TA 36 LANL 2002

Los Alamos
NATIONAL LABORATORY

Risk Reduction & Environmental Stewardship Division
Water Quality & Hydrology Group (RRES-WQH)
PO Box 1663, MS K497
Los Alamos, New Mexico 87545
(505) 667-7969/Fax: (505) 665-9344

Date: December 9, 2002
Refer to: RRES-WQH: 02-452

HSWA-1

Mr. John Young
Hazardous Materials Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

Mr. Curt Frischkorn
Ground Water Quality Bureau
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: NOTICE OF INTENT TO DISCHARGE, HYDROGEOLOGIC WORKPLAN WELL R-23, DRILLING WATER

Dear Mr. Young and Mr. Frischkorn:

On December 2, 2002, your agency concurred with Los Alamos National Laboratory's proposal to land apply water produced during the drilling of Hydrogeologic Workplan Well R-23 (personal communication, Mr. Curt Frischkorn, NMED, and Mr. Bob Beers, LANL). The Laboratory's proposal to discharge drilling water from Workplan Well R-23 was made in accordance with the requirements of the Hydrogeologic Workplan Notice of Intent (NOI) submitted to your agency on August 2, 2001, and subsequently revised on July 16, 2002. Under the Hydrogeologic Workplan NOI, when drilling water produced from a Hydrogeologic Workplan Well exceeds a New Mexico Water Quality Control Commission (NM WQCC) Regulation 3103 ground water standard or a RCRA regulatory limit the Laboratory will coordinate disposal with the NMED. Since samples of the drilling water produced from Workplan Well R-23 exceed the NM WQCC Regulation 3103 ground water standard for manganese (Mn) and cadmium (Cd), your agency's concurrence was requested.

The Laboratory has containerized approximately 100,000 gallons of water produced during the drilling of Workplan Well R-23. Workplan Well R-23 is located on Pajarito Road near the intersection of State Road 4. Candidate sites for the land application of R-23 drilling water are as follows:

- The road to Mortandad Canyon from TA-52. Depth to ground water: regional = 1260 ft.
- The road to the R-14 drill site: Depth to ground water: regional = 1180 ft.
- The roads at TA-49: Depth to ground water: regional = 1180 ft.

Because current weather conditions are not conducive to evaporation (lower temperatures, higher humidity) and recent precipitation has increased soil moisture, it is necessary for the Laboratory to utilize a variety of land application sites. The conditions at each site will be carefully evaluated before use. In accordance the Workplan NOI, no ponding, pooling, or run-off of the discharged water will be permitted. Information regarding the quality of the Workplan Well R-23 drilling water is provided below.

Water Quality Data

Attachment 1.0 contains analytical reports (metals, general chemistry, perchlorate, nitrate, HE, and tritium) from the sampling of containerized drilling water from Workplan Well R-23. All samples were filtered prior to analysis (with the exception of total Hg). Sample results were compliant with all NM WQCC Regulation 3103 ground water standards with the exception of the following contaminants:

Contaminant	Screening Result (mg/L)	NM WQCC ground water standard (mg/L)
Mn	0.26	0.2
Mn	0.28	0.2
Mn	0.48	0.2
Cd	0.014	0.1

Note: Two additional samples for cadmium were below the NM WQCC ground water standard of 0.1 mg/L (0.002 mg/L, <0.002 mg/L).

No perchlorate, HE, or tritium were detected in the Workplan Well R-23 drilling water at concentrations greater than the analytical laboratory's Method Detection Limits (MDLs).

Please call me at (505) 667-6969 or Roy Bohn of the Laboratory's Environmental Restoration Project (RRES-R) at (505) 665-5138 if additional information is required.

Sincerely,

Bob Beers
Water Quality & Hydrology Group

BB/yg

Attachments: a/s

Cy: M. Leavitt, NMED/GWQB, Santa Fe, NM, w/att.
J. Davis, NMED/SWQB, Santa Fe, NM, w/att.
J. Bearzi, NMED/HWB, Santa Fe, NM, w/att.
J. Vozella, DOE/OLASO, w/o att., MS A316
G. Turner, DOE/OLASO, w/att., MS A316

