, ESH-18, w/enc., MS K497
C. Nylander, ESH-18, w/enc., MS K497
WQ&H File, w/enc., MS K497
IM-5, w/enc., MS A150

Table 1.0. Analytical Results, October 31, 2001, City of Santa Fe Buckman Water Supply Wells¹.

Buckman Wells	Nitrate (mg/L)	HE (ug/L)	TDS (mg/L)	Perchlorate (ug/L)			Tritium (pCi/L)			Sr-90 (pCi/L)			
	Result (as N)	Result	Result	GEL Result	Acculabs Result	Babcock Result	U. of Miami Result	Uncertainty ⁴	Detect? ⁵ (Y/N)	Result	Uncertainty ⁴	MDA	Detect? ⁵ (Y/N)
#1 #1 GEL dup	1.13	U	537	U ⁶	<0.25	<2	0.03	0.29	N	-0.0834	0.0653	0.222	N
#2	1.18	U	475	U ⁶	<0.25	<2	0.29	0.29	N	0.0293	0.0548	0.183	N
#3	1.60	U	537	U ⁶	<0.25	<2	0.03	0.29	N	-0.0205	0.0551	0.188	N
#4 #4 LANL dupe	1.40	U	537	<0.958	<0.25	<2	-0.10	0.29	N	0.0109	0.0494	0.166	N
#6	1.50	U	441	<0.958	<0.25	<2	0.03	0.29	N	-0.0053	0.0673	0.226	N
#7	1.55	U	323	<0.958	<0.25	<2	-0.35	0.29	N	-0.0197	0.0674	0.228	N
#8	0.620	U	296	U ⁶	<0.25	<2	-0.06	0.29	N	-0.146	0.0616	0.187	N
#8 LANL dupe	0.630	U	297	U ⁶	<0.25	<2	-0.06	0.29	N	-0.125	0.0579	0.179	N

Notes:

¹ All analyses by General Engineering Laboratories (GEL) with the exception of duplicate perchlorate analyses by Babcock and Acculabs and low-level tritium by University of Miami.

² A duplicate sample prepared by GEL for QC purposes.

³ J flag indicates an estimated detection. The result was greater than the MDL of 0.25 ppb, but less than the RL of 0.50 ppb.

⁴ Uncertainty means analytical uncertainty (+/-), expressed as one standard deviation (1s).

⁵ A detection is defined as a value that is equal to or greater than three times the uncertainty (i.e., three times one standard deviation or 3-sigma) and greater than the MDA (Minimum Detectable Activity).

⁶ U flag means that the sample result is qualified as a nondetect due to blank contamination.

Table 2.0. Alpha Spec Results, October 31, 2001, City of Santa Fe Buckman Water Supply Wells¹

Buckman Wells	U-233/234 (pCi/L) ⁵				U-235/236 (pCi/L) ⁵				U-238 (pCi/L) ⁵				Total U (ug/L)	
	Result	Uncertainty ³	MDA	Detect? ⁴ (Y/N)	Result	Uncertainty ³	MDA	Detect? ⁴ (Y/N)	Result	Uncertainty ³	MDA	Detect? ⁴ (Y/N)	Result	Uncertainty ³
#1	7.87	0.618	0.0129	Y	0.301	0.0346	0.00388	Y	5.29	0.419	0.0341	Y	15.88	1.25
#2	13.2	1.03	0.0129	Y	0.347	0.0365	0.00475	Y	6.79	0.539	0.0129	Y	20.37	1.60
#3	8.14	0.675	0.0129	Y	0.274	0.0182	0.0106	Y	2.86	0.226	0.0104	Y	8.58	0.67
#4	12.0	0.894	0.0151	Y	0.297	0.0290	0.0139	Y	3.00	0.229	0.0162	Y	9.07	0.68
#6	8.02	0.61	0.0129	Y	0.273	0.0184	0.0146	Y	1.67	0.133	0.0131	Y	5.05	0.40
#7	5.65	0.435	0.0144	Y	0.110	0.0149	0.0099	Y	1.90	0.152	0.0124	Y	5.71	0.45
#8	6.84	0.531	0.0176	Y	0.261	0.0285	0.0176	Y	4.17	0.328	0.0206	Y	12.53	0.98
#8-dup ²	6.86	0.504	0.0176	Y	0.292	0.0301	0.0176	Y	4.06	0.315	0.016	Y	12.40	0.94

Notes:

- ¹ All analyses by General Engineering Laboraories (GEL).
- ² A duplicate sample prepared by LANL.
- ³ Uncertainty means analytical uncertainty (+/-), expressed as one standard deviation (1s).
- ⁴ A detection is defined as a value that is equal to or greater than three times the uncertainty (i.e., three times one standard deviation or 3-sigma) and greater than the MDA (Minimum Detectable Activity).
- ⁵ All results for U-233/234, U-235/236, and U-238 should be qualified R due to gross blank contamination.

Table 3.0. ICP-MS Results, October 31, 2001, City of Santa Fe Buckman Water Supply Wells¹

Buckman Wells	U-235 (ug/L)		U-238 (ug/L)		Total U ⁴ (ug/L)		²³⁸ U/ ²³⁵ U Ratio				Natural Uranium ^{5?}
	LANL	GEL	LANL	GEL	LANL	GEL	LANL	GEL	Grand Average ⁷		
	Result	Result	Result	Result	Result	Result			Mean	Std Dev	Y/N
#1	0.1214	0.1240	17.72	17.26	17.84	17.384	136.95	139.19	137.54	1.48	Y ⁶
#1	0.1196	0.1203	17.68	17.01	17.80	17.136	138.69	135.00			
#1	0.1203	0.1203	17.67	17.13	17.70	17.161	137.87	137.54			
#2	0.1551	0.167	22.67	23.14	22.83	23.307	137.23	138.56	137.17	1.10	Y
#2	0.1530	0.171	22.45	23.23	22.61	23.401	137.73	135.85			
#2	0.1520	0.178	22.31	24.19	22.46	24.368	137.78	135.90			
#3	0.0616	0.064	9.05	9.08	9.09	9.144	137.61	141.88	137.36	3.80	Y
#3	0.0610	0.068	8.92	9.25	8.98	9.396	137.29	141.36			
#3	0.0612	0.067	8.93	9.17	8.97	9.21	136.69	137.71			
#3-dupc	0.0620	NA	8.95	NA	8.95	NA	136.96	NA			
#3-dupc	0.0632	NA	8.97	NA	8.97	NA	137.16	NA			
#3-dupc	0.0688	NA	9.08	NA	9.08	NA	137.65	NA			
#4	0.0681	0.073	9.93	9.91	10.00	9.983	136.78	135.75	136.89	0.63	Y
#4	0.0694	0.075	10.15	10.3	10.22	10.375	137.26	137.33			
#4	0.0704	0.078	10.26	10.72	10.33	10.798	136.75	137.44			
#6	0.0896 ²	0.042	6.18 ²	5.79	6.27 ²	5.832	65.254 ²	137.86	135.96	4.16	Y
#6	0.0433	0.045	6.25	6.15	6.29	6.195	135.55	136.67			
#6	0.045	0.045	6.38	6.32	6.35	6.35	139.77	140.44			
#7	0.0415	0.039	6.13	5.6	6.17	5.639	138.49	143.59	138.77	3.76	Y
#7	0.0425	0.042	6.06	6	6.11	6.042	133.96	142.86			
#7	0.0415	0.045	6.07	6.14	6.11	6.185	137.29	136.44			
#8	0.0950	0.101	13.84	14.2	13.94	14.301	136.76	140.59	138.89	1.83	Y
#8	0.0950	0.109	13.89	14.85	13.99	14.959	137.93	136.24			
#8	0.0945	0.102	13.85	14.25	13.99	14.210	137.85	140.09			
#8-dupc	NA	0.101	NA	NA	NA	14.173	NA	139.31			
#8-dupc	NA	0.105	NA	14.2	NA	14.121	NA	141.83			
#8-dupc	NA	0.109	NA	14.25	NA	14.201	NA	139.36			

Notes:

¹ All analyses by General Engineering Laboratories (GEL) and Los Alamos National Laboratory (LANL).

² Anomalous U-235 results were obtained by LANL on samples Buckman #3 (replicate 2) and Buckman #6 (replicate 1). These replicates were not included in final calculations.

⁴ Total uranium concentration is the sum of isotopes 234, 235 & 238. U-234 concentration was not measured and was derived from U-238 concentration assuming natural abundance (0.0055% U-234).

⁵ Natural uranium has a ²³⁸U/²³⁵U mass ratio of 137.88.

⁶ Within 3 standard deviations of natural uranium ratio of 137.88.

⁷ A Grand Average mean and standard deviation were calculated for each Buckman well using all LANL and GEL ²³⁸U/²³⁵U replicate and duplicate ratios.

ATTACHMENT 1.0

ANALYTICAL REPORTS

**GENERAL ENGINEERING LABORATORIES
CHARLESTON, SC**

BUCKMAN WELLS NOS. 1, 2, 3, 4, 6, 7, 8

**GENERAL CHEMISTRY
NITRATE/NITRITE
PERCHLORATE
HIGH EXPLOSIVES
STRONTIUM-90
ISOTOPIC URANIUM**

SAMPLE DATE: OCTOBER 31, 2001

General Engineering Laboratories

**TOTAL METALS
- 1 -
INORGANIC ANALYSIS DATA PACKAGE**

SDG No.: 51362

Method Type: SW-846

Sample ID: 51362001

Client ID: GU01101BUCK1

Contract: LANL00701

Lab Code: GEL

Case No.: GEL

SAS No.:

Matrix: WATER

Date Received: 11/2/2001

Level: LOW

% Solids: 0.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7440-70-2	Calcium	11500	µg/L			P	24.7	TJA61 Trace ICP2	110701
7439-95-4	Magnesium	837	µg/L			P	5.140	TJA61 Trace ICP2	110701
7440-09-7	Potassium	2590	µg/L			P	18.2	TJA61 Trace ICP2	110701
7440-23-5	Sodium	102000	µg/L			P	30.1	TJA61 Trace ICP2	110701

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

TOTAL METALS
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 51362

Method Type: SW-846

Sample ID: 51362002

Client ID: GU01101BUCK2

Contract: LANL00701

Lab Code: GEL

Case No.: GEL

SAS No.:

