ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Analytical Report

November 29, 2006

Report to:
James Hix
Cordilleran Compliance Services
5550 Marshall Street
Arvada, CO 80002

Bill to:
James Hix
Cordilleran Compliance Services
5550 Marshall Street
Arvada, CO 80002

Project ID: ED04243
ACZ Project ID: L59449

James Hix:

Enclosed are the analytical results for sample(s) submitted to ACZ Laboratories, Inc. (ACZ) on October 17, 2006. This project has been assigned to ACZ's project number, L59449. Please reference this number in all future inquiries.

All analyses were performed according to ACZ's Quality Assurance Plan, version 11.0. The enclosed results relate only to the samples received under L59449. Each section of this report has been reviewed and approved by the appropriate Laboratory Supervisor, or a qualified substitute.

Except as noted, the test results for the methods and parameters listed on ACZ's current NELAC certificate letter (#ACZ) meet all requirements of NELAC.

This report shall be used or copied only in its entirety. ACZ is not responsible for the consequences arising from the use of a partial report.

All samples and sub-samples associated with this project will be disposed of after December 29, 2006. If the samples are determined to be hazardous, additional charges apply for disposal (typically less than $10/sample). If you would like the samples to be held longer than ACZ's stated policy or to be returned, please contact your Project Manager or Customer Service Representative for further details and associated costs. ACZ retains analytical reports for five years.

If you have any questions or other needs, please contact your Project Manager.

29/Nov/06

Tony Antalek, Project Manager, has reviewed and approved this report in its entirety.

ACZ Laboratories, Inc.
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Case Narrative

Cordilleran Compliance Services

November 29, 2006

Project ID: ED04243
ACZ Project ID: L59449

Sample Receipt

ACZ Laboratories, Inc. (ACZ) received 3 ground water samples from Cordilleran Compliance Services on October 17, 2006. The samples were received in good condition. Upon receipt, the sample custodian removed the samples from the cooler, inspected the contents, and logged the samples into ACZ's computerized Laboratory Information Management System (LIMS). The samples were assigned ACZ LIMS project number L59449. The custodian verified the sample information entered into the computer against the chain of custody (COC) forms and sample bottle labels.

Holding Times

All analyses except those qualified with an ACZ 'H' flag were performed within EPA recommended holding times. The BTEX analyses were run outside of method holding time due to instrument issues.

Sample Analysis

These samples were analyzed for inorganic, organic and radiochemistry parameters. The individual methods are referenced on both, the ACZ invoice and the analytical reports. The extended qualifier reports may contain footnotes qualifying specific elements due to QC failures. In addition the following has been noted with this specific project:

1. The Gamma Scan and Tritium analyses were subcontracted to Paragon Analytical Labs in Ft. Collins, Colorado.

2. The BTEX analyses were qualified with the ACZ 'N1' flag due to high MTBE recovery on one of the quality control elements. There was insufficient sample remaining for reanalysis.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Inorganic Analytical Results

Cordilleran Compliance Services
Project ID: ED04243
Sample ID: CW-W902

ACZ Sample ID: ***L59449-01***
Date Sampled: *10/16/06 09:40*
Date Received: *10/17/06*
Sample Matrix: *Ground Water*

Inorganic Prep

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M200.2 ICP							10/20/06 13:42	erf

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Boron, total	M200.7 ICP	0.11			mg/L	0.01	0.05	10/25/06 19:45	msh
Calcium, total	M200.7 ICP	60.4			mg/L	0.2	1	10/25/06 19:45	msh
Iron, total	M200.7 ICP		U		mg/L	0.02	0.05	10/25/06 19:45	msh
Magnesium, total	M200.7 ICP	27.6			mg/L	0.2	1	10/25/06 19:45	msh
Manganese, total	M200.7 ICP		U		mg/L	0.005	0.03	10/25/06 19:45	msh
Potassium, total	M200.7 ICP	0.8	B		mg/L	0.3	1	10/25/06 19:45	msh
Selenium, total	M200.7 ICP		U		mg/L	0.04	0.2	10/26/06 18:31	gme
Sodium, total	M200.7 ICP	50.5			mg/L	0.3	1	10/25/06 19:45	msh

Wet Chemistry

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration								
Bicarbonate as CaCO3		293			mg/L	2	20	10/30/06 0:00	ct
Carbonate as CaCO3			U		mg/L	2	20	10/30/06 0:00	ct
Hydroxide as CaCO3			U		mg/L	2	20	10/30/06 0:00	ct
Total Alkalinity		293			mg/L	2	20	10/30/06 0:00	ct
Bromide	M300.0 - Ion Chromatography		U	*	mg/L	0.1	0.5	10/26/06 16:29	nps
Chloride	M300.0 - Ion Chromatography	1.6	B		mg/L	0.5	3	10/26/06 16:29	nps
Fluoride	SM4500F-C	0.3	B	*	mg/L	0.1	0.5	10/26/06 11:09	ct
Lab Filtration	SM 3030 B			*				10/18/06 10:15	mls
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	0.35		*	mg/L	0.02	0.1	10/21/06 20:55	pjb
Nitrogen, ammonia	M350.1 - Automated Phenate		U	*	mg/L	0.05	0.5	10/25/06 14:19	nps
Phosphate	Calculation based on Ortho Phosphorus	0.09	B		mg/L	0.03	0.15	11/28/06 0:00	calc
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	0.03	B	*	mg/L	0.01	0.05	10/17/06 21:27	pjb
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	410			mg/L	10	20	10/23/06 16:31	ct
Sulfate	SM4500 SO4-D	60			mg/L	10	50	11/01/06 14:28	mhm/ct
Sulfide as S	376.2 - Methylene Blue		U	*	mg/L	0.02	0.1	10/19/06 17:11	ct

Cordilleran Compliance Services
Project ID: ED04243
Sample ID: EG-SP902

ACZ Sample ID: ***L59449-02***
Date Sampled: *10/16/06 14:40*
Date Received: *10/17/06*
Sample Matrix: *Ground Water*

Inorganic Prep

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Total Hot Plate Digestion	M200.2 ICP							10/20/06 13:54	erf

Metals Analysis

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Boron, total	M200.7 ICP	0.27			mg/L	0.01	0.05	10/25/06 19:49	msh
Calcium, total	M200.7 ICP	67.0			mg/L	0.2	1	10/25/06 19:49	msh
Iron, total	M200.7 ICP	0.03	B		mg/L	0.02	0.05	10/25/06 19:49	msh
Magnesium, total	M200.7 ICP	30.9			mg/L	0.2	1	10/25/06 19:49	msh
Manganese, total	M200.7 ICP		U		mg/L	0.005	0.03	10/25/06 19:49	msh
Potassium, total	M200.7 ICP	0.5	B		mg/L	0.3	1	10/25/06 19:49	msh
Selenium, total	M200.7 ICP		U		mg/L	0.2	1	10/26/06 18:35	gme
Sodium, total	M200.7 ICP	56.8			mg/L	0.3	1	10/25/06 19:49	msh

Wet Chemistry

Parameter	EPA Method	Result	Qual	XQ	Units	MDL	PQL	Date	Analyst
Alkalinity as CaCO3	SM2320B - Titration								
Bicarbonate as CaCO3		320			mg/L	2	20	10/30/06 0:00	ct
Carbonate as CaCO3			U		mg/L	2	20	10/30/06 0:00	ct
Hydroxide as CaCO3			U		mg/L	2	20	10/30/06 0:00	ct
Total Alkalinity		320			mg/L	2	20	10/30/06 0:00	ct
Bromide	M300.0 - Ion Chromatography		U	*	mg/L	0.5	3	10/26/06 16:47	nps
Chloride	M300.0 - Ion Chromatography		U	*	mg/L	3	10	10/26/06 16:47	nps
Fluoride	SM4500F-C	0.5	B	*	mg/L	0.1	0.5	10/26/06 11:11	ct
Lab Filtration	SM 3030 B			*				10/18/06 10:17	mls
Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	0.17		*	mg/L	0.02	0.1	10/21/06 21:00	pjb
Nitrogen, ammonia	M350.1 - Automated Phenate		U	*	mg/L	0.05	0.5	10/25/06 14:21	nps
Phosphate	Calculation based on Ortho Phosphorus	0.03	B		mg/L	0.03	0.15	11/28/06 0:00	calc
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	0.01	B	*	mg/L	0.01	0.05	10/17/06 21:29	pjb
Residue, Filterable (TDS) @180C	M160.1 - Gravimetric	430			mg/L	10	20	10/23/06 16:36	ct
Sulfate	SM4500 SO4-D	80			mg/L	10	50	11/01/06 14:32	mhm/ct
Sulfide as S	376.2 - Methylene Blue		U	*	mg/L	0.02	0.1	10/19/06 17:47	ct