Cy (continued):
M. Johansen, DOE/OLASO, w/att., MS A316
J. Holt, ADO, w/att., MS A104
B. Ramsey, RRES-DO, w/o att., MS J591
K. Hargis, RRES-DO, w/o att, MS J591
D. Stavert, RRES-EP, w/att., MS J591
C. Nylander, RRES-GP, w/o att., MS M992
S. Rae, RRES-WQH, w/att., MS K497
D. Rogers, RRES-WQH, w/o att., MS K497
M. Saladen, RRES-WQH, w/o att., MS K497
J. McCann, RRES-WQH, w/o att., MS M992
R. Bohn, RRES-R, w/att., MS M992
D. Volkman, FWO-UI, w/o att., MS K718
RRES-WQH File, w/att., MS K497
IM-5, w/att., MS A150

ATTACHMENT 1.0

HYDROGEOLOGIC WORKPLAN
WELL R-23

CONTAINERIZED DRILLING WATER

ANALYTICAL REPORTS:

- GENERAL CHEMISTRY
- METALS
- PERCHLORATE
- NITRATE/NITRITE
- TOTAL Hg
- HE
- TRITIUM

SAMPLE DATES:

SEPTEMBER 19, 2002
SEPTEMBER 24, 2002
OCTOBER 1, 2002

R-23 Drilling Water
Screening Results

12/5/2002

ER WATER SAMPLES

SAMPLE ID	DESCRIPTION	DATE MM/DD/YY	ER Req#	Ag ppm	Al ppm	Std.D. +/-	Alk(Lab) ppm CaCO3	As ppm	Std.D. +/-	B ppm	Std.D. +/-
GW23-02-47759	R-23 mud	09/19/02	1228S	<0.001	0.23	0.01	325	0.0014	0.0001	0.43	0.01
GW23-02-47349	R-23 mud	09/24/02	1259S	<0.001	0.77	0.01	305	0.020	0.001	0.16	0.01
GW23-02-47350	R-23 mud	09/24/02	1259S	<0.001	0.10	0.01	310	0.032	0.001	0.06	0.01

R-23 Drilling Water
Screening Results

12/5/2002

SAMPLE ID	Ba ppm	Std.D. +/-	Be ppm	Br ppm	Ca ppm	Std.D. +/-	Cd ppm	Std.D. +/-	Cl ppm	ClO3 ppm	ClO4 ppm	Co ppm	Std.D. +/-	CO3 ppm
GW23-02-47759	0.025	0.001	<0.002	<0.06	19.6	0.3	0.014	0.001	4.78	<0.06	<0.01	<0.002		0
GW23-02-47349	0.075	0.001	<0.002	<0.06	22.9	0.4	0.002	0.001	4.73	<0.06	<0.01	0.006	0.001	0
GW23-02-47350	0.061	0.001	<0.002	<0.06	19.7	1.6	<0.002		5.80	<0.06	<0.01	0.004	0.001	0

R-23 Drilling Water
Screening Results

12/5/2002

SAMPLE ID	Cr ppm	Std.D. +/-	Cs ppm	Cu ppm	Std.D. +/-	F ppm	Fe ppm	Std.D. +/-	Hardness CaCO3 ppm	HCO3 ppm	Hg ppm	Std.D. +/-	Hg total ppm	Std.D. +/-
GW23-02-47759	0.014	0.001	<0.003	0.043	0.001	0.35	0.16	0.01	70.7	396	0.0003	0.0001	---	
GW23-02-47349	0.019	0.001	<0.003	0.015	0.001	0.28	0.52	0.01	99.2	372	0.0009	0.0001	**0.0029**	0.0001
GW23-02-47350	0.010	0.001	<0.003	0.009	0.001	0.33	0.24	0.01	80.5	378	0.0002	0.0001	0.0012	0.0001

R-23 Drilling Water
Screening Results

12/5/2002

SAMPLE ID	K ppm	Std.D. +/-	Li ppm	Std.D. +/-	Mg ppm	Std.D. +/-	Mn ppm	Std.D. +/-	Mo ppm	Std.D. +/-	Na ppm	Std.D. +/-	Ni ppm	Std.D. +/-	NO2 ppm
GW23-02-47759	6.49	0.03	0.028	0.001	5.28	0.03	**0.26**	0.01	0.18	0.01	127	1	0.015	0.001	3.05
GW23-02-47349	5.58	0.08	0.048	0.001	10.2	0.2	**0.28**	0.01	0.008	0.001	150	1	0.019	0.001	0.41
GW23-02-47350	5.81	0.05	0.054	0.001	7.60	0.04	**0.48**	0.01	0.015	0.001	182	15	0.012	0.001	1.05