Matrix: WATER

Date Received: 11/2/2001

Level: LOW

% Solids: 0.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7440-70-2	Calcium	45900	µg/L			P	24.7	TJA61 Trace ICP2	110701
7439-95-4	Magnesium	7760	µg/L			P	5.140	TJA61 Trace ICP2	110701
7440-09-7	Potassium	5060	µg/L			P	18.2	TJA61 Trace ICP2	110701
7440-23-5	Sodium	124000	µg/L			P	75.1	TJA61 Trace ICP2	110701

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

TOTAL METALS
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 51362

Method Type: SW-846

Sample ID: 51362003

Client ID: GU01101BUCK3

Contract: LANL00701

Lab Code: GEL

Case No.: GEL

SAS No.:

Matrix: WATER

Date Received: 11/2/2001

Level: LOW

% Solids: 0.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7440-70-2	Calcium	41200	µg/L			P	24.7	TJA61 Trace ICP2	110701
7439-95-4	Magnesium	5690	µg/L			P	5.140	TJA61 Trace ICP2	110701
7440-09-7	Potassium	5420	µg/L			P	18.2	TJA61 Trace ICP2	110701
7440-23-5	Sodium	114000	µg/L			P	30.1	TJA61 Trace ICP2	110701

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

TOTAL METALS
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 51362

Method Type: SW-846

Sample ID: 51362004

Client ID: GU01101BUCK4

Contract: LANL00701

Lab Code: GEL

Case No.: GEL

SAS No.:

Matrix: WATER

Date Received: 11/2/2001

Level: LOW

% Solids: 0.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7440-70-2	Calcium	87900	µg/L			P	24.7	TJA61 Trace ICP2	110701
7439-95-4	Magnesium	12300	µg/L			P	5.140	TJA61 Trace ICP2	110701
7440-09-7	Potassium	6760	µg/L			P	18.2	TJA61 Trace ICP2	110701
7440-23-5	Sodium	103000	µg/L			P	30.1	TJA61 Trace ICP2	110701

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

TOTAL METALS
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 51362

Method Type: SW-846

Sample ID: 51362005

Client ID: GU01101BUCK6

Contract: LANL00701

Lab Code: GEL

Case No.: GEL

SAS No.:

Matrix: WATER

Date Received: 11/2/2001

Level: LOW

% Solids: 0.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7440-70-2	Calcium	65700	µg/L			P	24.7	TJA61 Trace ICP2	110701
7439-95-4	Magnesium	8810	µg/L			P	5.140	TJA61 Trace ICP2	110701
7440-09-7	Potassium	5160	µg/L			P	18.2	TJA61 Trace ICP2	110701
7440-23-5	Sodium	87600	µg/L			P	15.0	TJA61 Trace ICP2	110701

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

General Engineering Laboratories

**TOTAL METALS
- 1 -
INORGANIC ANALYSIS DATA PACKAGE**

SDG No.: 51362

Method Type: SW-846

Sample ID: 51362006

Client ID: GU01101BUCK7

Contract: LANL00701

Lab Code: GEL

Case No.: GEL

SAS No.:

Matrix: WATER

Date Received: 11/2/2001

Level: LOW

% Solids: 0.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7440-70-2	Calcium	34400	µg/L			P	24.7	TJA61 Trace ICP2	110701
7439-95-4	Magnesium	4920	µg/L			P	5.140	TJA61 Trace ICP2	110701
7440-09-7	Potassium	4570	µg/L			P	18.2	TJA61 Trace ICP2	110701
7440-23-5	Sodium	85100	µg/L			P	15.0	TJA61 Trace ICP2	110701

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

TOTAL METALS
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

SDG No.: 51362

Method Type: SW-846

Sample ID: 51362007

Client ID: GU01101BUCK8

Contract: LANL00701

Lab Code: GEL

Case No.: GEL

SAS No.:

Matrix: WATER

Date Received: 11/2/2001

Level: LOW

% Solids: 0.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7440-70-2	Calcium	14500	µg/L			P	24.7	TJA61 Trace ICP2	110701
7439-95-4	Magnesium	2190	µg/L			P	5.140	TJA61 Trace ICP2	110701
7440-09-7	Potassium	2560	µg/L			P	18.2	TJA61 Trace ICP2	110701
7440-23-5	Sodium	98100	µg/L			P	30.1	TJA61 Trace ICP2	110701

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

General Engineering Laboratories

**TOTAL METALS
- 1 -
INORGANIC ANALYSIS DATA PACKAGE**

SDG No.: 51362

Method Type: SW-846

Sample ID: 51362008

Client ID: GU01102BUCK8

Contract: LANL00701

Lab Code: GEL

Case No.: GEL

SAS No.:

Matrix: WATER

Date Received: 11/2/2001

Level: LOW

% Solids: 0.00

CAS No.	Analyte	Concentration	Units	C	Qual	M	DL	Instrument ID	Analytical Run
7440-70-2	Calcium	14500	µg/L			P	24.7	TJA61 Trace ICP2	110701
7439-95-4	Magnesium	2190	µg/L			P	5.140	TJA61 Trace ICP2	110701
7440-09-7	Potassium	2560	µg/L			P	18.2	TJA61 Trace ICP2	110701
7440-23-5	Sodium	98100	µg/L			P	30.1	TJA61 Trace ICP2	110701

Color Before:

Clarity Before:

Texture:

Color After:

Clarity After:

Artifacts:

Comments:

Certificate of Analysis

Company : Los Alamos National Labs
 Address : MS K497 ESH-18
 Water Quality & Hydrology
 Los Alamos, New Mexico 87545
 Contact: Billy Turney
 Project: Groundwater

Report Date: December 4, 2001

Page 1 of 2

Client Sample ID: GU01101BUCK6 Project: ESHL00701
 Sample ID: 51362005 Client ID: ESHL001
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
<i>EPA 300.0 Chloride in Liquid</i>											
Chloride		3.44	0.025	0.100	mg/L	1	EOC1	11/29/01	0255	122772	1
Sulfate		18.3	0.062	0.200	mg/L	1					
<i>EPA 314.0 Perchlorate by IC</i>											
Perchlorate	U	ND	0.958	4.00	ug/L	1	KMR1	11/29/01	0228	122835	2
Solids Analysis Federal											
<i>EPA 160.1 Solids, Dissolved-F</i>											
Total Dissolved Solids		441	5.09	10.0	mg/L		TSM	11/06/01	1355	118918	5
TRAACS Nutrient Analysis Fed											
<i>EPA 353.1 Nitrogen, (NO3/NO2</i>											
Nitrogen, Nitrate/Nitrite		1.50	0.0069	0.050	mg/L	1	THL	11/09/01	1140	119609	6
Titration Analysis Federal											
<i>SM 2320B Total Alkalinity Federal</i>											
Alkalinity, Total as CaCO3		399	0.725	1.00	mg/L		BEP1	11/13/01	1330	120051	7
Bicarbonate alkalinity (CaCO3)		398	0.725	1.00	mg/L						
Carbonate alkalinity (CaCO3)	U	ND	0.725	1.00	mg/L						
Wet Chemistry General Federal											
<i>EPA 340.2 Fluoride Federal</i>											
Fluoride		0.477	0.006	0.100	mg/L	1	AL1	11/26/01	1100	122164	8

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	AME	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 300.0	
2	EPA 314.0	
3	EPA 314.0	
4	EPA 314.0	
5	EPA 160.1	

Certificate of Analysis

Company : Los Alamos National Labs
Address : MS K497 ESH-18
Water Quality & Hydrology
Los Alamos, New Mexico 87545
Contact: Billy Turney
Project: Groundwater

Report Date: December 4, 2001

Page 2 of 2

Client Sample ID: GU01101BUCK6
Sample ID: 51362005

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
6	EPA 353.1										
7	SM 2320B										
8	EPA 340.2										

Notes:

The Qualifiers in this report are defined as follows :

- ** Indicates the analyte is a surrogate compound.
- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- B Analyte found in the sample as well as the associated blank.
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- UI Uncertain identification for gamma spectroscopy.
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

The above sample is reported on an "as received" basis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, Inc. standard operating procedures. Please direct any questions to your Project Manager, Stacy Griffin.



Reviewed by _____

Certificate of Analysis

Company : Los Alamos National Labs
 Address : MS K497 ESH-18
 Water Quality & Hydrology
 Los Alamos, New Mexico 87545
 Contact: Billy Turney
 Project: Groundwater

Report Date: December 4, 2001

Page 1 of 2

Client Sample ID: GU01101BUCK7
 Sample ID: 51362006
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client
 Project: ESHL00701
 Client ID: ESHL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
<i>EPA 300.0 Chloride in Liquid</i>											
Chloride		3.20	0.025	0.100	mg/L	1	EOC1	11/29/01	0310	122772	1
Sulfate		22.7	0.062	0.200	mg/L	1					
<i>EPA 314.0 Perchlorate by IC</i>											
Perchlorate	U	ND	0.958	4.00	ug/L	1	KMR1	11/29/01	0300	122835	2
Solids Analysis Federal											
<i>EPA 160.1 Solids, Dissolved-F</i>											
Total Dissolved Solids		323	5.09	10.0	mg/L		TSM	11/06/01	1355	118918	5
TRAACS Nutrient Analysis Fed											
<i>EPA 353.1 Nitrogen, (NO3/NO2</i>											
Nitrogen, Nitrate/Nitrite		1.55	0.0069	0.050	mg/L	1	THL	11/09/01	1140	119609	6
Titration Analysis Federal											
<i>SM 2320B Total Alkalinity Federal</i>											
Alkalinity, Total as CaCO3		273	0.725	1.00	mg/L		BEP1	11/13/01	1330	120051	7
Bicarbonate alkalinity (CaCO3)		271	0.725	1.00	mg/L						
Carbonate alkalinity (CaCO3)		1.98	0.725	1.00	mg/L						
Wet Chemistry General Federal											
<i>EPA 340.2 Fluoride Federal</i>											
Fluoride		0.432	0.006	0.100	mg/L	1	AL1	11/26/01	1100	122164	8

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846-8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	AME	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 300.0	
2	EPA 314.0	
3	EPA 314.0	
4	EPA 314.0	
5	EPA 160.1	

Certificate of Analysis

Company : Los Alamos National Labs
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Project: Groundwater

Report Date: December 4, 2001

Page 2 of 2

Client Sample ID: GU01101BUCK7
Sample ID: 51362006

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
6	EPA 353.1									
7	SM 2320B									
8	EPA 340.2									

Notes:

The Qualifiers in this report are defined as follows :

- ** Indicates the analyte is a surrogate compound.
- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- B Analyte found in the sample as well as the associated blank.
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- UI Uncertain identification for gamma spectroscopy.
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

The above sample is reported on an "as received" basis.