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit, typically 5 times the MDL.
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

AS	Analytical Spike (Post Digestion)	*LCSWD*	Laboratory Control Sample - Water Duplicate
ASD	Analytical Spike (Post Digestion) Duplicate	*LFB*	Laboratory Fortified Blank
CCB	Continuing Calibration Blank	*LFM*	Laboratory Fortified Matrix
CCV	Continuing Calivation Verification standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
ICB	Initial Calibration Blank	*MS*	Matrix Spike
ICV	Initial Calibration Verification standard	*MSD*	Matrix Spike Duplicate
ICSAB	Inter-element Correction Standard - A plus B solutions	*PBS*	Prep Blank - Soil
LCSS	Laboratory Control Sample - Soil	*PBW*	Prep Blank - Water
LCSSD	Laboratory Control Sample - Soil Duplicate	*PQV*	Practical Quantitation Verification standard
LCSW	Laboratory Control Sample - Water	*SDL*	Serial Dilution

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method or calibration procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.
Standard	Verifies the validity of the calibration.

ACZ Qualifiers (Qual)

B	Analyte concentration detected at a value between MDL and PQL.
H	Analysis exceeded method hold time. pH is a field test with an immediate hold time.
R	Poor spike recovery accepted because the other spike in the set fell within the given limits.
T	High Relative Percent Difference (RPD) accepted because sample concentrations are less than 10x the MDL.
U	Analyte was analyzed for but not detected at the indicated MDL
V	High blank data accepted because sample concentration is 10 times higher than blank concentration
W	Poor recovery for Silver quality control is accepted because Silver often precipitates with Chloride.
X	Quality control sample is out of control.
Z	Poor spike recovery is accepted because sample concentration is four times greater than spike concentration.

Method References

(1)	EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2)	EPA 600/R-93-100. Methods for the Determination of Inorganic Substances in Environmental Samples, August 1993.
(3)	EPA 600/R-94-111. Methods for the Determination of Metals in Environmental Samples - Supplement I, May 1994.
(5)	EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December 1996.
(6)	Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995.

Comments

(1)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2)	Soil, Sludge, and Plant matrices for Inorganic analyses are reported on a dry weight basis.
(3)	Animal matrices for Inorganic analyses are reported on an "as received" basis.

ACZ Laboratories, Inc.
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Inorganic Extended Qualifier Report

Cordilleran Compliance Services

ACZ Project ID: ***L59449***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L59449-01	WG215415	Bromide	M300.0 - Ion Chromatography	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG215412	Fluoride	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG215199	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	M1	Matrix spike recovery was high, the method control sample recovery was acceptable.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG215368	Nitrogen, ammonia	M350.1 - Automated Phenate	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG214983	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
			M365.1 - Automated Ascorbic Acid	ZU	Analysis date/time preceeds filter date/time. A portion of sample was filtered and analyzed prior to the creation of a Filter workgroup.
	WG215077	Sulfide as S	376.2 - Methylene Blue	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L59449-02	WG215415	Bromide	M300.0 - Ion Chromatography	DH	Sample required dilution due to high TDS and/or EC value.
			M300.0 - Ion Chromatography	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
		Chloride	M300.0 - Ion Chromatography	DH	Sample required dilution due to high TDS and/or EC value.
	WG215412	Fluoride	SM4500F-C	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG215199	Nitrate/Nitrite as N	M353.2 - H2SO4 preserved	M1	Matrix spike recovery was high, the method control sample recovery was acceptable.
			M353.2 - H2SO4 preserved	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG215368	Nitrogen, ammonia	M350.1 - Automated Phenate	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
	WG214983	Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
			M365.1 - Automated Ascorbic Acid	ZU	Analysis date/time preceeds filter date/time. A portion of sample was filtered and analyzed prior to the creation of a Filter workgroup.
	WG215077	Sulfide as S	376.2 - Methylene Blue	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).

Cordilleran Compliance Services
Project ID: ED04243
Sample ID: CW-W902

ACZ Sample ID: ***L59449-01***
Date Sampled: *10/16/06 9:40*
Date Received: *10/17/06*
Sample Matrix: *Ground Water*

BTEX with MTBE

Analysis Method: **M8021B GC/PID**
Extract Method:

Workgroup: ***WG215679***
Analyst: *ccp*
Extract Date:
Analysis Date: ***10/31/06 11:20***

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Benzene	71-43-2		UH	1	*	ug/L	0.2	0.5
Ethylbenzene	100-41-4		UH	1	*	ug/L	0.2	1
m p Xylene	1330 20 7		UH	1	*	ug/L	0.4	2
Methyl Tert Butyl Ether	1634-04-4		UH	1	*	ug/L	0.2	1
o Xylene	95-47- 6		UH	1	*	ug/L	0.2	1
Toluene	108-88-3		UH	1	*	ug/L	0.2	1

Surrogate Recoveries	CAS	% Recovery	Dilution	XQ	Units	LCL	UCL
Bromofluorobenzene	460-00-4	94	1		%	83	117

Cordilleran Compliance Services
Project ID: ED04243
Sample ID: CW-W902

ACZ Sample ID: ***L59449-01***
Date Sampled: *10/16/06 9:40*
Date Received: *10/17/06*
Sample Matrix: *Ground Water*

Methane

Analysis Method: **RSK 175 (GC/FID)**
Extract Method:

Workgroup: ***WG215622***
Analyst: *jj*
Extract Date:
Analysis Date: ***10/30/06 17:21***

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Methane	74-82-8		U	1	*	mg/L	0.002	0.002

Cordilleran Compliance Services
Project ID: ED04243
Sample ID: EG-SP902

ACZ Sample ID: ***L59449-02***
Date Sampled: *10/16/06 14:40*
Date Received: *10/17/06*
Sample Matrix: *Ground Water*

BTEX with MTBE

Analysis Method: **M8021B GC/PID**
Extract Method:

Workgroup: ***WG215679***
Analyst: *ccp*
Extract Date:
Analysis Date: ***10/31/06 9:55***

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Benzene	71-43-2		UH	1	*	ug/L	0.2	0.5
Ethylbenzene	100-41-4		UH	1	*	ug/L	0.2	1
m p Xylene	1330 20 7		UH	1	*	ug/L	0.4	2
Methyl Tert Butyl Ether	1634-04-4		UH	1	*	ug/L	0.2	1
o Xylene	95-47- 6		UH	1	*	ug/L	0.2	1
Toluene	108-88-3		UH	1	*	ug/L	0.2	1

Surrogate Recoveries	CAS	% Recovery	Dilution	XQ	Units	LCL	UCL
Bromofluorobenzene	460-00-4	95.9	1		%	83	117

Cordilleran Compliance Services
Project ID: ED04243
Sample ID: EG-SP902

ACZ Sample ID: ***L59449-02***
Date Sampled: *10/16/06 14:40*
Date Received: *10/17/06*
Sample Matrix: *Ground Water*

Methane

Analysis Method: **RSK 175 (GC/FID)**
Extract Method:

Workgroup: ***WG215622***
Analyst: *jj*
Extract Date:
Analysis Date: ***10/30/06 17:29***

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Methane	74-82-8		U	1	*	mg/L	0.002	0.002