R-23 Drilling Water
Screening Results

12/5/2002

SAMPLE ID	NO3 ppm	Oxalate ppm	Pb ppm	Std.D. +/-	pH Lab	PO4 ppm	Rb ppm	Std.D. +/-	Sb ppm	Se ppm	Si ppm	Std.D. +/-	SiO2 ppm calc	SO4 ppm
GW23-02-47759	0.48	0.21	0.011	0.001	7.36	<0.1	0.015	0.001	<0.002	<0.002	10.4	0.1	22.3	88.9
GW23-02-47349	0.80	<0.06	0.0052	0.0001	7.32	0.13	0.013	0.001	<0.002	<0.002	24.6	0.4	52.6	1.69
GW23-02-47350	0.41	<0.06	0.0011	0.0001	7.63	0.33	0.016	0.001	<0.002	<0.002	26.7	0.2	57.1	106

R-23 Drilling Water
Screening Results

12/5/2002

SAMPLE ID	Sn ppm	Sr ppm	Std.D. +/-	Th ppm	Ti ppm	Tl ppm	U ppm	Std.D. +/-	V ppm	std.D. +/-	Zn ppm	Std.D. +/-	Acetate ppm	Formate ppm
GW23-02-47759	<0.002	0.17	0.01	<0.002	<0.002	<0.002	0.0025	0.0001	0.014	0.001	0.009	0.001	+	+
GW23-02-47349	<0.002	0.51	0.01	<0.002	<0.002	<0.002	0.0014	0.0001	0.021	0.001	0.015	0.001	++	++
GW23-02-47350	<0.002	0.51	0.01	<0.002	<0.002	<0.002	0.0033	0.0001	0.017	0.001	0.007	0.001	++	++

SAMPLE ID	comments
GW23-02-47759	unknown peak before NO3
GW23-02-47349	unknown peak before NO3
GW23-02-47350	unknown peak before NO3

R-23

Certificate of Analysis

Company : Los Alamos National Lab
Address : PO Box 1663
TA-3, Bldg. 271, Drop Pt. 01U
Los Alamos, New Mexico 87545
Contact: Keith Greene
Project: Groundwater Project

Report Date: October 24, 2002

Client Sample ID:	GW23-02 49606 12	Project:	LANL00401
Sample ID:	68200001	Client ID:	LANL004
Matrix:	Ground Water		
Collect Date:	01-OCT-02 00:00		
Receive Date:	03-OCT-02		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Mercury Analysis Federal										
7470 Cold Vapor Hg Liquid										
Mercury	U	ND	0.943	4.00	ug/L	20	NOR1 10/23/02	1826	210028	1

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 7470A Prep	EPA 7470A Mercury Prep Liquid	KHN	10/22/02	1500	210025

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 7470A	

Notes:
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> Actual result is greater than amount reported
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BD Flag for results below the MDC or a flag for low tracer recovery.
E Concentration exceeds instrument calibration range
H Holding time exceeded
J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
P The response between the confirmation column and the primary column is >40%D
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
Y QC Samples were not spiked with this compound.

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

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

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

R-23

Certificate of Analysis

Company : Los Alamos National Lab
Address : PO Box 1663
TA-3, Bldg. 271, Drop Pt. 01U
Los Alamos, New Mexico 87545
Contact: Keith Greene
Project: Groundwater Project

Report Date: October 24, 2002

Client Sample ID:	GW23-02 49607 12	Project:	LANL00401
Sample ID:	68200002	Client ID:	LANL004
Matrix:	Ground Water		
Collect Date:	01-OCT-02 00:00		
Receive Date:	03-OCT-02		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Mercury Analysis Federal										
7470 Cold Vapor Hg Liquid										
Mercury	U	ND	0.943	4.00	ug/L	20	NOR1 10/23/02	1828	210028	1

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 7470A Prep	EPA 7470A Mercury Prep Liquid	KHN	10/22/02	1500	210025

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 7470A	

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Los Alamos, New Mexico 87545
Contact: Keith Greene
Project: Groundwater Project