This data report has been prepared and reviewed in accordance with General Engineering Laboratories, Inc. standard operating procedures. Please direct any questions to your Project Manager, Stacy Griffin.

Reviewed by 

Certificate of Analysis

Company : Los Alamos National Labs
 Address : MS K497 ESH-18
 Water Quality & Hydrology
 Los Alamos, New Mexico 87545
 Contact: Billy Turney
 Project: Groundwater

Report Date: December 4, 2001

Page 1 of 2

Client Sample ID: GU01101BUCK8 Project: ESHL00701
 Sample ID: 51362007 Client ID: ESHL001
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
<i>EPA 300.0 Chloride in Liquid</i>											
Chloride		1.87	0.025	0.100	mg/L	1	EOC1	11/29/01	0325	122772	1
Sulfate		8.79	0.062	0.200	mg/L	1					
<i>EPA 314.0 Perchlorate by IC</i>											
Perchlorate	J	1.25	0.958	4.00	ug/L	1	KMR1	11/29/01	0332	122835	2
Solids Analysis Federal											
<i>EPA 160.1 Solids, Dissolved-F</i>											
Total Dissolved Solids		296	5.09	10.0	mg/L		TSM	11/06/01	1355	118918	5
TRAACS Nutrient Analysis Fed											
<i>EPA 353.1 Nitrogen, (NO3/NO2</i>											
Nitrogen, Nitrate/Nitrite		0.620	0.0069	0.050	mg/L	1	THL	11/09/01	1140	119609	6
Titration Analysis Federal											
<i>SM 2320B Total Alkalinity Federal</i>											
Alkalinity, Total as CaCO3		242	0.725	1.00	mg/L		BEP1	11/13/01	1330	120051	7
Bicarbonate alkalinity (CaCO3)		239	0.725	1.00	mg/L						
Carbonate alkalinity (CaCO3)		1.96	0.725	1.00	mg/L						
Wet Chemistry General Federal											
<i>EPA 340.2 Fluoride Federal</i>											
Fluoride		0.439	0.006	0.100	mg/L	1	AL1	11/26/01	1100	122164	8

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	AME	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 300.0	
2	EPA 314.0	
3	EPA 314.0	
4	EPA 314.0	
5	EPA 160.1	

Certificate of Analysis

Company : Los Alamos National Labs
Address : MS K497 ESH-18
Water Quality & Hydrology
Los Alamos, New Mexico 87545
Contact: Billy Turney
Project: Groundwater

Report Date: December 4, 2001

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Client Sample ID: GU01101BUCK8
Sample ID: 51362007

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
6	EPA 353.1									
7	SM 2320B									
8	EPA 340.2									

Notes:

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- B Analyte found in the sample as well as the associated blank.
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- UI Uncertain identification for gamma spectroscopy.
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

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Certificate of Analysis

Company : Los Alamos National Labs
 Address : MS K497 ESH-18
 Water Quality & Hydrology
 Los Alamos, New Mexico 87545
 Contact: Billy Turney
 Project: Groundwater

Report Date: December 4, 2001

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Client Sample ID: GU01102BUCK8 Project: ESHL00701
 Sample ID: 51362008 Client ID: ESHL001
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
<i>EPA 300.0 Chloride in Liquid</i>											
Chloride		1.93	0.025	0.100	mg/L	1	EOC1	11/29/01	0340	122772	1
Sulfate		8.41	0.062	0.200	mg/L	1					
<i>EPA 314.0 Perchlorate by IC</i>											
Perchlorate	J	2.16	0.958	4.00	ug/L	1	KMR1	11/29/01	0424	122835	2
Solids Analysis Federal											
<i>EPA 160.1 Solids, Dissolved-F</i>											
Total Dissolved Solids		292	5.09	10.0	mg/L		TSM	11/06/01	1355	118918	5
TRAACS Nutrient Analysis Fed											
<i>EPA 353.1 Nitrogen, (NO3/NO2)</i>											
Nitrogen, Nitrate/Nitrite		0.630	0.0069	0.050	mg/L	1	THL	11/09/01	1140	119609	6
Titration Analysis Federal											
<i>SM 2320B Total Alkalinity Federal</i>											
Alkalinity, Total as CaCO3		252	0.725	1.00	mg/L		BEP1	11/13/01	1330	120051	7
Bicarbonate alkalinity (CaCO3)		250	0.725	1.00	mg/L						
Carbonate alkalinity (CaCO3)		1.87	0.725	1.00	mg/L						
Wet Chemistry General Federal											
<i>EPA 340.2 Fluoride Federal</i>											
Fluoride		0.435	0.006	0.100	mg/L	1	ALI	11/26/01	1100	122164	8

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	AME	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 300.0	
2	EPA 314.0	
3	EPA 314.0	
4	EPA 314.0	
5	EPA 160.1	

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Client Sample ID: GU01102BUCK8
Sample ID: 51362008

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
6	EPA 353.1										
7	SM 2320B										
8	EPA 340.2										

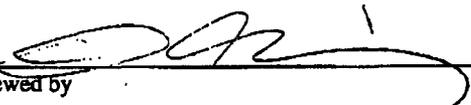
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 Project: Groundwater

Report Date: December 4, 2001

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Client Sample ID:	GU01101BUCK1	Project:	ESHL00701
Sample ID:	51362001	Client ID:	ESHL001
Matrix:	Ground Water		
Collect Date:	31-OCT-01		
Receive Date:	02-NOV-01		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
<i>EPA 300.0 Chloride in Liquid</i>											
Chloride		2.58	0.025	0.100	mg/L	1	EOC1	11/29/01	0056	122772	1
Sulfate		14.1	0.062	0.200	mg/L	1					
<i>EPA 314.0 Perchlorate by IC</i>											
Perchlorate	J	1.89	0.958	4.00	ug/L	1	KMR1	11/28/01	2236	122835	2
Solids Analysis Federal											
<i>EPA 160.1 Solids, Dissolved-F</i>											
Total Dissolved Solids		306	5.09	10.0	mg/L		TSM	11/06/01	1355	118918	5
TRAACS Nutrient Analysis Fed											
<i>EPA 353.1 Nitrogen, (NO3/NO2)</i>											
Nitrogen, Nitrate/Nitrite		1.13	0.0069	0.050	mg/L	1	THL	11/09/01	1140	119609	6
Titration Analysis Federal											
<i>SM 2320B Total Alkalinity Federal</i>											
Alkalinity, Total as CaCO3		249	0.725	1.00	mg/L		BEP1	11/13/01	1330	120051	7
Bicarbonate alkalinity (CaCO3)		246	0.725	1.00	mg/L						
Carbonate alkalinity (CaCO3)		3.12	0.725	1.00	mg/L						
Wet Chemistry General Federal											
<i>EPA 340.2 Fluoride Federal</i>											
Fluoride		0.683	0.006	0.100	mg/L	1	AL1	11/26/01	1100	122164	8

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	AME	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 300.0	
2	EPA 314.0	
3	EPA 314.0	
4	EPA 314.0	

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Contact: Billy Turney
Project: Groundwater

Report Date: December 4, 2001

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Client Sample ID: GU01101BUCK1
Sample ID: 51362001

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
5	EPA 160.1									
6	EPA 353.1									
7	SM 2320B									
8	EPA 340.2									

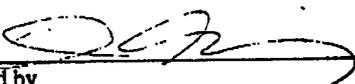
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Report Date: December 4, 2001

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Client Sample ID: GU01101BUCK2
 Sample ID: 51362002
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client

Project: ESHL00701
 Client ID: ESHL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
<i>EPA 300.0 Chloride in Liquid</i>											
Chloride		3.16	0.025	0.100	mg/L	1	EOC1	11/29/01	0140	122772	1
Sulfate		21.7	0.062	0.200	mg/L	1					
<i>EPA 314.0 Perchlorate by IC</i>											
Perchlorate	J	2.65	0.958	4.00	ug/L	1	KMR1	11/29/01	0032	122835	2
Solids Analysis Federal											
<i>EPA 160.1 Solids, Dissolved-F</i>											
Total Dissolved Solids		475	5.09	10.0	mg/L		TSM	11/06/01	1355	118918	5
TRAACS Nutrient Analysis Fed											
<i>EPA 353.1 Nitrogen, (NO3/NO2</i>											
Nitrogen, Nitrate/Nitrite		1.18	0.0069	0.050	mg/L	1	THL	11/09/01	1140	119609	6
Titration Analysis Federal											
<i>SM 2320B Total Alkalinity Federal</i>											
Alkalinity, Total as CaCO3		417	0.725	1.00	mg/L		BEP1	11/13/01	1330	120051	7
Bicarbonate alkalinity (CaCO3)		416	0.725	1.00	mg/L						
Carbonate alkalinity (CaCO3)		1.13	0.725	1.00	mg/L						
Wet Chemistry General Federal											
<i>EPA 340.2 Fluoride Federal</i>											
Fluoride		0.392	0.006	0.100	mg/L	1	ALI	11/26/01	1100	122164	8

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	AME	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 300.0	
2	EPA 314.0	
3	EPA 314.0	
4	EPA 314.0	
5	EPA 160.1	

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Client Sample ID: GU01101BUCK2
Sample ID: 51362002

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
6	EPA 353.1									
7	SM 2320B									
8	EPA 340.2									

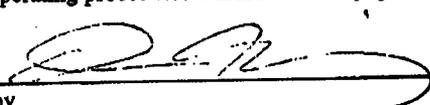
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 Contact: Billy Turney
 Project: Groundwater