Cordilleran Compliance Services
Project ID: ED04243
Sample ID: TB100906-04

ACZ Sample ID: ***L59449-03***
Date Sampled: *10/16/06 14:48*
Date Received: *10/17/06*
Sample Matrix: *Ground Water*

BTEX with MTBE

Analysis Method: **M8021B GC/PID**
Extract Method:

Workgroup: ***WG215679***
Analyst: *ccp*
Extract Date:
Analysis Date: ***10/31/06 10:37***

Compound	CAS	Result	QUAL	Dilution	XQ	Units	MDL	PQL
Benzene	71-43-2		UH	1	*	ug/L	0.2	0.5
Ethylbenzene	100-41-4		UH	1	*	ug/L	0.2	1
m p Xylene	1330 20 7		UH	1	*	ug/L	0.4	2
Methyl Tert Butyl Ether	1634-04-4		UH	1	*	ug/L	0.2	1
o Xylene	95-47- 6		UH	1	*	ug/L	0.2	1
Toluene	108-88-3	0.8	JH	1	*	ug/L	0.2	1

Surrogate Recoveries	CAS	% Recovery	Dilution	XQ	Units	LCL	UCL
Bromofluorobenzene	460-00-4	94.9	1		%	83	117

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
Lower	Lower Recovery Limit, in % (except for LCSS, mg/Kg)
LCL	Lower Control Limit
MDL	Method Detection Limit. Same as Minimum Reporting Limit. Allows for instrument and annual fluctuations.
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RPD	Relative Percent Difference, calculation used for Duplicate QC Types
Upper	Upper Recovery Limit, in % (except for LCSS, mg/Kg)
UCL	Upper Control Limit
Sample	Value of the Sample of interest

QC Sample Types

SURR	Surrogate	*LFM*	Laboratory Fortified Matrix
INTS	Internal Standard	*LFMD*	Laboratory Fortified Matrix Duplicate
DUP	Sample Duplicate	*LRB*	Laboratory Reagent Blank
LCSS	Laboratory Control Sample - Soil	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSW	Laboratory Control Sample - Water	*PBS*	Prep Blank - Soil
LFB	Laboratory Fortified Blank	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Spikes/Fortified Matrix	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

B	Analyte detected in daily blank
H	Analysis exceeded method hold time.
J	Analyte concentration detected at a value between MDL and PQL
R	Poor spike recovery accepted because the other spike in the set fell within the given limits.
T	High Relative Percent Difference (RPD) accepted because sample concentrations are less than 10x the MDL.
U	Analyte was analyzed for but not detected at the indicated MDL
V	High blank data accepted because sample concentration is 10 times higher than blank concentration
W	Poor recovery for Silver quality control is accepted because Silver often precipitates with Chloride.
X	Quality contreol sample is out of control.
Z	Poor spike recovery is accepted because sample concentration is four times greater than spike concentration.
P	Analyte concentration differs from second detector by more than 40%.
E	Analyte concentration is estimated due to result exceeding calibration range.
M	Analyte concentration is estimated due to matrix interferences.

Method References

(1)	EPA 600/4-83-020. Methods for Chemical Analysis of Water and Wastes, March 1983.
(2)	EPA 600/4-90/020. Methods for the Determination of Organic Compounds in Drinking Water (I), July 1990.
(3)	EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July 1990.
(5)	EPA SW-846. Test Methods for Evaluating Solid Waste, Third Edition with Update III, December, 1996.
(6)	Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995.

Comments

(1)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.
(2)	Organic analyses are reported on an "as received" basis.

Cordilleran Compliance Services

ACZ Project ID: ***L59449***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION
L59449-01	WG215679	Benzene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		Ethylbenzene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		m p Xylene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		Methyl Tert Butyl Ether	M8021B GC/PID	C6	Sample RPD between the primary and confirmatory analysis exceeded 40%. Per EPA Method 8000B, the higher value was reported as there was no obvious chromatographic interference.
			M8021B GC/PID	H1	Sample analysis performed past holding time.
			M8021B GC/PID	M1	Matrix spike recovery was high, the method control sample recovery was acceptable.
			M8021B GC/PID	N1	See Case Narrative.
			M8021B GC/PID	V7	Calibration verification recovery was above the method control limit for this analyte, however the average % difference or % drift for all the analytes met method criteria.
		o Xylene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		Toluene	M8021B GC/PID	H1	Sample analysis performed past holding time.
	WG215622	*All Compounds*	RSK 175 (GC/FID)	RA	Relative Percent Difference (RPD) was not used for data validation because the sample concentration is too low for accurate evaluation (< 10x MDL).
L59449-02	WG215679	Benzene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		Ethylbenzene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		m p Xylene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		Methyl Tert Butyl Ether	M8021B GC/PID	C6	Sample RPD between the primary and confirmatory analysis exceeded 40%. Per EPA Method 8000B, the higher value was reported as there was no obvious chromatographic interference.
			M8021B GC/PID	H1	Sample analysis performed past holding time.
			M8021B GC/PID	M1	Matrix spike recovery was high, the method control sample recovery was acceptable.
			M8021B GC/PID	N1	See Case Narrative.
			M8021B GC/PID	V7	Calibration verification recovery was above the method control limit for this analyte, however the average % difference or % drift for all the analytes met method criteria.
		o Xylene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		Toluene	M8021B GC/PID	H1	Sample analysis performed past holding time.
L59449-03	WG215679	Benzene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		Ethylbenzene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		m p Xylene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		Methyl Tert Butyl Ether	M8021B GC/PID	C6	Sample RPD between the primary and confirmatory analysis exceeded 40%. Per EPA Method 8000B, the higher value was reported as there was no obvious chromatographic interference.
			M8021B GC/PID	H1	Sample analysis performed past holding time.
			M8021B GC/PID	M1	Matrix spike recovery was high, the method control sample recovery was acceptable.
			M8021B GC/PID	N1	See Case Narrative.
			M8021B GC/PID	V7	Calibration verification recovery was above the method control limit for this analyte, however the average % difference or % drift for all the analytes met method criteria.
		o Xylene	M8021B GC/PID	H1	Sample analysis performed past holding time.
		Toluene	M8021B GC/PID	H1	Sample analysis performed past holding time.

Cordilleran Compliance Services
Project ID: ED04243
Sample ID: CW-W902
Locator:

ACZ Sample ID: ***L59449-01***
Date Sampled: *10/16/06 9:40*
Date Received: *10/17/06*
Sample Matrix:

Gamma Emitting Nuclides — Prep Method:

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Gamma Emitting Nuclides			see attach-ments					n/a

Tritium in water — Prep Method:

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Tritium in water			see attach-ments					n/a

Cordilleran Compliance Services
Project ID: ED04243
Sample ID: EG-SP902
Locator:

ACZ Sample ID: ***L59449-02***
Date Sampled: *10/16/06 14:40*
Date Received: *10/17/06*
Sample Matrix:

Gamma Emitting Nuclides — Prep Method:

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Gamma Emitting Nuclides			see attach-ments					n/a

Tritium in water — Prep Method:

Parameter	Measure Date	Prep Date	Result	Error(+/-)	LLD	Units	XQ	Analyst
Tritium in water			see attach-ments					n/a

Report Header Explanations

Batch	A distinct set of samples analyzed at a specific time
Error(+/-)	Calculated sample specific uncertainty
Found	Value of the QC Type of interest
Limit	Upper limit for RPD, in %.
LCL	Lower Control Limit, in % (except for LCSS, mg/Kg)
LLD	Calculated sample specific Lower Limit of Detection
PCN/SCN	A number assigned to reagents/standards to trace to the manufacturer's certificate of analysis
PQL	Practical Quantitation Limit
QC	True Value of the Control Sample or the amount added to the Spike
Rec	Amount of the true value or spike added recovered, in % (except for LCSS, mg/Kg)
RER	Relative Error Ratio, calculation used for Dup. QC taking into account the error factor.
UCL	Upper Control Limit, in % (except for LCSS, mg/Kg)
Sample	Value of the Sample of interest

QC Sample Types

DUP	Sample Duplicate	*MS/MSD*	Matrix Spike/Matrix Spike Duplicate
LCSS	Laboratory Control Sample - Soil	*PBS*	Prep Blank - Soil
LCSW	Laboratory Control Sample - Water	*PBW*	Prep Blank - Water

QC Sample Type Explanations

Blanks	Verifies that there is no or minimal contamination in the prep method procedure.
Control Samples	Verifies the accuracy of the method, including the prep procedure.
Duplicates	Verifies the precision of the instrument and/or method.
Matrix Spikes	Determines sample matrix interferences, if any.