Report Date: October 16, 2002

Client Sample ID:	GW23-02-49580 01/02/03	Project:	LANL00401
Sample ID:	67898002	Client ID:	LANL004
Matrix:	Ground Water		
Collect Date:	24-SEP-02 00:00		
Receive Date:	27-SEP-02		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-EXPL Federal											
HEXP / HEXPU											
1,3,5-Trinitrobenzene	U	ND	0.249	1.04	ug/L	1	JLW	10/04/02	2007	204789	1
2,4,6-Trinitrotoluene	U	ND	0.779	1.04	ug/L	1					
2,4-Dinitrotoluene	U	ND	0.349	1.04	ug/L	1					
2,6-Dinitrotoluene	U	ND	0.501	1.04	ug/L	1					
2-Amino-4,6-dinitrotoluene	U	ND	0.779	1.04	ug/L	1					
4-Amino-2,6-dinitrotoluene	U	ND	0.409	1.04	ug/L	1					
HMX	U	ND	0.779	1.04	ug/L	1					
Nitrobenzene	U	ND	0.131	1.04	ug/L	1					
RDX	U	ND	0.530	1.04	ug/L	1					
Tetryl	U	ND	0.320	1.04	ug/L	1					
m-Dinitrobenzene	U	ND	0.330	1.04	ug/L	1					
m-Nitrotoluene	U	ND	0.640	1.04	ug/L	1					
o-Nitrotoluene	U	ND	0.640	1.04	ug/L	1					
p-Nitrotoluene	U	ND	0.640	1.04	ug/L	1					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	09/30/02	0902	204788

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 8330	

Surrogate recovery	Test	Recovery%	Acceptable Limits
1,2-dinitrobenzene	HEXP / HEXPU	0%*	(59%-118%)

Notes:
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P The response between the confirmation column and the primary column is >40%D

R-23

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Company : Los Alamos National Lab
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Los Alamos, New Mexico 87545
Contact: Keith Greene
Project: Groundwater Project

Report Date: October 16, 2002

Client Sample ID:	GW23-02-49579 01/02/03	Project:	LANL00401
Sample ID:	67898001	Client ID:	LANL004
Matrix:	Ground Water		
Collect Date:	24-SEP-02 00:00		
Receive Date:	27-SEP-02		
Collector:	Client		

Parameter	Qualifier	Result	DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
HPLC-EXPL Federal											
HEXP / HEXPU											
1,3,5-Trinitrobenzene	U	ND	0.249	1.04	ug/L	1	JLW	10/04/02	1925	204789	1
2,4,6-Trinitrotoluene	U	ND	0.779	1.04	ug/L	1					
2,4-Dinitrotoluene	U	ND	0.349	1.04	ug/L	1					
2,6-Dinitrotoluene	U	ND	0.501	1.04	ug/L	1					
2-Amino-4,6-dinitrotoluene	U	ND	0.779	1.04	ug/L	1					
4-Amino-2,6-dinitrotoluene	U	ND	0.409	1.04	ug/L	1					
HMX	U	ND	0.779	1.04	ug/L	1					
Nitrobenzene	U	ND	0.131	1.04	ug/L	1					
RDX	U	ND	0.530	1.04	ug/L	1					
Tetryl	U	ND	0.320	1.04	ug/L	1					
m-Dinitrobenzene	U	ND	0.330	1.04	ug/L	1					
m-Nitrotoluene	U	ND	0.640	1.04	ug/L	1					
o-Nitrotoluene	U	ND	0.640	1.04	ug/L	1					
p-Nitrotoluene	U	ND	0.640	1.04	ug/L	1					

The following Prep Methods were performed

Method	Description	Analyst	Date	Time	Prep Batch
SW846 8330 PREP	8330 EXPLOSIVES BY HPLC Prep in liquid	GMS	09/30/02	0902	204788

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	SW846 8330	

Surrogate recovery	Test	Recovery%	Acceptable Limits
1,2-dinitrobenzene	HEXP / HEXPU	96%	(59%-118%)

Notes:
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H Holding time exceeded
J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.