Report Date: December 4, 2001

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Client Sample ID:	GU01101BUCK3	Project:	ESHL00701
Sample ID:	51362003	Client ID:	ESHL001
Matrix:	Ground Water		
Collect Date:	31-OCT-01		
Receive Date:	02-NOV-01		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
<i>EPA 300.0 Chloride in Liquid</i>											
Chloride		3.22	0.025	0.100	mg/L	1	EOC1	11/29/01	0155	122772	1
Sulfate		21.5	0.062	0.200	mg/L	1					
<i>EPA 314.0 Perchlorate by IC</i>											
Perchlorate	U	ND	0.958	4.00	ug/L	1	KMR1	11/29/01	0104	122835	2
Solids Analysis Federal											
<i>EPA 160.1 Solids, Dissolved-F</i>											
Total Dissolved Solids		414	5.09	10.0	mg/L		TSM	11/06/01	1355	118918	5
TRAACS Nutrient Analysis Fed											
<i>EPA 353.1 Nitrogen, (NO3/NO2)</i>											
Nitrogen, Nitrate/Nitrite		1.60	0.0069	0.050	mg/L	1	THL	11/09/01	1140	119609	6
Titration Analysis Federal											
<i>SM 2320B Total Alkalinity Federal</i>											
Alkalinity, Total as CaCO3		362	0.725	1.00	mg/L		BEP1	11/13/01	1330	120051	7
Bicarbonate alkalinity (CaCO3)		361	0.725	1.00	mg/L						
Carbonate alkalinity (CaCO3)		1.70	0.725	1.00	mg/L						
Wet Chemistry General Federal											
<i>EPA 340.2 Fluoride Federal</i>											
Fluoride		0.435	0.006	0.100	mg/L	1	AL1	11/26/01	1100	122164	8

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	AME	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 300.0	
2	EPA 314.0	
3	EPA 314.0	
4	EPA 314.0	
5	EPA 160.1	

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Client Sample ID:
Sample ID:

GU01101BUCK3
51362003

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
6	EPA 353.1									
7	SM 2320B									
8	EPA 340.2									

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- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
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 Contact: Billy Turney
 Project: Groundwater

Report Date: December 4, 2001

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Client Sample ID:	GU01101BUCK4	Project:	ESHL00701
Sample ID:	51362004	Client ID:	ESHL001
Matrix:	Ground Water		
Collect Date:	31-OCT-01		
Receive Date:	02-NOV-01		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Ion Chromatography Federal											
<i>EPA 300.0 Chloride in Liquid</i>											
Chloride		3.99	0.025	0.100	mg/L	1	EOC1	11/29/01	0210	122772	1
Sulfate		18.3	0.062	0.200	mg/L	1					
<i>EPA 314.0 Perchlorate by IC</i>											
Perchlorate	U	ND	0.958	4.00	ug/L	1	KMR1	11/29/01	0135	122835	2
Solids Analysis Federal											
<i>EPA 160.1 Solids, Dissolved-F</i>											
Total Dissolved Solids		537	5.09	10.0	mg/L		TSM	11/06/01	1355	118918	5
TRAACS Nutrient Analysis Fed											
<i>EPA 353.1 Nitrogen, (NO3/NO2</i>											
Nitrogen, Nitrate/Nitrite		1.40	0.0069	0.050	mg/L	1	THL	11/09/01	1140	119609	6
Titration Analysis Federal											
<i>SM 2320B Total Alkalinity Federal</i>											
Alkalinity, Total as CaCO3		501	0.725	1.00	mg/L		BEP1	11/13/01	1330	120051	7
Bicarbonate alkalinity (CaCO3)		501	0.725	1.00	mg/L						
Carbonate alkalinity (CaCO3)	U	ND	0.725	1.00	mg/L						
Wet Chemistry General Federal											
<i>EPA 340.2 Fluoride Federal</i>											
Fluoride		0.281	0.006	0.100	mg/L	1	AL1	11/26/01	1100	122164	8

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	AME	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	EPA 300.0	
2	EPA 314.0	
3	EPA 314.0	
4	EPA 314.0	
5	EPA 160.1	

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Report Date: December 4, 2001

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Client Sample ID: GU01101BUCK4
Sample ID: 51362004

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
6	EPA 353.1										
7	SM 2320B										
8	EPA 340.2										

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1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01101BUCK1

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A
 Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 51362
 Matrix: (soil/water) WATER Lab Sample ID: 51362001
 Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2K0709
 Level: (low/med) LOW Date Received: 11/02/01
 % Moisture: _____ decanted: (Y/N) _____ Date Extracted: 11/06/01
 Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 11/07/01
 Injection Volume: 0.100 (mL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
2691-41-0-----	HMX	0.10	U
121-82-4-----	RDX	0.10	U
99-35-4-----	1,3,5-Trinitrobenzene	0.10	U
99-65-0-----	1,3-Dinitrobenzene	0.10	U
98-95-3-----	Nitrobenzene	0.10	U
479-45-8-----	Tetryl	0.10	U
118-96-7-----	2,4,6-Trinitrotoluene	0.10	U
35572-78-2-----	2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0-----	4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2-----	2,4-Dinitrotoluene	0.10	U
606-20-2-----	2,6-Dinitrotoluene	0.10	U
88-72-2-----	2-Nitrotoluene	0.10	U
99-99-0-----	4-Nitrotoluene	0.10	U
99-08-1-----	3-Nitrotoluene	0.10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01101BUCK2

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A
 Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 51362
 Matrix: (soil/water) WATER Lab Sample ID: 51362002
 Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2K0710
 Level: (low/med) LOW Date Received: 11/02/01
 % Moisture: _____ decanted: (Y/N) _____ Date Extracted: 11/06/01
 Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 11/07/01
 Injection Volume: 0.100 (mL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
2691-41-0	HMX	0.10	U
121-82-4	RDX	0.10	U
99-35-4	1,3,5-Trinitrobenzene	0.10	U
99-65-0	1,3-Dinitrobenzene	0.10	U
98-95-3	Nitrobenzene	0.10	U
479-45-8	Tetryl	0.10	U
118-96-7	2,4,6-Trinitrotoluene	0.10	U
35572-78-2	2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0	4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2	2,4-Dinitrotoluene	0.10	U
606-20-2	2,6-Dinitrotoluene	0.10	U
88-72-2	2-Nitrotoluene	0.10	U
99-99-0	4-Nitrotoluene	0.10	U
99-08-1	3-Nitrotoluene	0.10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01101BUCK3

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A
 Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 51362
 Matrix: (soil/water) WATER Lab Sample ID: 51362003
 Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2K0711
 Level: (low/med) LOW Date Received: 11/02/01
 % Moisture: _____ decanted: (Y/N) _____ Date Extracted: 11/06/01
 Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 11/07/01
 Injection Volume: 0.100 (mL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
2691-41-0-----	HMX	0.10	U
121-82-4-----	RDX	0.10	U
99-35-4-----	1,3,5-Trinitrobenzene	0.10	U
99-65-0-----	1,3-Dinitrobenzene	0.10	U
98-95-3-----	Nitrobenzene	0.10	U
479-45-8-----	Tetryl	0.10	U
118-96-7-----	2,4,6-Trinitrotoluene	0.10	U
35572-78-2-----	2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0-----	4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2-----	2,4-Dinitrotoluene	0.10	U
606-20-2-----	2,6-Dinitrotoluene	0.10	U
88-72-2-----	2-Nitrotoluene	0.10	U
99-99-0-----	4-Nitrotoluene	0.10	U
99-08-1-----	3-Nitrotoluene	0.10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01101BUCK4

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 51362

Matrix: (soil/water) WATER Lab Sample ID: 51362004

Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2K0712

Level: (low/med) LOW Date Received: 11/02/01

% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 11/06/01

Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 11/08/01

Injection Volume: 0.100 (mL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L Q

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
2691-41-0-----	HMX	0.10	U
121-82-4-----	RDX	0.10	U
99-35-4-----	1,3,5-Trinitrobenzene	0.10	U
99-65-0-----	1,3-Dinitrobenzene	0.10	U
98-95-3-----	Nitrobenzene	0.10	U
479-45-8-----	Tetryl	0.10	U
118-96-7-----	2,4,6-Trinitrotoluene	0.10	U
35572-78-2-----	2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0-----	4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2-----	2,4-Dinitrotoluene	0.10	U
606-20-2-----	2,6-Dinitrotoluene	0.10	U
88-72-2-----	2-Nitrotoluene	0.10	U
99-99-0-----	4-Nitrotoluene	0.10	U
99-08-1-----	3-Nitrotoluene	0.10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01101BUCK6

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A
 Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 51362
 Matrix: (soil/water) WATER Lab Sample ID: 51362005
 Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2K0713
 Level: (low/med) LOW Date Received: 11/02/01
 % Moisture: _____ decanted: (Y/N) _____ Date Extracted: 11/06/01
 Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 11/08/01
 Injection Volume: 0.100 (mL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
2691-41-0-----	HMX	0.10	U
121-82-4-----	RDX	0.10	U
99-35-4-----	1,3,5-Trinitrobenzene	0.10	U
99-65-0-----	1,3-Dinitrobenzene	0.10	U
98-95-3-----	Nitrobenzene	0.10	U
479-45-8-----	Tetryl	0.10	U
118-96-7-----	2,4,6-Trinitrotoluene	0.10	U
35572-78-2-----	2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0-----	4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2-----	2,4-Dinitrotoluene	0.10	U
606-20-2-----	2,6-Dinitrotoluene	0.10	U
88-72-2-----	2-Nitrotoluene	0.10	U
99-99-0-----	4-Nitrotoluene	0.10	U
99-08-1-----	3-Nitrotoluene	0.10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01101BUCK7

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A

Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 51362

Matrix: (soil/water) WATER Lab Sample ID: 51362006

Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2K0716

Level: (low/med) LOW Date Received: 11/02/01

% Moisture: _____ decanted: (Y/N) _____ Date Extracted: 11/06/01

Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 11/08/01

Injection Volume: 0.100 (mL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
---------	----------	--	---

2691-41-0-----	HMX	0.10	U
121-82-4-----	RDX	0.10	U
99-35-4-----	1,3,5-Trinitrobenzene	0.10	U
99-65-0-----	1,3-Dinitrobenzene	0.10	U
98-95-3-----	Nitrobenzene	0.10	U
479-45-8-----	Tetryl	0.10	U
118-96-7-----	2,4,6-Trinitrotoluene	0.10	U
35572-78-2-----	2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0-----	4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2-----	2,4-Dinitrotoluene	0.10	U
606-20-2-----	2,6-Dinitrotoluene	0.10	U
88-72-2-----	2-Nitrotoluene	0.10	U
99-99-0-----	4-Nitrotoluene	0.10	U
99-08-1-----	3-Nitrotoluene	0.10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01101BUCK8

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A
 Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 51362
 Matrix: (soil/water) WATER Lab Sample ID: 51362007
 Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2K0717
 Level: (low/med) LOW Date Received: 11/02/01
 % Moisture: _____ decanted: (Y/N) _____ Date Extracted: 11/06/01
 Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 11/08/01
 Injection Volume: 0.100 (mL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L Q