ACZ Qualifiers (Qual)

H	Analysis exceeded method hold time.
R	Poor spike recovery accepted because the other spike in the set fell within the given limits.
T	High Replicate Error Ratio (RER) accepted because sample concentrations are less than 10x the MDL.
U	No nuclides detected above the Lower Limit of Detection (LLD)
V	High blank data accepted because sample concentration is 10 times higher than blank concentration
X	QC is out of control. See Case Narrative.
Z	Poor spike recovery is accepted because sample concentration is four times greater than spike concentration.

Method Prefix Reference

M	EPA methodology, including those under SDWA, CWA, and RCRA
SM	Standard Methods for the Examination of Water and Wastewater, 19th edition, 1995.
D	ASTM
RP	DOE
ESM	DOE/ESM

Comments

(1)	Solid matrices are reported on a dry weight basis.
(2)	Preparation method: "Method" indicates preparation defined in analytical method.
(3)	QC results calculated from raw data. Results may vary slightly if the rounded values are used in the calculations.

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

RadChem Extended Qualifier Report

Cordilleran Compliance Services

ACZ Project ID: ***L59449***

ACZ ID	WORKNUM	PARAMETER	METHOD	QUAL	DESCRIPTION

No extended qualifiers associated with this analysis

Cordilleran Compliance Services ACZ Project ID: ***L59449***

Gas Chromatography

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Methane	RSK 175 (GC/FID)

Wet Chemistry

The following parameters are not offered for certification or are not covered by NELAC certificate #ACZ.

Lab Filtration	SM 3030 B
Sulfide as S	376.2 - Methylene Blue

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Cordilleran Compliance Services
ED04243

ACZ Project ID: L59449
Date Received: 10/17/2006
Received By:
Date Printed: 10/18/2006

Receipt Verification

	YES	NO	NA
1) Does this project require special handling procedures such as CLP protocol?			X
2) Are the custody seals on the cooler intact?	X		
3) Are the custody seals on the sample containers intact?			X
4) Is there a Chain of Custody or other directive shipping papers present?	X		
5) Is the Chain of Custody complete?	X		
6) Is the Chain of Custody in agreement with the samples received?	X		
7) Is there enough sample for all requested analyses?	X		
8) Are all samples within holding times for requested analyses?	X		
9) Were all sample containers received intact?	X		
10) Are the temperature blanks present?			X
11) Are the trip blanks (VOA and/or Cyanide) present?			X
12) Are samples requiring no headspace, headspace free?	X		
13) Do the samples that require a Foreign Soils Permit have one?			X

Exceptions: If you answered no to any of the above questions, please describe

Two trip blanks were received with this project. The project manager indicated to dispose of one trip blank and to log in the other. TB100906-05 was disposed of.

Contact (For any discrepancies, the client must be contacted)

N/A

Shipping Containers

Cooler Id		Temp (°C)	Rad (µR/hr)
1505		7.6	16

Client must contact ACZ Project Manager if analysis should not proceed for samples received outside of thermal preservation acceptance criteria.

Notes

ACZ Laboratories, Inc.
2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

Sample Receipt

Cordilleran Compliance Services
ED04243

ACZ Project ID: L59449
Date Received: 10/17/2006
Received By:

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	O < 2	T >12	N/A	RAD	ID
L59449-01	CW-W902	Y			Y				Y			
L59449-02	EG-SP902	Y			Y				Y			
L59449-03	TB100906-04									X		

Sample Container Preservation Legend

Abbreviation	Description	Container Type	Preservative/Limits
R	Raw/Nitric	RED	pH must be < 2
B	Filtered/Sulfuric	BLUE	pH must be < 2
BK	Filtered/Nitric	BLACK	pH must be < 2
G	Filtered/Nitric	GREEN	pH must be < 2
O	Raw/Sulfuric	ORANGE	pH must be < 2
P	Raw/NaOH	PURPLE	pH must be > 12 *
T	Raw/NaOH Zinc Acetate	TAN	pH must be > 12
Y	Raw/Sulfuric	YELLOW	pH must be < 2
YG	Raw/Sulfuric	YELLOW GLASS	pH must be < 2
N/A	No preservative needed	Not applicable	
RAD	Gamma/Beta dose rate	Not applicable	must be < 250 µR/hr

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By: _____

L59449

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: James Hix
Company: Cordilleran Compliance
E-mail: jameshix@cordcomp.com
Address: 5550 Marshall St
Arvada, CO 80002
~~Telephone:~~ Fax: 303 237 2659 Fax

Copy of Report to:

Name:
Company:
E-mail:
Telephone: 303 237 2072

Invoice to:

Name: James Hix
Company: Cordilleran Compliance
E-mail: jameshix@cordcomp.com
Address: 5550 Marshall St
Arvada, CO 80002
Telephone: 303 237 2072

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☐ NO ☐
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

PROJECT INFORMATION

Quote #: PRESCO-BTLMNT-MESA
Project/PO #: ED04243
Reporting state for compliance testing:
Sampler's Name:
Are any samples NRC licensable material?

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	BTEX/MTBE (8021B) (3)40 ml	Methane (3)40 ml RSK175/8015	Anions (Br, Cl, F, SO4, HCO3, CO3, PO4, NO2/NO3)	Alkalinity Carb + Bi carb	TDS	Total Metals (B, Ca, Fe, K, Na, Mg, Mn, Se)	NH_3 H_2S	Tritium H-3 Gamma Emitters
CW-W902	10/16/06 0940	W		✓	✓	✓	✓	✓	✓	✓	✓

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
James Hix	10/16/06	RTE	10.17.06 11:13

1 of 3

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: James Hix
Company: Cordilleran Compliance
E-mail: jameshix@cordcomp.com
Address: 5550 Marshall St.
Arvada, CO 80002
~~Telephone~~ Fax: 303 237 2659 Fax

Copy of Report to:

Name: JWH
Company:
E-mail:
Telephone: 303 237-2072

Invoice to:

Name: James Hix
Company: Cordilleran Compliance
E-mail: jameshix@cordcomp.com
Address: 5550 Marshall St
Arvada, CO 80002
Telephone: 303 237-2072

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ✓ NO
If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

PROJECT INFORMATION

Quote #: PRESCO-BTLMNT-MESA
Project/PO #: ED04243
Reporting state for compliance testing:
Sampler's Name:
Are any samples NRC licensable material?

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	BTEX/MTBE (8021B)	Methane RSK175	Anions (Cl, F, SO4, CO3, HCO3, PO4, NO2/NO3)	Alkalinity Carb & Bicarb	TDS	TOTAL METALS (B, Ca, Fe, K, Na, Mg, Mn, Se)	NH_3 H_2S	Tritium H-3 Gamma Emitters
E6-SP902	10/16/06 1440	W		✓	✓	✓	✓	✓	✓	✓	✓

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
		RAE	10/17/06 11:13

2 of 3

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name: James Hix	Address: 5550 Marshall st
Company: Cordilleran Compliance	Arvada, CO 80002
E-mail: jameshix@cordcomp.com	~~Telephone~~ FAX: 303 237 2659 Fax

Copy of Report to:

Name:	E-mail:
Company:	Telephone:

Invoice to:

Name: James Hix	Address:
Company: Cordilleran	
E-mail: jameshix@cordcomp.com	Telephone: 303 237 2072

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ✓ / NO

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

PROJECT INFORMATION

Quote #: PRESCO-BTLMNT MESA

Project/PO #: ED04243

Reporting state for compliance testing:

Sampler's Name:

Are any samples NRC licensable material?