R-23

Certificate of Analysis

Company : Los Alamos National Lab
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TA-3, Bldg. 271, Drop Pt. 01U
Los Alamos, New Mexico 87545
Contact: Keith Greene
Project: Groundwater Project

Report Date: October 30, 2002

Client Sample ID: GW23-02-49349 15/16
Sample ID: 67894001
Matrix: Ground Water
Collect Date: 24-SEP-02 00:00
Receive Date: 27-SEP-02
Collector: Client

Project: LANL00401
Client ID: LANL004

Parameter	Qualifier	Result		DL	RL	Units	DF	AnalystDate	Time	Batch	Method
Rad Alpha Spec											
Alphaspec Pu, Liquid											
Plutonium-238		0.0203	+/-0.0203	0.257	0.040	pCi/L		AAK 10/24/02	1735	207052	1
Plutonium-239/240		-0.111	+/-0.0442	0.224	0.040	pCi/L					
ISOU											
Uranium-233/234		19.9	+/-0.472	0.208	0.020	pCi/L		AAK 10/24/02	1659	207053	2
Uranium-235/236		1.02	+/-0.109	0.181	0.005	pCi/L					
Uranium-238		20.7	+/-0.481	0.232	0.020	pCi/L					
Rad Gamma Spec											
GAMMA SPEC											
Americium-241		-2.89	+/-13.3	15.7	25.0	pCi/L		CRB 10/15/02	1748	206047	3
Bismuth-211	UUI	0.00	+/-25.8	16.8		pCi/L					
Bismuth-214		6.14	+/-7.56	7.79	10.0	pCi/L					
Cadmium-109		18.9	+/-63.5	67.4		pCi/L					
Cerium-139		-0.774	+/-1.63	2.63	5.00	pCi/L					
Cesium-134		-1.48	+/-1.73	2.79		pCi/L					
Cesium-137		-0.265	+/-1.70	2.84	2.00	pCi/L					
Cobalt-60		-0.0359	+/-1.78	3.11	2.00	pCi/L					
Europium-152		2.03	+/-4.78	8.34	20.0	pCi/L					
Lead-212		21.7	+/-5.97	4.75	15.0	pCi/L					
Lead-214		8.67	+/-9.00	5.93	10.0	pCi/L					
Mercury-203		1.07	+/-2.14	3.77	5.00	pCi/L					
Potassium-40		46.9	+/-42.7	30.0	100	pCi/L					
Radium-223		-4.69	+/-32.5	55.8		pCi/L					
Radium-224	UUI	0.00	+/-39.4	54.1		pCi/L					
Radium-226		6.14	+/-7.56	5.44	0.500	pCi/L					
Radium-228	UUI	0.00	+/-12.9	13.6	0.500	pCi/L					
Ruthenium-106		7.85	+/-16.1	27.8	50.0	pCi/L					
Sodium-22		0.998	+/-1.74	3.18	5.00	pCi/L					
Strontium-85		-16.5	+/-3.61	4.67		pCi/L					
Thallium-208		8.56	+/-4.71	3.01	10.0	pCi/L					
Thorium-227		-12.9	+/-19.1	32.3		pCi/L					
Thorium-231		-1.77	+/-8.84	15.2		pCi/L					
Thorium-234	UUI	0.00	+/-117	157	250	pCi/L					
Tin-113		-1.44	+/-2.29	3.83	10.0	pCi/L					
Uranium-235		10.7	+/-20.7	19.2	50.0	pCi/L					
Yttrium-88		-0.379	+/-2.36	3.62	10.0	pCi/L					
Rad Gas Flow											
GFPC, Sr90, liquid											

Certificate of Analysis

Company : Los Alamos National Lab
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Los Alamos, New Mexico 87545
Contact: Keith Greene

Report Date: October 30, 2002

Project: Groundwater Project

Client Sample ID: GW23-02-49349 15/16
Sample ID: 67894001

Project: LANL00401
Client ID: LANL004

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow												
GFPC, Sr90, liquid												
Strontium-90		0.0101		0.147	0.200	pCi/L		AB2	10/22/02	0338	206648	4
Rad Liquid Scint												
LSC, Tritium Dist, Liquid												
Tritium		0.00	+/-104	175	250	pCi/L		JS1	10/17/02	1717	204941	5

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	DOE EML HASL 300	
2	DOE EML HASL 300	
3	EPA 901.1	
4	EPA 905.0 Modified	
5	EPA 906.0	

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Reviewed by

R-23

Certificate of Analysis

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Address : PO Box 1663
TA-3, Bldg. 271, Drop Pt. 01U
Los Alamos, New Mexico 87545
Contact: Keith Greene
Project: Groundwater Project

Report Date: October 30, 2002

Client Sample ID:	GW23-02-49350 15/16	Project:	LANL00401
Sample ID:	67894002	Client ID:	LANL004
Matrix:	Ground Water		
Collect Date:	24-SEP-02 00:00		
Receive Date:	27-SEP-02		
Collector:	Client		