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
2691-41-0-----	HMX	0.10	U
121-82-4-----	RDX	0.10	U
99-35-4-----	1,3,5-Trinitrobenzene	0.10	U
99-65-0-----	1,3-Dinitrobenzene	0.10	U
98-95-3-----	Nitrobenzene	0.10	U
479-45-8-----	Tetryl	0.10	U
118-96-7-----	2,4,6-Trinitrotoluene	0.10	U
35572-78-2-----	2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0-----	4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2-----	2,4-Dinitrotoluene	0.10	U
606-20-2-----	2,6-Dinitrotoluene	0.10	U
88-72-2-----	2-Nitrotoluene	0.10	U
99-99-0-----	4-Nitrotoluene	0.10	U
99-08-1-----	3-Nitrotoluene	0.10	U

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

GU01102BUCK8

Lab Name: GENERAL ENGINEERING LABOR Contract: N/A
 Lab Code: N/A Case No.: N/A SAS No.: N/A SDG No.: 51362
 Matrix: (soil/water) WATER Lab Sample ID: 51362008
 Sample wt/vol: 770.0 (g/ml) ML Lab File ID: EX2K0718
 Level: (low/med) LOW Date Received: 11/02/01
 % Moisture: _____ decanted: (Y/N) _____ Date Extracted: 11/06/01
 Concentrated Extract Volume: 1.60 (ml) Date Analyzed: 11/08/01
 Injection Volume: 0.100 (mL) Dilution Factor: 1.0
 GPC Cleanup: (Y/N) N

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
2691-41-0-----	HMX	0.10	U
121-82-4-----	RDX	0.10	U
99-35-4-----	1,3,5-Trinitrobenzene	0.10	U
99-65-0-----	1,3-Dinitrobenzene	0.10	U
98-95-3-----	Nitrobenzene	0.10	U
479-45-8-----	Tetryl	0.10	U
118-96-7-----	2,4,6-Trinitrotoluene	0.10	U
35572-78-2-----	2-Amino-4,6-dinitrotoluene	0.10	U
19406-51-0-----	4-Amino-2,6-dinitrotoluene	0.10	U
121-14-2-----	2,4-Dinitrotoluene	0.10	U
606-20-2-----	2,6-Dinitrotoluene	0.10	U
88-72-2-----	2-Nitrotoluene	0.10	U
99-99-0-----	4-Nitrotoluene	0.10	U
99-08-1-----	3-Nitrotoluene	0.10	U



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 Project: Groundwater

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Client Sample ID: GU01101BUCK1
 Sample ID: 51362001
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client
 Project: ESHL00701
 Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec												
<i>Alphaspec U, Liquid</i>												
Uranium-233/234		7.87	0.0357	0.618	0.100	pCi/L		AAK	11/22/01	0932	118989	1
Uranium-235/236		0.301	0.0388	0.0346	0.100	pCi/L						
Uranium-238		5.29	0.0341	0.419	0.100	pCi/L						
Rad Gas Flow												
<i>GFPC, Sr90, liquid low level</i>												
Strontium-90		-0.0834	0.222	0.0653	0.200	pCi/L		BF1	11/20/01	0800	118798	2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	FDG	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

The Qualifiers in this report are defined as follows :

- ** Indicates the analyte is a surrogate compound.
- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- B Analyte found in the sample as well as the associated blank.
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- UI Uncertain identification for gamma spectroscopy.
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

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Client Sample ID: GU01101BUCK1
Sample ID: 51362001

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
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standard operating procedures. Please direct any questions to your Project Manager, Stacy Griffin.

Dr. None

Reviewed by

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Client Sample ID: GU01101BUCK2
 Sample ID: 51362002
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client
 Project: ESHL00701
 Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec												
<i>Alphaspec U, Liquid</i>												
Uranium-233/234		13.2	0.0129	1.03	0.100	pCi/L		AAK	11/22/01	0932	118989	1
Uranium-235/236		0.347	0.00475	0.0365	0.100	pCi/L						
Uranium-238		6.79	0.0129	0.539	0.100	pCi/L						
Rad Gas Flow												
<i>GFPC, Sr90, liquid low level</i>												
Strontium-90		0.0293	0.183	0.0548	0.200	pCi/L		BF1	11/20/01	0800	118798	2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	FDG	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

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- > Actual result is greater than amount reported
- B Analyte found in the sample as well as the associated blank.
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- UI Uncertain identification for gamma spectroscopy.
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

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Client Sample ID:
Sample ID:

GU01101BUCK2
51362002

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
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M. Moore

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Client Sample ID: GU01101BUCK3
 Sample ID: 51362003
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client
 Project: ESHL00701
 Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec												
<i>Alphaspec U, Liquid</i>												
Uranium-233/234		8.14	0.00384	0.625	0.100	pCi/L		AAK	11/22/01	0932	118989	1
Uranium-235/236		0.147	0.0104	0.0184	0.100	pCi/L						
Uranium-238		2.86	0.0104	0.226	0.100	pCi/L						
Rad Gas Flow												
<i>GFPC, Sr90, liquid low level</i>												
Strontium-90		-0.0205	0.188	0.0551	0.200	pCi/L		BFI	11/20/01	0803	118798	2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	FDG	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

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- < Actual result is less than amount reported
- > Actual result is greater than amount reported
- B Analyte found in the sample as well as the associated blank.
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- UI Uncertain identification for gamma spectroscopy.
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

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Project: Groundwater

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Client Sample ID: GU01101BUCK3
Sample ID: 51362003

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
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M. Nune

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Client Sample ID: GU01101BUCK4
 Sample ID: 51362004
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client
 Project: ESHL00701
 Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec												
<i>Alphaspec U, Liquid</i>												
Uranium-233/234		12.0	0.0151	0.894	0.100	pCi/L	AAK	11/22/01	0932	118989	1	
Uranium-235/236		0.297	0.0139	0.029	0.100	pCi/L						
Uranium-238		3.00	0.0162	0.229	0.100	pCi/L						
Rad Gas Flow												
<i>GFPC, Sr90, liquid low level</i>												
Sr-90		0.0109	0.166	0.0494	0.200	pCi/L	BF1	11/20/01	0803	118798	2	

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	FDG	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

The Qualifiers in this report are defined as follows :

- ** Indicates the analyte is a surrogate compound.
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- B Analyte found in the sample as well as the associated blank.
- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- UI Uncertain identification for gamma spectroscopy.
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

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Project: Groundwater

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Client Sample ID: GU01101BUCK4
Sample ID: 51362004

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
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M. None

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 Contact: Billy Turney
 Project: Groundwater

Report Date: November 30, 2001

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Client Sample ID: GU01101BUCK6
 Sample ID: 51362005
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client
 Project: ESHL00701
 Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec												
Alphaspec U, Liquid												
Uranium-233/234		8.02	0.0182	0.610	0.100	pCi/L		AAK	11/22/01	0932	118989	1
Uranium-235/236		0.165	0.0146	0.0194	0.100	pCi/L						
Uranium-238		1.67	0.0131	0.133	0.100	pCi/L						
Rad Gas Flow												
GFPC, Sr90, liquid low level												
Strontium-90		0.0053	0.226	0.0673	0.200	pCi/L		BF1	11/20/01	0803	118798	2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	FDG	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

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- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
- U Indicates the compound was analyzed for but not detected above the detection limit
- UI Uncertain identification for gamma spectroscopy.
- X Lab-specific qualifier - must be fully described in case narrative and data summary package

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Water Quality & Hydrology
Los Alamos, New Mexico 87545
Contact: Billy Turney
Project: Groundwater

Report Date: November 30, 2001

Page 2 of 2

Client Sample ID: GU01101BUCK6
Sample ID: 51362005

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
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 Project: Groundwater

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Client Sample ID: GU01101BUCK7
 Sample ID: 51362006
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client
 Project: ESHL00701
 Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec												
<i>Alphaspec U, Liquid</i>												
Uranium-233/234		5.65	0.0144	0.435	0.100	pCi/L	AAK	11/22/01	0938	118989	1	
Uranium-235/236		0.110	0.00989	0.0149	0.100	pCi/L						
Uranium-238		1.90	0.0124	0.152	0.100	pCi/L						
Rad Gas Flow												
<i>GFPC, Sr90, liquid low level</i>												
Strontium-90		-0.0197	0.228	0.0674	0.200	pCi/L	BF1	11/20/01	0812	118798	2	

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	FDG	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

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- E Concentration exceeds instrument calibration range
- J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
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Project: Groundwater

Report Date: November 30, 2001

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Client Sample ID: GU01101BUCK7
Sample ID: 51362006

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	AnalystData	Time	Batch Mtd.
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B. Turner

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 Project: Groundwater

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Client Sample ID: GU01101BUCK8
 Sample ID: 51362007
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client

Project: ESHL00701
 Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec												
<i>Alphaspec U, Liquid</i>												
Uranium-233/234		6.84	0.0176	0.531	0.100	pCi/L		AAK	11/22/01	0938	118989	1
Uranium-235/236		0.261	0.0176	0.0285	0.100	pCi/L						
Uranium-238		4.17	0.0206	0.328	0.100	pCi/L						
Rad Gas Flow												
<i>GFPC, Sr90, liquid low level</i>												
Strontium-90		0.146	0.187	0.0616	0.200	pCi/L		BF1	11/20/01	0812	118798	2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	FDG	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

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Client Sample ID:
Sample ID:

GU01101BUCKS
51362007

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
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M. Moore

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 Project: Groundwater

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Client Sample ID: GU01102BUCK8
 Sample ID: 51362008
 Matrix: Ground Water
 Collect Date: 31-OCT-01
 Receive Date: 02-NOV-01
 Collector: Client
 Project: ESHL00701
 Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
Rad Alpha Spec												
<i>Alphaspec U, Liquid</i>												
Uranium-233/234		6.56	0.020	0.504	0.100	pCi/L		AAK	11/22/01	0938	118989	1
Uranium-235/236		0.692	0.0124	0.0605	0.100	pCi/L						
Uranium-238		4.06	0.016	0.315	0.100	pCi/L						
Rad Gas Flow												
<i>GFPC, Sr90, liquid low level</i>												
Strontium-90		0.125	0.179	0.0579	0.200	pCi/L		BF1	11/20/01	0812	118798	2