ANALYSES REQUESTED *(attach list or use quote number)*

SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	BTEX MTBE (8021B)
TB100906-05	10/16/06 1448	W		✓
TB100906-04	10/16/06 1448	W		✓

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

Please refer to ACZ's terms & conditions located on the reverse side of this COC.

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
		RAC	10.17.06/11:13

3 of 3

PARAGON ANALYTICS
225 Commerce Drive ◆ Fort Collins, CO 80524 ◆ (800) 443-1511 ◆ (970) 490-1511 ◆ FAX (970) 490-1522

November 27, 2006

Mr. Tony Antalek
ACZ Laboratories, Inc.
2773 Downhill Drive
Steamboat Springs, CO 80487

Re: Paragon Workorder: 06-10-164
Client Project Name: None Submitted
Client Project Number: L59449

Dear Mr. Antalek:

Two water samples were received from ACZ Laboratories, Inc. on October 20, 2006. The samples were scheduled for Tritium (pages 1-68) and Gamma Spectroscopy (pages 1-146) analyses.

The results for these analyses are contained in the enclosed reports.

Thank you for your confidence in Paragon Analytics. Should you have any questions, please call.

Sincerely,

Paragon Analytics
Lance Steere
Senior Project Manager

LRS/jb
Enclosure: Report

Paragon Analytics

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 0610164
Client Name: ACZ Laboratories, Inc.
Client Project Name:
Client Project Number: L59449
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L59449-01	0610164-1		WATER	16-Oct-06	9:40
L59449-02	0610164-2		WATER	16-Oct-06	14:40

06010164

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name:	Tony Antalek	Address:	2773 DOWNHILL DR
Company:	ACZ LABS, INC.		STEAMBOAT SPGS, CO 80487
E-mail:	TAntalek@acz.com	Telephone:	(970) 879-6590

Copy of Report to:

Name:	N/A	E-mail:	
Company:		Telephone:	

Invoice to:

Name:	YVONNE BAKER	Address:	2773 DOWNHILL DR
Company:	ACZ LAS, INC.		STEAMBOAT SPGS, CO 80487
E-mail:	yb@acz.com	Telephone:	(970) 870-6590

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☑ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

PROJECT INFORMATION

Quote #:

Project/PO #:

Shipping Co.:

Tracking #:

Reporting state for compliance testing:

Are any samples NRC licensable material?

ANALYSES REQUESTED *(attach list or use quote number)*

	SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	GAMMA SCAN	H3						
1	L59449-01	10/16/2006 09:40	GW	3	✓	✓						
2	L59449-02	10/16/2006 14:40	GW	2	✓	✓						
				1								
				1								

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

SUBCONTRACTED - Paragon Analytical, Attn: Lance Steere, 225 Commerce Drive, Ft. Collins, CO 80524 (970) 490-1511 - PLEASE SHIP UPS GROUND SERVICE

SEND ONE EACH RRAD & TWO EACH VLUP PER SAMPLE

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME	Page
T. ANTALEK	10/19/2006 1600	Ann Laff	10-20-06 1110	
				Of

FRMQA021.12.03.06

White - Return with sample. Yellow - Retain for your records.

CONDITION OF SAMPLE UPON RECEIPT FORM **Paragon Analytics**

Client: ACZ Workorder No: 0610164

Project Manager: LS Initials: SL Date: 10.20.06

1. Does this project require any **special handling** in addition to standard Paragon procedures?		YES	(NO)
2. Are custody **seals** on **shipping containers** intact?	NONE	(YES)	NO
3. Are Custody seals on **sample containers** intact?	(NONE)	YES	NO
4. Is there a **COC (Chain-of-Custody) present** or other representative documents?		(YES)	NO
5. Are the **COC and bottle labels complete and legible**?		(YES)	NO
6. Is the **COC in agreement** with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were **airbills / shipping documents** present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous **samples requiring preservation preserved correctly?** (excluding volatiles)	N/A	(YES)	NO
9. Are all aqueous **non-preserved samples pH 4-9**?	(N/A)	YES	NO
10. Is there **sufficient sample** for the requested analyses?		(YES)	NO →
11. Were all samples placed in the **proper containers** for the requested analyses?		(YES)	NO
12. Are all samples within **holding times** for the requested analyses?		(YES)	NO
13. Were all sample containers received **intact**? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, Rx CN/S, radon), headspace free? **Size of bubble:** ____ < green pea ____ > green pea	N/A	(YES)	NO
15. Were samples checked for and free from the presence of **residual chlorine?** (Applicable when PM has indicated samples are from a chlorinated water source; note if field preservation with sodium thiosulfate was not observed.)	(N/A)	YES	NO
16. Were the samples **shipped on ice**?		(YES)	NO
17. Were cooler temperatures measured at 0.1-6.0°C? **IR gun used*:** (#2) #4	RAD ONLY	(YES)	NO

Cooler #: 1

Temperature (°C): 2.4

No. of custody seals on cooler: 0

DOT Survey/ Acceptance Information

External µR/hr reading: 12

Background µR/hr reading: 12

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? (YES) / NO / NA (If no, see Form 008.)

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

→ Sample #1 (L 59449-01) recieved only 2 40 ml Vials ~~for 8260?~~ (VL) ~~or~~ H3 ~~(if these Vials are for H3, they are according to the label, Preserved with HCL~~ → 1 Liter poly pres. w. HNO3)

Sample #2 (L 59449-01) recieved only 1 40 ml Vial ~~for Voc or~~ H3 ? ~~Pres with HCL~~

40 ml Vials for H3 Not preserved. Limited Vol. for H3

→ Discussed per. w/client. Enough, just

If applicable, was the client contacted? YES / (NO) / NA Contact: _____ Date/Time: _____

Project Manager Signature / Date: 10/23/06

SL 10.20.06

*IR Gun #2: Oakton, SN 29922500201-0066 *IR Gun #4: Oakton, SN 2372220101-0002

0610164

SHIPPING DEPARTMENT
(970)879-6590
ACZ LABORATORIES INC
2773 DOWNHILL DRIVE
STEAMBOAT SPRIN CO 80487

15 LBS 1 OF 1

SHIP TO:
LANCE STEERE
(970)490-1511
PARAGON ANALYTICAL LABS
225 COMMERCE DRIVE
FT COLLINS CO 80524

12

2.4

CO 805 0-01

6

UPS GROUND
TRACKING #: 1Z 810 130 03 9407 9509

BILLING: P/P

DWS ID Lab[redacted] 1110

1Z8101300394079509

Paragon Analytics
Radiochemistry Case Narrative
Tritium

ACZ Laboratories, Inc.

L59449

Paragon WO 0610164

1. This report consists of the analytical results and supporting documentation for two water samples received by Paragon on 10/20/06.
2. These samples were prepared according to Paragon Analytics procedures SOP700R9. Modifications were made to this procedure per QASS 313613.
3. The samples were analyzed for the presence of tritium according to Paragon Analytics procedure SOP704R8. The analyses were completed on 11/13/06.
4. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
5. No anomalous situations were encountered during the preparation or analysis of these samples. All quality control criteria were met.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, Paragon Analytics certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Emily Walter
Radiochemistry Instrument Technician

11/16/06
Date

Radiochemistry Final Data Review

11/16/06
Date

1

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 1

SAMPLE RESULTS SUMMARY

Tritium Analysis By Liquid Scintillation Sample Results Summary

Client Name: ACZ Laboratories, Inc.
Client Project Name:
Client Project Number: L59449

Laboratory Name: Paragon Analytics
PAI Work Order: 0610164

Reported on: Tuesday, November 14, 2006 1:24:30 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0610164-1	L59449-01	Sample	H-3	-70 +/- 190	330	pCi/l	WATER	3H061106-1	11/12/06	U
0610164-2	L59449-02	Sample	H-3	-100 +/- 190	330	pCi/l	WATER	3H061106-1	11/12/06	U

Comments:

Data Package ID: *H30610164-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
T - Result is less than Requested MDC, greater than sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

2

PARAGON ANALYTICS, INC.