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Alpha Spec												
Alphaspec Pu, Liquid												
Plutonium-238		-0.0339	+/-0.0268	0.215	0.040	pCi/L		AAK	10/24/02	1735	207052	1
Plutonium-239/240		-0.0254	+/-0.0406	0.187	0.040	pCi/L						
ISOU												
Uranium-233/234		8.72	+/-0.307	0.199	0.020	pCi/L		AAK	10/24/02	1659	207053	2
Uranium-235/236		0.320	+/-0.0657	0.173	0.005	pCi/L						
Uranium-238		8.23	+/-0.296	0.222	0.020	pCi/L						
Rad Gamma Spec												
GAMMA SPEC												
Americium-241		0.575	+/-2.69	4.50	25.0	pCi/L		CRB	10/15/02	1750	206047	3
Bismuth-211	UUI	0.00	+/-24.3	16.0		pCi/L						
Bismuth-214		2.50	+/-9.19	7.96	10.0	pCi/L						
Cadmium-109		37.0	+/-27.2	45.5		pCi/L						
Cerium-139		-2.43	+/-1.38	2.27	5.00	pCi/L						
Cesium-134		-0.216	+/-1.80	3.09		pCi/L						
Cesium-137		0.938	+/-1.90	3.35	2.00	pCi/L						
Cobalt-60		0.422	+/-2.01	3.58	2.00	pCi/L						
Europium-152		-0.121	+/-4.88	8.15	20.0	pCi/L						
Lead-212	UUI	0.00	+/-5.73	7.19	15.0	pCi/L						
Lead-214		9.84	+/-8.46	5.58	10.0	pCi/L						
Mercury-203		-0.0348	+/-2.16	3.65	5.00	pCi/L						
Potassium-40		1.98	+/-53.7	34.9	100	pCi/L						
Radium-223		4.16	+/-32.4	54.6		pCi/L						
Radium-224		51.8	+/-34.7	55.3		pCi/L						
Radium-226		2.50	+/-9.19	6.64	0.500	pCi/L						
Radium-228	UUI	0.00	+/-15.9	15.5	0.500	pCi/L						
Ruthenium-106		-6.58	+/-16.8	28.6	50.0	pCi/L						
Sodium-22		-0.26	+/-2.00	3.48	5.00	pCi/L						
Strontium-85		-16.8	+/-3.52	4.46		pCi/L						
Thallium-208	UUI	0.00	+/-4.58	4.59	10.0	pCi/L						
Thorium-227		3.50	+/-19.2	29.6		pCi/L						
Thorium-231		2.76	+/-8.55	14.6		pCi/L						
Thorium-234		9.61	+/-69.8	43.8	250	pCi/L						
Tin-113		-1.51	+/-2.34	3.77	10.0	pCi/L						
Uranium-235		18.0	+/-17.8	16.8	50.0	pCi/L						
Yttrium-88		0.498	+/-2.18	4.04	10.0	pCi/L						
Rad Gas Flow												
GFPC, Sr90, liquid												
Strontium-90		-0.0478		0.150	0.200	pCi/L		AB2	10/22/02	0338	206648	4

Certificate of Analysis

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Client Sample ID: GW23-02-49350 15/16
Sample ID: 67894002

Project: LANL00401
Client ID: LANL004

Parameter	Qualifier	Result		DL	RL	Units	DF	Analyst	Date	Time	Batch	Method
Rad Liquid Scint												
LSC, Tritium Dist, Liquid												
Tritium		-55.6	+/-96.0	167	250	pCi/L		JS1	10/17/02	1847	204941	5

The following Analytical Methods were performed

Method	Description	Analyst Comments
1	DOE EML HASL 300	
2	DOE EML HASL 300	
3	EPA 901.1	
4	EPA 905.0 Modified	
5	EPA 906.0	

Notes:
The Qualifiers in this report are defined as follows :

< 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.
BD Flag for results below the MDC or a flag for low tracer recovery.
E Concentration exceeds instrument calibration range
H Holding time exceeded
J Indicates an estimated value. The result was greater than the detection limit, but less than the reporting limit.
P The response between the confirmation column and the primary column is >40%D
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
Y QC Samples were not spiked with this compound.

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

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

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