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PRE	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	11/06/01	1000	118832
SW846 3005A	ICP-MS 3005 PREP	FDG	11/09/01	1000	119120
SW846 3005A	ICP-TRACE SW846 3005A	AJM	11/06/01	1445	118976

The following Analytical Methods were performed

Method	Description
1	DOE EML HASL 300
2	EPA 905.0

Notes:

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Client Sample ID: GU01102BUCK8
Sample ID: 51362008

Project: ESHL00701
Client ID: ESHL001

Parameter	Qualifier	Result	DL	TPU	RL	Units	DF	Analyst	Date	Time	Batch	Mtd.
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De. none

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Sample ID	Client ID	Replicate 1	ug/L	Total U Results (ug/L)	²³⁵ U/ ²³⁸ U			
1200105711	Method Blank	²³⁵ U	0	-0.34	0			
Nov 13 2001 12:01		²³⁸ U	-0.34					
1200105712	Laboratory Control Sample	²³⁵ U	0.757	104.557	13712.02114		Rec. (isotopic)	Rec. (total)
Nov 13 2001 12:05		²³⁸ U	103.8				105.13889	104.5
							104.56331	
51362001	GU01101BUCK1	²³⁵ U	0.124	17.384	13919.35484			
Nov 13 2001 12:09		²³⁸ U	17.26					
							%Diff (isotopic)	%Diff (total)
1200105715	Serial Dilution	²³⁵ U	0.023	3.203	13826.08696		-7.258065	-7.875057524
Nov 13 2001 12:12	5x dil.factor	²³⁸ U	3.18				-7.87949	
							RPD (isotopic)	RPD (total)
1200105714	Sample Duplicate	²³⁵ U	0.127	17.987	14062.99213		2.3904382	3.409572814
Nov 13 2001 12:16		²³⁸ U	17.86				3.4168565	
							Rec. (isotopic)	Rec. (total)
1200105713	Matrix Spike	²³⁵ U	0.889	123.589	13802.02475		106.25	106.205
Nov 13 2001 12:20		²³⁸ U	122.7				106.21537	
51362002	GU01101BUCK2	²³⁵ U	0.167	23.307	13856.28743			
Nov 13 2001 12:24		²³⁸ U	23.14					
51362003	GU01101BUCK3	²³⁵ U	0.084	9.144	14187.5		Analytical batch 119121	
Nov 13 2001 12:28		²³⁸ U	9.08				Preparation batch 119120	
51362004	GU01101BUCK4	²³⁵ U	0.073	9.983	13575.34247		Initial Sample vol. 50 mL	
Nov 13 2001 12:39		²³⁸ U	9.91				Final Sample vol. 50 mL	
51362005	GU01101BUCK6	²³⁵ U	0.042	5.832	13785.71429			
Nov 13 2001 12:42		²³⁸ U	5.79					
51362006	GU01101BUCK7	²³⁵ U	0.039	5.639	14358.97436			
Nov 13 2001 12:46		²³⁸ U	5.6					
51362007	GU01101BUCK8	²³⁵ U	0.101	14.301	14059.40594			
Nov 13 2001 12:50		²³⁸ U	14.2					
51362008	GU01102BUCK8	²³⁵ U	0.101	14.171	13930.69307			
Nov 13 2001 12:54		²³⁸ U	14.07					

MS 10/4/01

Sample ID	Client ID	Replicate 2	ug/L	Total U Results (ug/L)	²³⁵ U/ ²³⁸ U			
1200105711	Method Blank	²³⁸ U	0	-0.05	0			
Nov 14 2001 11:29		²³⁸ U	-0.05					
1200105712	Laboratory Control Sample	²³⁸ U	0.747	102.847	13668.0054		Rec. (isotopic)	Rec. (total)
Nov 14 2001 11:43		²³⁸ U	102.1				103.75	104.5
							102.8508	
51326001	GU01101BUCK1	²³⁸ U	0.126	17.136	13500			
Nov 14 2001 11:46		²³⁸ U	17.01					
							%Diff (isotopic)	%Diff (total)
1200105715	Serial Dilution	²³⁸ U	0.025	3.515	13960		-0.79365	2.5618581
Nov 14 2001 11:50	5x dil.factor	²³⁸ U	3.49				2.586714	
							RPD (isotopic)	RPD (total)
1200105714	Sample Duplicate	²³⁸ U	0.143	19.273	13377.6224		12.63941	11.738856
Nov 14 2001 11:54		²³⁸ U	19.13				11.73215	
							Rec. (isotopic)	Rec. (total)
1200105713	Matrix Spike	²³⁸ U	0.899	125.099	13815.3504		107.3611	107.963
Nov 14 2001 11:58		²³⁸ U	124.2				107.9782	
51362002	GU01101BUCK2	²³⁸ U	0.171	23.401	13584.7953			
Nov 14 2001 12:01		²³⁸ U	23.23					
51362003	GU01101BUCK3	²³⁸ U	0.066	9.396	14136.3636		Analytical batch 119121	
Nov 14 2001 12:05		²³⁸ U	9.33				Preparation batch 119120	
51362004	GU01101BUCK4	²³⁸ U	0.075	10.375	13733.3333		Initial Sample vol. 50 mL	
Nov 14 2001 12:16		²³⁸ U	10.3				Final Sample vol. 50 mL	
51362005	GU01101BUCK6	²³⁸ U	0.045	6.195	13666.6667			
Nov 14 2001 12:20		²³⁸ U	6.15					
51362006	GU01101BUCK7	²³⁸ U	0.042	6.042	14285.7143			
Nov 14 2001 12:24		²³⁸ U	6					
51362007	GU01101BUCK8	²³⁸ U	0.109	14.959	13623.8532			
Nov 14 2001 12:28		²³⁸ U	14.85					
51362008	GU01102BUCK8	²³⁸ U	0.104	14.854	14182.6923			
Nov 14 2001 12:31		²³⁸ U	14.75					

ms 12/1/01

Sample ID	Client ID	Replicate 3	ug/L	Total U Results (ug/L)	²³⁵ U/ ²³⁸ U	MDL ²³⁵ U (ug/L)	MDL ²³⁸ U (ug/L)
1200105711	Method Blank	²³⁵ U	0	-0.04	0	0.001337	0.018
Nov 14 2001 12:42		²³⁸ U	-0.04				
						Rec. (isotopic)	Rec. (total)
1200105712	Laboratory Control Sample	²³⁵ U	0.802	111.202	13765.586	111.38889	104.5
Nov 14 2001 12:46		²³⁸ U	110.4			111.21185	
51326001	GU01101BUCK1	²³⁵ U	0.134	18.564	13753.731		
Nov 14 2001 12:50		²³⁸ U	18.43				
						%Diff (isotopic)	%Diff (total)
1200105715	Serial Dilution	²³⁵ U	0.025	3.725	14800	-6.716418	0.328593
Nov 14 2001 12:54	5x dil.factor	²³⁸ U	3.7			0.3798155	
						RPD (isotopic)	RPD (total)
1200105714	Sample Duplicate	²³⁵ U	0.134	18.764	13902.985	0	1.071582
Nov 14 2001 12:57		²³⁸ U	18.63			1.0793308	
						Rec. (isotopic)	Rec. (total)
1200105713	Matrix Spike	²³⁵ U	0.943	130.443	13732.768	112.36111	111.879
Nov 14 2001 13:01		²³⁸ U	129.5			111.88677	
51362002	GU01101BUCK2	²³⁵ U	0.178	24.368	13589.888		
Nov 14 2001 13:05		²³⁸ U	24.19				
51362003	GU01101BUCK3	²³⁵ U	0.07	9.71	13771.429		Analytical batch 119121
Nov 14 2001 13:09		²³⁸ U	9.64				
							Preparation batch 119120
51362004	GU01101BUCK4	²³⁵ U	0.078	10.798	13743.59		
Nov 14 2001 13:20		²³⁸ U	10.72				Initial Sample vol. 50 mL
51362005	GU01101BUCK6	²³⁵ U	0.045	6.365	14044.444		Final Sample vol. 50 mL
Nov 14 2001 13:24		²³⁸ U	6.32				
51362006	GU01101BUCK7	²³⁵ U	0.045	6.185	13644.444		
Nov 14 2001 13:27		²³⁸ U	6.14				
51362007	GU01101BUCK8	²³⁵ U	0.108	15.238	14009.259		
Nov 14 2001 13:31		²³⁸ U	15.13				
51362008	GU01102BUCK8	²³⁵ U	0.109	15.299	13935.78		
Nov 14 2001 13:35		²³⁸ U	15.19				

MB 12/4/01

Sample ID	Client ID	Replicate 2	ug/L	Total U Results (ug/L)	²³⁸ U/ ²³⁵ U				
1200105711	Method Blank	²³⁸ U	0	-0.05		0			
Nov 14 2001 11:29		²³⁸ U	-0.05						
							Rec. (isotopic)	Rec. (total)	
1200105712	Laboratory Control Sample	²³⁸ U	0.747	102.847		13668.0054	103.75	104.5	
Nov 14 2001 11:43		²³⁸ U	102.1				102.8508		
51326001	GU01101BUCK1	²³⁸ U	0.126	17.136		13500			
Nov 14 2001 11:46		²³⁸ U	17.01						
							%Diff (isotopic)	%Diff (total)	
1200105715	Serial Dilution	²³⁸ U	0.025	3.515		13960	-0.79365	2.5618581	
Nov 14 2001 11:50	5x dil.factor	²³⁸ U	3.49				2.586714		
							RPD (isotopic)	RPD (total)	
1200105714	Sample Duplicate	²³⁸ U	0.143	19.273		13377.6224	12.63941	11.738856	
Nov 14 2001 11:54		²³⁸ U	19.13				11.73215		
							Rec. (isotopic)	Rec. (total)	
1200105713	Matrix Spike	²³⁸ U	0.899	125.099		13815.3504	107.3611	107.963	
Nov 14 2001 11:58		²³⁸ U	124.2				107.9782		
51362002	GU01101BUCK2	²³⁸ U	0.171	23.401		13584.7953			
Nov 14 2001 12:01		²³⁸ U	23.23						
51362003	GU01101BUCK3	²³⁸ U	0.066	9.396		14136.3636			Analytical batch 119121
Nov 14 2001 12:05		²³⁸ U	9.33						Preparation batch 119120
51362004	GU01101BUCK4	²³⁸ U	0.075	10.375		13733.3333			Initial Sample vol. 50 mL
Nov 14 2001 12:16		²³⁸ U	10.3						
51362005	GU01101BUCK6	²³⁸ U	0.045	6.195		13666.6667			Final Sample vol. 50 mL
Nov 14 2001 12:20		²³⁸ U	6.15						
51362006	GU01101BUCK7	²³⁸ U	0.042	6.042		14285.7143			
Nov 14 2001 12:24		²³⁸ U	6						
51362007	GU01101BUCK8	²³⁸ U	0.109	14.959		13623.8532			
Nov 14 2001 12:28		²³⁸ U	14.85						
51362008	GU01102BUCK8	²³⁸ U	0.104	14.854		14182.6923			
Nov 14 2001 12:31		²³⁸ U	14.75						