Radiochemistry Data Package

Section 2

QC RESULTS SUMMARY

Tritium Analysis By Liquid Scintillation

PAI 704 Rev 8

Method Blank Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Lab ID: 3H061106-1MB

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 9
Date Collected: 06-Nov-06
Date Prepared: 06-Nov-06
Date Analyzed: 13-Nov-06

Prep Batch: 3H061106-1
QCBatchID: 3H061106-1-1
Run ID: 3H061106-1A
Count Time: 60 minutes

Final Aliquot: 10.0 ml
Result Units: pCi/l
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10028-17-8	H-3	30 +/- 200	330	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Data Package ID: *H30610164-1*

Tritium Analysis By Liquid Scintillation

PAI 704 Rev 8

Laboratory Control Sample(s)

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Lab ID: 3H061106-1LCS

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 9
Date Collected: 06-Nov-06
Date Prepared: 06-Nov-06
Date Analyzed: 13-Nov-06

Prep Batch: 3H061106-1
QCBatchID: 3H061106-1-1
Run ID: 3H061106-1A
Count Time: 60 minutes

Final Aliquot: 9.90 ml
Result Units: pCi/l
File Name: Manual Entry

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
10028-17-8	H-3	10200 +/- 1600	300	10700	95.3	85 - 115	P

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

Data Package ID: *H30610164-1*

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

3

Section 3

INDIVIDUAL SAMPLE RESULTS

Tritium Analysis By Liquid Scintillation

PAI 704 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Field ID: L59449-01
Lab ID: 0610164-1

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 9
Date Collected: 16-Oct-06
Date Prepared: 06-Nov-06
Date Analyzed: 12-Nov-06

Prep Batch: 3H061106-1
QCBatchID: 3H061106-1-1
Run ID: 3H061106-1A
Count Time: 60 minutes
Report Basis: Unfiltered

Final Aliquot: 10.0 ml
Prep Basis: Unfiltered
Moisture(%): 100.000
Result Units: pCi/l
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10028-17-8	H-3	-70 +/- 190	330	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *H30610164-1*

Tritium Analysis By Liquid Scintillation

PAI 704 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Field ID: L59449-02
Lab ID: 0610164-2

Sample Matrix: WATER
Prep SOP: PAI 700 Rev 9
Date Collected: 16-Oct-06
Date Prepared: 06-Nov-06
Date Analyzed: 12-Nov-06

Prep Batch: 3H061106-1
QCBatchID: 3H061106-1-1
Run ID: 3H061106-1A
Count Time: 60 minutes
Report Basis: Unfiltered

Final Aliquot: 10.0 ml
Prep Basis: Unfiltered
Moisture(%): 100.000
Result Units: pCi/l
File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10028-17-8	H-3	-100 +/- 190	330	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *H30610164-1*

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 4

RAW DATA

Tritium Analysis By Liquid Scintillation Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0610164

Prep SOP: PAI 700
Analytical SOP: PAI 704

Reported on: Tuesday, November 14, 2006 1:02:49 PM

Sample ID / QC Type	Nuclide / Type	Sample Date/Time	Prep Batch / QCBatchID	Ingrowth Date /Time	Quench Factor / %Lum	Matrix / %Moist.	Samp Alq / Analy Alq	Inst ID / Det ID	AnRunID / File Name	Count Date/Time	GrossCPM / BkgCPM	BaseEff / ProgEff	CntDur(min) / Yield	Activity +/- / 2 s TPU	MDC / DecLev	ReportUnits / ReportBasis	DER / RPD	%Spk. Recov / Flags
0610164-1	H-3	10/16/06	3H061106-1	NA	138.4	WATER	43 ml	LS6000	3H061106-1A	11/12/06	7.720	23.86%	60	-70	330	pCi/l	NA	
SMP	Trg. Analyte	9:40:00 AM	3H061106-1-1	NA	0.11	100	10 ml	27-05	Manual Entry	12:54 PM	8.080	NA	NA	190	NA	Unfiltered	NA	U
0610164-2	H-3	10/16/06	3H061106-1	NA	138.9	WATER	43 ml	LS6000	3H061106-1A	11/12/06	7.550	23.86%	60	-100	330	pCi/l	NA	
SMP	Trg. Analyte	2:40:00 PM	3H061106-1-1	NA	0.11	100	10 ml	27-06	Manual Entry	1:56 PM	8.080	NA	NA	190	NA	Unfiltered	NA	U
3H061106-1	H-3	11/6/06	3H061106-1	NA	138.9	WATER	50 ml	LS6000	3H061106-1A	11/13/06	8.230	23.86%	60	30	330	pCi/l	NA	
MB	Trg. Analyte	10:29:27 AM	3H061106-1-1	NA	0.14	NA	10 ml	27-07	Manual Entry	11:14 AM	8.080	NA	NA	200	NA	Unfiltered	NA	U
3H061106-1	H-3	11/6/06	3H061106-1	NA	138.2	WATER	50 ml	LS6000	3H061106-1A	11/13/06	61.700	23.86%	60	10200	300	pCi/l	NA	95.3
LCS	Trg. Analyte	10:29:27 AM	3H061106-1-1	NA	0.07	NA	9.9 ml	27-08	Manual Entry	12:15 PM	8.080	NA	NA	1600	NA	Unfiltered	NA	P

Comments:

Data Package ID: *H30610164-1*

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Z - Chemical Yield outside default limits.
Q - DER is greater than Warning Limit of 1.42
E - DER is greater than Control Limit of 2.13
* - Duplicate RPD not within limits.
# - Result is less than Request MDC, greater than sample specific MDC
A - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
B - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
NC - Not Calculated for duplicate results less than 5 times MDC
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Notes:

1) The Tracer results are not yield corrected (i.e. activity measured not activity added).
2) Where sample time is not available, 12:00 PM (Mountain) is used for decay correction.

Abbreviations:

TR- Tracer TA - Target Analyte
TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
DER - Duplicate Error Ratio
BDL - Below Detection Limit

ID:3H:10-ML GEO 11 NOV 2006 20:37

USER: 8 COMMENT:LS6000

PRESET TIME :	60.00						
DATA CALC :	CPM	H# :YES	SAMPLE REPEATS:	1	PRINTER	: STD	
COUNT BLANK :	NO	IC# : NO	REPLICATES :	1	RS232	: OFF	
TWO PHASE :	NO	AQC : NO	CYCLE REPEATS :	1			
SCINTILLATOR:	LIQUID	LUMEX: NO	LOW SAMPLE REJ:	0			
LOW LEVEL :	YES	HALF LIFE CORRECTION DATE:			none		

CHAN: 50.0 - 250.0 %ERROR: 1.75 FACTOR: 1.000000 BKG. SUB: 0
CHAN: 450.0 - 900.0 %ERROR:20.00 FACTOR: 1.000000 BKG. SUB: 0