MS 12/1/01

Sample ID	Client ID	Replicate 3	ug/L	Total U Results (ug/L)	²³⁸ U/ ²³⁵ U	MDL ²³⁸ U (ug/L)	MDL ²³⁵ U (ug/L)
1200105711	Method Blank	²³⁸ U	0	-0.04	0	0.001337	0.018
Nov 14 2001 12:42		²³⁸ U	-0.04				
						Rec. (isotopic)	Rec. (total)
1200105712	Laboratory Control Sample	²³⁸ U	0.802	111.202	13765.586	111.38889	104.5
Nov 14 2001 12:46		²³⁸ U	110.4			111.21185	
51326001	GU01101BUCK1	²³⁸ U	0.134	18.564	13753.731		
Nov 14 2001 12:50		²³⁸ U	18.43				
						%Diff (isotopic)	%Diff (total)
1200105715	Serial Dilution	²³⁸ U	0.025	3.725	14800	-6.716418	0.328593
Nov 14 2001 12:54	5x dil.factor	²³⁸ U	3.7			0.3798155	
						RPD (isotopic)	RPD (total)
1200105714	Sample Duplicate	²³⁸ U	0.134	18.764	13902.985	0	1.071582
Nov 14 2001 12:57		²³⁸ U	18.63			1.0793308	
						Rec. (isotopic)	Rec. (total)
1200105713	Matrix Spike	²³⁸ U	0.943	130.443	13732.768	112.36111	111.879
Nov 14 2001 13:01		²³⁸ U	129.5			111.88677	
51362002	GU01101BUCK2	²³⁸ U	0.178	24.368	13589.888		
Nov 14 2001 13:05		²³⁸ U	24.19				
51362003	GU01101BUCK3	²³⁸ U	0.07	9.71	13771.429	Analytical batch 119121	
Nov 14 2001 13:09		²³⁸ U	9.64			Preparation batch 119120	
51362004	GU01101BUCK4	²³⁸ U	0.078	10.798	13743.59		
Nov 14 2001 13:20		²³⁸ U	10.72			Initial Sample vol. 50 mL	
51362005	GU01101BUCK6	²³⁸ U	0.045	6.365	14044.444	Final Sample vol. 50 mL	
Nov 14 2001 13:24		²³⁸ U	6.32				
51362006	GU01101BUCK7	²³⁸ U	0.045	6.185	13644.444		
Nov 14 2001 13:27		²³⁸ U	6.14				
51362007	GU01101BUCK8	²³⁸ U	0.108	15.238	14009.259		
Nov 14 2001 13:31		²³⁸ U	15.13				
51362008	GU01102BUCK8	²³⁸ U	0.109	15.299	13935.78		
Nov 14 2001 13:35		²³⁸ U	15.19				

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P.O. Box 432 Riverside, CA 92502-0432
PH (909) 653-3351 FAX (909) 653-1662
e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01101BUCK1
Site: GW-2123
Description:

Matrix: water

Page: 1 of
Lab No.: L91863-001

Date Reported: 11/08/2001

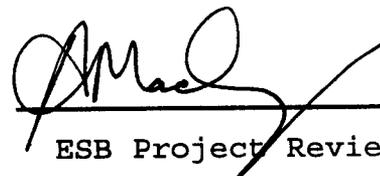
Collected By:
Date: 10/31/2001
Time: 1215
Submitted By: Fed.Exp.
Date: 11/02/2001
Time: 0930

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	011106/KO

ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace (Less Than RL, Above MDL) value estimated.

cc:


ESB Project Reviewer



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Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01101BUCK2
Site: GW-2124
Description:

Matrix: water

Page: 1 of
Lab No.: L91863-002

Date Reported: 11/08/2001

Collected By:

Date: 10/31/2001

Time: 1405

Submitted By: Fed.Exp.

Date: 11/02/2001

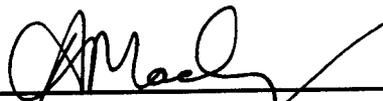
Time: 0930

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	011106/KO

ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace (Less Than RL, Above MDL) value estimated.

CC:



ESB Project Reviewer



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Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01101BUCK3
Site: GW-2125
Description:

Matrix: water

Page: 1 of
Lab No.: L91863-003

Date Reported: 11/08/2001

Collected By:

Date: 10/31/2001

Time: 1105

Submitted By: Fed. Exp.

Date: 11/02/2001

Time: 0930

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	011106/KO

ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace (Less Than RL, Above MDL) value estimated.

CC:


ESB Project Reviewer



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Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01101BUCK4
Site: GW-2126
Description:

Matrix: water

Page: 1 of
Lab No.: L91863-004

Date Reported: 11/08/2001

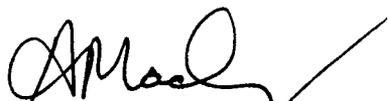
Collected By:
Date: 10/31/2001
Time: 1025
Submitted By: Fed. Exp.
Date: 11/02/2001
Time: 0930

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	011106/KO

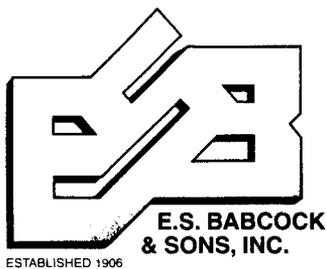
ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace (Less Than RL, Above MDL) value estimated.

CC:



ESB Project Reviewer



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Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01102BUCK4
Site: GW-2126
Description:

Matrix: water

Page: 1 of
Lab No.: L91863-005

Date Reported: 11/08/2001

Collected By:
Date: 10/31/2001
Time: 1025
Submitted By: Fed.Exp.
Date: 11/02/2001
Time: 0930

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	011106/KO

ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace (Less Than RL, Above MDL) value estimated.

cc:



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Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01101BUCK6
Site: GW-2127
Description:

Matrix: water

Page: 1 of
Lab No.: L91863-006

Date Reported: 11/08/2001

Collected By:

Date: 10/31/2001
Time: 0945

Submitted By: Fed.Exp.

Date: 11/02/2001
Time: 0930

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	011106/KO

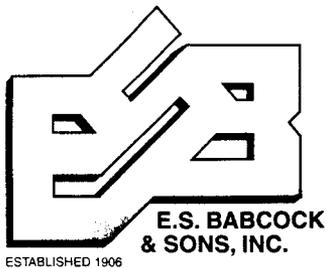
ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace (Less Than RL, Above MDL) value estimated.

CC:



ESB Project Reviewer



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e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01101BUCK7
Site: GW-2128
Description:

Matrix: water

Page: 1 of
Lab No.: L91863-007

Date Reported: 11/08/2001

Collected By:
Date: 10/31/2001
Time: 1135
Submitted By: Fed.Exp.
Date: 11/02/2001
Time: 0930

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	011106/KO

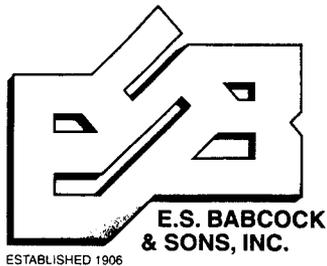
ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace (Less Than RL, Above MDL) value estimated.

cc:



ESB Project Reviewer



Environmental Laboratory Certification #1156
6100 Quail Valley Court Riverside, CA 92507-0704
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PH (909) 653-3351 FAX (909) 653-1662
e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

2951-PERC

Client:

Los Alamos National Laboratory
Bob Beers
P.O. Box 1663
M.S. K497
Los Alamos, NM 87545

Client I.D.: BU01101BUCK8
Site: GW-2129
Description:

Matrix: water

Page: 1 of
Lab No.: L91863-008

Date Reported: 11/08/2001

Collected By:

Date: 10/31/2001

Time: 1330

Submitted By: Fed. Exp.

Date: 11/02/2001

Time: 0930

<u>Constituent</u>	<u>Result</u>	<u>Method</u>	<u>RL</u>	<u>MDL</u>	<u>Date / Analyst</u>
Perchlorate	ND ug/L	EPA 314.0	4.	2.	011106/KO

ND = None detected at MDL (Method Detection Limit). RL & MDL units same as result.

J=Trace (Less Than RL, Above MDL) value estimated.

CC:


ESB Project Reviewer

ATTACHMENT 3.0

ANALYTICAL REPORTS

**UNIVERSITY OF MIAMI
TRITIUM LABORATORY
MIAMI, FL**

BUCKMAN WELLS NOS. 1, 2, 3, 4, 6, 7, 8

TRITIUM

SAMPLE DATE: OCTOBER 31, 2001

Client: LOS ALAMOS NATIONAL LAB - BEERS
 Recvd : 01/10/26
 Job# : 1548
 Final : 01/12/11

Pur. Order: 13004 7C18/WSR5 1802
 Contact: Bob Beers, 505/667-7969
 ESH-18, MS K497 (P) 665-9344
 Los Alamos, NM 87545

Cust LABEL INFO	JOB.SX	REFDATE	QUANT	ELYS	TU	eTU
LANL-BEERS- UU01101G10W	1548.01	011024	1000	275	7.66	0.25
LANL-BEERS- UU01102G10W	1548.02	011024	1000	275	7.26	0.24
LANL-BEERS- UU01101BUCK1	1548.03	011031	1000	275	-0.01	0.09
LANL-BEERS- UU01101BUCK2	1548.04	011031	1000	275	0.09	0.09
LANL-BEERS- UU01101BUCK3	1548.05	011031	1000	275	0.01	0.09
LANL-BEERS- UU01101BUCK4	1548.06	011031	1000	275	-0.03	0.09
LANL-BEERS- UU01101BUCK6	1548.07	011031	1000	264	0.01	0.09
LANL-BEERS- UU01101BUCK-FLD	1548.08	011031	1000	275	-0.05	0.09
LANL-BEERS- UU01101BUCK7	1548.09	011031	1000	275	-0.11	0.09
LANL-BEERS- UU01101BUCK8	1548.10	011031	1000	275	-0.02	0.09

ATTACHMENT 4.0

ANALYTICAL REPORTS

**ACCULABS, INC.
GOLDEN, CO**

BUCKMAN WELLS NOS. 1, 2, 3, 4, 6, 7, 8

PERCHLORATE

SAMPLE DATE: OCTOBER 31, 2001

Perchlorate Analysis Data Sheet

Client Sample No.