ALPHA-BETA DISCRIMINATION: NO

SAM NO	POS	TIME MIN	H#	WIND1 CPM	WIND1 %ERROR	WIND2 CPM	WIND2 %ERROR	LUMEX %	ELAPSED TIME
1	37-1	60.00	139.5	8.67	8.77	28.93	4.80	0.14	61.02
2	37-2	60.00	139.1	8.37	8.93	29.68	4.74	0.14	122.15
3	37-3	60.00	139.0	8.02	9.12	29.82	4.73	0.13	183.27
4	37-4	60.00	138.5	7.52	9.42	29.38	4.76	0.13	244.40
5	37-5	60.00	139.2	7.68	9.31	28.33	4.85	0.13	305.54
6	37-6	60.00	139.3	8.18	9.03	29.78	4.73	0.12	366.67
7	37-7	60.00	138.8	7.70	9.30	29.27	4.77	0.11	427.77
8	37-8	60.00	138.5	7.73	9.28	30.20	4.70	0.11	488.86
9	37-9	60.00	139.5	8.80	8.70	30.23	4.70	0.11	550.01
10	37-10	60.00	139.5	8.08	9.08	29.82	4.73	0.11	611.13
11	37-11	60.00	138.7	7.53	9.41	29.82	4.73	0.11	672.24 *
12	37-12	60.00	139.4	8.25	8.99	28.62	4.83	0.11	733.39
13	27-1	60.00	139.6	8.48	8.86	28.73	4.82	0.12	794.63
14	27-2	60.00	138.8	8.18	9.03	29.52	4.75	0.11	855.71
15	27-3	60.00	138.9	7.38	9.50	28.72	4.82	0.11	916.81
16	27-4	60.00	138.6	8.43	8.89	28.72	4.82	0.11	977.91
17	27-5	60.00	138.4	7.72	9.29	28.82	4.81	0.11	1039.01
18	27-6	60.00	138.9	7.55	9.40	27.93	4.89	0.11	1100.09
19	27-7	SAMPLE TERMINATED:							

OK
GW 11/14/06

000012

ID: 3H: 10-ML GEO 13 NOV 2006 11:14

USER: 8 COMMENT:LS6000

PRESET TIME :	60.00						
DATA CALC :	CPM	H#	:YES	SAMPLE REPEATS:	1	PRINTER	: STD
COUNT BLANK :	NO	IC#	: NO	REPLICATES :	1	RS232	: OFF
TWO PHASE :	NO	AQC	: NO	CYCLE REPEATS :	1		
SCINTILLATOR:	LIQUID	LUMEX:	NO	LOW SAMPLE REJ:	0		
LOW LEVEL :	YES	HALF LIFE CORRECTION DATE:			none		

CHAN: 50.0 - 250.0 %ERROR: 1.75 FACTOR: 1.000000 BKG. SUB: 0
CHAN: 450.0 - 900.0 %ERROR:20.00 FACTOR: 1.000000 BKG. SUB: 0

ALPHA-BETA DISCRIMINATION: NO

SAM NO	POS	TIME MIN	H#	WIND1 CPM	WIND1 %ERROR	WIND2 CPM	WIND2 %ERROR	LUMEX %	ELAPSED TIME
MISSING SAMPLE									
7	27-7	60.00	138.9	8.23	9.00	30.28	4.69	0.14	61.14
8	27-8	60.00	138.2	61.70	3.29	31.25	4.62	0.07	122.25
9	27-9	60.00	137.6	8.03	9.11	29.68	4.74	0.16	183.38

OK
SW 11/14/06

Paragon Analytics

LSC Run Log 310861

Instrument ID: LS 6000

	Date	Sample ID	CountTime (min.)	Rack & Position	Test	User #	Batch ID	Position Check	Initials	Comments
1	11/11/06	3H061106-1CB1	60	37 - 1	H3-10mL	8	3H061106-1	MC	MC	NA
2		0610133-1		- 2						
3		2		- 3						
4		3		- 4						
5		3D		- 5						
6		4		- 6						
7		5		- 7						
8		6		- 8						
9		7		- 9						
10		8		- 10						
11		3H061106-1CB2		- 11						
12		0610141-1		- 12					MC	
13		2		27 - 1						
14		3		- 2						
15		4		- 3						
16		5		- 4						
17		0610164-1		- 5						
18		2		- 6					GW	
19	11/13/06	3H061106-1MB	100	- 7						
20		-1LCS		- 8						
21		-1CB3		- 9				MC	GW	
22	11/13/06	DAILY Q.C.	10	1;3 -1-4;1-2	—	1;3	—			
23	11/3/06	3H060623011-B1	100	40 - 1	H3-10mL		3H061107-2			NA
24	11/3/06	B2		- 2						
25		B3		- 3						
26		-S1		- 4						
27		S2		- 5						
28		S3		- 6						
29		S4		- 7						
30		S5		- 8						

Reviewed by / Date GW 11/14/06

FORM 762r4.XLS (12/24/2002)

TRITIUM RUN LOG

297984 Logbook/Page No. SOP 700 Rev 9 Form 1306r1.doc (3/30/2003)

Date	Workorder/ Sample Number	Column ID	Flask ID	Run No.	Comments	Technician's Initials
11/6/06	0610133 -4	E	602	1	Batch 3H061106-1	DBC
	-5	F	T2			
	0610133 -6	A	T12	2		
	-7	B	T5			
	-8	C	103			
	0610147 -1	D	101			
	-2	E	T8			
	-3	F	600			
	-4	A	T8	3		
	-5	B	103			
	0610164 -1	C	602			
	-2	D	603			
	0611014 -2	E	600			
	-2 Dup	F	101			
	-4	A	T7	4		
	-4MS	B	T9			
	3H061106-1 MB	C	T2			
	LCS	D	T3			
				DBC 11/7/06		

Reviewed by / Date JHG 11/7/06

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 5

QUALITY ASSURANCE SUMMARY REPORTS

Paragon Analytics

QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH FOR ALL REDUCED
TEST VOLUME
METHOD SAMPLES
SOP/REV (PREP) - PREP
SOP/REV (ANAL) _____

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

DUE TO LIMITED SAMPLE VOLUME, A REDUCED ALIQUOT WAS USED TO PREPARE THESE SAMPLES.

5/19/06

TECHNICIAN/ANALYST _____ DATE 5/19/06

DEPARTMENT MANAGER _____ DATE 5/19/06

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 6

LABORATORY BENCH SHEETS

6

Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: 3H061106-1

Prep Procedure: H3 10-mL

Analytical QASS / NCR? Y (N) NA

Prep Num	LabID	QC Type	Init Alq	Fin Alq	Units	Cnt 1 File/Inst	Cnt 1 Rack-Pos	Cnt 1 Pos Chk By	Cnt 2 File/Inst	Cnt 2 Rack-Pos	Cnt 2 Pos Chk By	Cnt 3 File/Inst	Cnt 3 Rack-Pos	Cnt 3 Pos Chk By	Notes
1	0610133-1	SMP	50	10	ml	L59000	37-2	MC							
1	0610133-2	SMP	50	10	ml		3								
1	0610133-3	SMP	50	10	ml		4								
1	0610133-3	DUP	50	10	ml		5								
1	0610133-4	SMP	50	10	ml		6								
1	0610133-5	SMP	50	10	ml		7								
1	0610133-6	SMP	50	10	ml		8								
1	0610133-7	SMP	50	10	ml		9								
1	0610133-8	SMP	50	10	ml		10								
1	0610141-1	SMP	50	10	ml		12								
1	0610141-2	SMP	50	10	ml		27-1								
1	0610141-3	SMP	50	10	ml		2								
1	0610141-4	SMP	50	10	ml		3								
1	0610141-5	SMP	50	10	ml		4								
1	0610164-1	SMP	43	10	ml		5								
1	0610164-2	SMP	43	10	ml		6								
1	0611014-2	SMP	50	10	ml		7								
1	0611014-2	DUP	50	10	ml										
1	0611014-4	SMP	50	10	ml										
1	0611014-4	MS	50	9.900990	ml										
1	3H061106-1CB1	MB	50	10	ml		37-1	MC							
1	3H061106-1CB2	MB	50	10	ml		11								
1	3H061106-1CB3	MB	50	10	ml		27-9								
1	3H061106-1	MB	50	10	ml		27-7								
1	3H061106-1	LCS	50	9.900990	ml		8								

11/15

11/16

11/14/06

11/14/06

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Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: 3H061106-1

Prep Procedure: H3

Analytical QASS / NCR? Y (N) NA

Prep Num	LabID	QC Type	Init Alq	Fin Alq	Units	Cnt 1 File/Inst	Cnt 1 Rack-Pos	Cnt 1 Pos Chk By	Cnt 2 File/Inst	Cnt 2 Rack-Pos	Cnt 2 Pos Chk By	Cnt 3 File/Inst	Cnt 3 Rack-Pos	Cnt 3 Pos Chk By	Notes