AU01101BUCK1

Lab Name: Acculabs Inc. Date Received: 11/02/01
 Lab Code: LANL Acculabs Job No: G01110032
 Matrix: Aqueous Acculabs Sample ID: G01110032-02A
 Extract Batch Code: 1902
 Extraction Type: Filter/DAI Date Filtered: 11/28/01
 Injection Volume (uL): 50

CAS No.	Analyte	Concentration Units: ug/L	Q	Dilution Factor	Date Analyzed	Acculabs File ID
14797-73-0	Perchlorate	0.26	J	1	12/04/01	per120350

000019

Perchlorate Analysis Data Sheet

Client Sample No.

AU01101BUCK2

Lab Name: Acculabs Inc.

Date Received: 11/02/01

Lab Code: LANL

Acculabs Job No: G01110032

Matrix: Aqueous

Acculabs Sample ID: G01110032-03A

Extract Batch Code: 1902

Extraction Type: Filter/DAI

Date Filtered: 11/28/01

Injection Volume (uL): 50

CAS No.	Analyte	Concentration Units: ug/L	Q	Dilution Factor	Date Analyzed	Acculabs File ID
14797-73-0	Perchlorate	0.50	U	1	12/04/01	per120351

000013

Perchlorate Analysis Data Sheet

Client Sample No.

AU01101BUCK3

Lab Name: Acculabs Inc.

Date Received: 11/02/01

Lab Code: LANL

Acculabs Job No: G01110032

Matrix: Aqueous

Acculabs Sample ID: G01110032-05A

Extract Batch Code: 1902

Extraction Type: Filter/DAI

Date Filtered: 11/28/01

Injection Volume (uL): 50

CAS No.	Analyte	Concentration Units: ug/L	Q	Dilution Factor	Date Analyzed	Acculabs File ID
14797-73-0	Perchlorate	0.50	U	1	12/04/01	per120353

000021

Perchlorate Analysis Data Sheet

Client Sample No.

AU01101BUCK4

Lab Name: Acculabs Inc.

Date Received: 11/02/01

Lab Code: LANL

Acculabs Job No: G01110032

Matrix: Aqueous

Acculabs Sample ID: G01110032-06A

Extract Batch Code: 1902

Extraction Type: Filter/DAI

Date Filtered: 11/28/01

Injection Volume (uL): 50

CAS No.	Analyte	Concentration Units: ug/L	Q	Dilution Factor	Date Analyzed	Acculabs File ID
14797-73-0	Perchlorate	0.50	U	1	12/04/01	per120354

000022

Perchlorate Analysis Data Sheet

Client Sample No.

AU01101BUCK6

Lab Name: Acculabs Inc.

Date Received: 11/02/01

Lab Code: LANL

Acculabs Job No: G01110032

Matrix: Aqueous

Acculabs Sample ID: G01110032-07A

Extract Batch Code: 1902

Extraction Type: Filter/DAI

Date Filtered: 11/28/01

Injection Volume (uL): 50

Concentration Units:

Dilution Factor

Date Analyzed

Acculabs File ID

CAS No.	Analyte	ug/L	Q	Dilution Factor	Date Analyzed	Acculabs File ID
14797-73-0	Perchlorate	0.50	U	1	12/04/01	per120355

000023

Perchlorate Analysis Data Sheet

Client Sample No.

AU01101BUCK7

Lab Name: Acculabs Inc.

Date Received: 11/02/01

Lab Code: LANL

Acculabs Job No: G01110032

Matrix: Aqueous

Acculabs Sample ID: G01110032-08A

Extract Batch Code: 1902

Extraction Type: Filter/DAI

Date Filtered: 11/28/01

Injection Volume (uL): 50

CAS No.	Analyte	Concentration Units: ug/L	Q	Dilution Factor	Date Analyzed	Acculabs File ID
14797-73-0	Perchlorate	0.50	U	1	12/04/01	per120356

000024

Perchlorate Analysis Data Sheet

Client Sample No.

AU01101BUCK8

Lab Name: Acculabs Inc.

Date Received: 11/02/01

Lab Code: LANL

Acculabs Job No: G01110032

Matrix: Aqueous

Acculabs Sample ID: G01110032-04A

Extract Batch Code: 1902

Extraction Type: Filter/DAI

Date Filtered: 11/28/01

Injection Volume (uL): 50

CAS No.	Analyte	Concentration Units: ug/L	Q	Dilution Factor	Date Analyzed	Acculabs File ID
14797-73-0	Perchlorate	0.25	J	1	12/04/01	per120352

000020

ATTACHMENT 5.0

ANALYTICAL REPORTS

**LOS ALAMOS NATIONAL LABORATORY
CHEMISTRY DIVISION
ISOTOPE & NUCLEAR CHEMISTRY GROUP**

BUCKMAN WELLS NOS. 1, 2, 3, 4, 6, 7, 8

ISOTOPIC URANIUM

SAMPLE DATE: OCTOBER 31, 2001

HR-ICPMS results for Buckman well water samples submitted 11/1/01

submitter ID	replicate number	concentration (ppb)			uncertainty (ppb) ^d		replicate statistics		
		[U 235]	[U 238]	[U] ^a	[U 235]	[U 238]	mean	stdev	%rsd
LU01101BUCK1	1	0.1214	17.72	17.84	0.0011	0.11	17.81	0.024	0.14
	2	0.1196	17.68	17.80	0.0010	0.09			
	3	0.1203	17.67	17.79	0.0010	0.13			
LU01101BUCK2	1	0.1551	22.67	22.83	0.0013	0.11	22.63	0.150	0.66
	2	0.1530	22.45	22.61	0.0013	0.13			
	3	0.1520	22.31	22.46	0.0017	0.11			
LU01101BUCK3	1	0.0616	9.03	9.09	0.0006	0.05	9.02	0.053	0.59
	2	0.0610	8.92	8.98	0.0009	0.06			
	3	0.0612	8.91	8.97	0.0008	0.05			
LU01102BUCK3	1	0.0620	9.05	9.11	0.0006	0.05	9.01	0.097	1.08
	3	0.0642	8.85	8.92	0.0201	0.08			
	2 ^b	3.6583	9.31	12.97	0.0031	0.17			
LU01101BUCK4	1	0.0681	9.93	10.00	0.0005	0.05	10.18	0.139	1.36
	2	0.0694	10.15	10.22	0.0006	0.05			
	3	0.0704	10.26	10.33	0.0006	0.05			
LU01101BUCK6	1 ^b	0.0896	6.18	6.27	0.0012	0.04	6.31	0.018	0.28
	2	0.0433	6.25	6.29	0.0004	0.03			
	3	0.0457	6.28	6.33	0.0006	0.04			
LU01101BUCK7	1	0.0415	6.13	6.17	0.0006	0.23	6.13	0.028	0.46
	2	0.0425	6.06	6.11	0.0002	0.04			
	3	0.0415	6.07	6.11	0.0003	0.03			
LU01101BUCK8	1	0.0950	13.84	13.94	0.0008	0.07	14.03	0.111	0.79
	2	0.0959	14.09	14.19	0.0006	0.13			
	3	0.0945	13.88	13.97	0.0012	0.20			

^a Total uranium concentration is the sum of isotopes 234, 235 & 238. U234 concentration was not measured and was derived from U238 concentration assuming natural abundance (0.0055% U234).

^b Anomalous U235 results were obtained on samples 2BUCK3 replicate 2 and 1BUCK6 replicate 1. These replicates were not included in calculation of replicate statistics.

^c RPD=relative percent difference between measured and true U238/U235.

^d Three measurements were made of each of three aliquots per sample. For U235, the uncertainty equals the measurement uncertainty or the uncertainty derived from counting statistics, whichever is greater.
For U238, the uncertainty equals the measurement uncertainty or the uncertainty in the calibration standard certification, whichever is greater.

ISOTOPE RATIO RESULTS

submitter ID	replicate number	blank subtracted time & drift corrected mean integrated counts with 6.5ns dead time applied.				RPD ^c
		U 235	U 238	U238/U235	8/5true	
LU01101BUCK1	1	6119	838025	136.951	137.881	0.68
	2	6027	835945	138.691		0.59
	3	6060	835447	137.865		0.01
LU01101BUCK2	1	6109	838287	137.225		0.48
	2	6028	830271	137.735		0.11
	3	5988	825019	137.778		0.07
LU01101BUCK3	1	5981	823043	137.611		0.20
	2	5923	813215	137.288		0.43
	3	5944	812490	136.688		0.87
LU01102BUCK3	1	5909	809296	136.962		0.67
	3	6121	791834	129.356		6.38
	2 ^b	344618	832290	2.415		193.11
LU01101BUCK4	1	5869	802835	136.782		0.80
	2	5979	820631	137.260		0.45
	3	6066	829449	136.748		0.83
LU01101BUCK6	1 ^b	12547	818757	65.254		71.51
	2	6107	827803	135.547		1.71
	3	6437	832122	129.270		6.45
LU01101BUCK7	1	5971	826938	138.490		0.44
	2	6112	818772	133.961		2.88
	3	5965	818991	137.289		0.43
LU01101BUCK8	1	5919	809440	136.761		0.82
	2	5973	823949	137.935		0.04
	3	5888	811626	137.853		0.02

^a Total uranium concentration is the sum of isotopes 234, 235 & 238. U234 concentration was not measured and was derived from U238 concentration assuming natural abundance (0.0055% U234).

^b Anomalous U235 results were obtained on samples 2BUCK3 replicate 2 and 1BUCK6 replicate 1. These replicates were not included in calculation of replicate statistics.

^c RPD=relative percent difference between measured and true U238/U235.

^d Three measurements were made of each of three aliquots per sample. For U235, the uncertainty equals the measurement uncertainty or the uncertainty derived from counting statistics, whichever is greater. For U238, the uncertainty equals the measurement uncertainty or the uncertainty in the calibration standard certification, whichever is greater.