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	H-3	486.3020.23	2,383.682	DPM/ml	11/06/06	0.5	ml	ST-002

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Sample Barcodes

0610164-1		0610141-1	
0610133-1		0610133-2	
0611014-2		0610164-2	
0610141-2		0610133-3	
0610141-3		0610133-4	
0611014-4		0610141-4	
0610133-5		0610141-5	
0610133-6		0610133-7	
0610133-8		0611014-2DUP	
0610133-3DUP		3H061106-1LCS	
3H061106-1LCS		3H061106-1CB1MB	
3H061106-1CB2MB		3H061106-1CB3MB	
3H061106-1MB		3H061106-1CB3MB	
3H061106-1CB2MB		3H061106-1CB1MB	
3H061106-1MB		0611014-4MS	

Paragon Analytics

Radiochemistry Prep Worksheet

Prep Batch: 3H061106-1

Prep Procedure: H3

Reviewed By: DBC DBC **Review Date:** 11/7/2006

Non-Routine Pre-Treatment? Y / (N) **Batch:** N/A **Re-Prep?** Y / (N) **Batch:** N/A **Prep (QASS) / NCR?** (Y) / N 313613

Prep SOP: PAI 700 **Rev:** 9
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Derek B. Caduff
Prep Date: 11/6/2006
Prep Dept: RS

Balance:
Balance:

Cocktail: UG LLT
Cocktail Pipet: T-002
Aliquot Pipet: RS-007

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Water Added(ml)	Moisture(%)	Analysis Vol.(ml)	Standards	Prep Notes
1	1	0610133-1	SMP		50	10	Unfiltered	0	100	10		
2	1	0610133-2	SMP		50	10	Unfiltered	0	100	10		
3	1	0610133-3	SMP		50	10	Unfiltered	0	100	10		
4	1	0610133-3	DUP		50	10	Unfiltered	0	100	10		
5	1	0610133-4	SMP		50	10	Unfiltered	0	100	10		
6	1	0610133-5	SMP		50	10	Unfiltered	0	100	10		
7	1	0610133-6	SMP		50	10	Unfiltered	0	100	10		
8	1	0610133-7	SMP		50	10	Unfiltered	0	100	10		
9	1	0610133-8	SMP		50	10	Unfiltered	0	100	10		
10	1	0610141-1	SMP		50	10	Unfiltered	0	100	10		
11	1	0610141-2	SMP		50	10	Unfiltered	0	100	10		
12	1	0610141-3	SMP		50	10	Unfiltered	0	100	10		
13	1	0610141-4	SMP		50	10	Unfiltered	0	100	10		
14	1	0610141-5	SMP		50	10	Unfiltered	0	100	10		
15	1	0610164-1	SMP		43	10	Unfiltered	0	100	10		
16	1	0610164-2	SMP		43	10	Unfiltered	0	100	10		
17	1	0611014-2	SMP		50	10	Unfiltered	0	100	10		
18	1	0611014-2	DUP		50	10	Unfiltered	0	100	10		
19	1	0611014-4	SMP		50	10	Unfiltered	0	100	10		
20	1	0611014-4	MS		50	9.900990	Unfiltered	0	100	10	S1	
21	1	3H061106-1CB1	MB		50	10	Unfiltered	0	100	10		
22	1	3H061106-1CB2	MB		50	10	Unfiltered	0	100	10		
23	1	3H061106-1CB3	MB		50	10	Unfiltered	0	100	10		
24	1	3H061106-1	MB		50	10	Unfiltered	0	100	10		
25	1	3H061106-1	LCS		50	9.900990	Unfiltered	0	100	10	S1	

DBC 11/7/06 DBC 11/7/06 DBC 11/7/06 DBC 11/7/06

Comments
UG LLT LOT #97-060701

DBC 11/7/06

Paragon Analytics
LIMS Version: 5.441A

Supersedes: ~~11/7/06~~ 11/6/06 10:51

000022

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: 3H061106-1

Prep Procedure: H3

Reviewed By: DBC DBC **Review Date:** 11/7/2006

Non-Routine Pre-Treatment? Y / (N) **Batch:** N/A **Re-Prep?** Y / (N) **Batch:** N/A **Prep** (QASS) / **NCR?** (Y) / N 313613

Prep SOP: PAI 700 **Rev:** 9
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Derek B. Caduff
Prep Date: 11/6/2006
Prep Dept: RS

Balance:
Balance:

Cocktail: UG LLT
Cocktail Pipet: T-002
Aliquot Pipet: RS-007

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Water Added(ml)	Moisture(%)	Analysis Vol.(ml)	Standards	Prep Notes

Spiked By: Derek B. Caduff **Date:** 11/6/2006

Witnessed By: Jeff Kujawa **Date:** 11/6/2006

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	H-3	486.3020.23	2,383.682	DPM/ml	11/06/06	0.5	ml	ST-002

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Comments
UG LLT LOT #97-060701

Supersedes: 11/6/06 10:51

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: 3H061106-1

Prep Procedure: H3

Prep Batch Not Validated!!!

Reviewed By: **Review Date:**

Non-Routine Pre-Treatment? Y / (N) **Batch:** N/A **Re-Prep?** Y / (N) **Batch:** N/A **Prep (QA)SS / NCR?** (Y) N 313613

Prep SOP: PAI 700 **Rev:** 9
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Derek B. Caduff DBC
Prep Date: 11/6/2006
Prep Dept: RS

Balance:
Balance:

Cocktail: UG LLT
Cocktail Pipet: T-002
Aliquot Pipet: RS-007

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq sample	Fin Alq sample	Prep Basis	Water Added(ml)	Moisture(%)	Analysis Vol.(ml)	Standards	Prep Notes
1	1	0610133-1	SMP		50	10	Unfiltered	0	100	10		
2	1	0610133-2	SMP		50	10	Unfiltered	0	100	10		
3	1	0610133-3	SMP		50	10	Unfiltered	0	100	10		
4	1	0610133-3	DUP		50	10	Unfiltered	0	100	10		
5	1	0610133-4	SMP		50	10	Unfiltered	0	100	10		
6	1	0610133-5	SMP		50	10	Unfiltered	0	100	10		
7	1	0610133-6	SMP		50	10	Unfiltered	0	100	10		
8	1	0610133-7	SMP		50	10	Unfiltered	0	100	10		
9	1	0610133-8	SMP		50	10	Unfiltered	0	100	10		
10	1	0610141-1	SMP		50	10	Unfiltered	0	100	10		
11	1	0610141-2	SMP		50	10	Unfiltered	0	100	10		
12	1	0610141-3	SMP		50	10	Unfiltered	0	100	10		
13	1	0610141-4	SMP		50	10	Unfiltered	0	100	10		
14	1	0610141-5	SMP	DM 11/16/06	50	10	Unfiltered	0	100	10		
15	1	0610164-1	SMP	43	~~50~~	10	Unfiltered	0	100	10		
16	1	0610164-2	SMP	43	50	10	Unfiltered	0	100	10		
17	1	0611014-2	SMP		50	10	Unfiltered	0	100	10		
18	1	0611014-2	DUP		50	10	Unfiltered	0	100	10		
19	1	0611014-4	SMP		50	10	Unfiltered	0	100	10		
20	1	0611014-4	MS		50	9.900990	Unfiltered	0	100	10	S1	
21	1	3H061106-1CB1	MB		50	10	Unfiltered	0	100	10		
22	1	3H061106-1CB2	MB		50	10	Unfiltered	0	100	10		
23	1	3H061106-1CB3	MB		50	10	Unfiltered	0	100	10		
24	1	3H061106-1	MB		50	10	Unfiltered	0	100	10		
25	1	3H061106-1	LCS		50	9.900990	Unfiltered	0	100	10	S1	

L59449: Page 52 of 242

Comments
UG LLT LOT #97-060701

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: 3H061106-1

Prep Procedure: H3

Prep Batch Not Validated!!!

Reviewed By: **Review Date:**

Non-Routine Pre-Treatment? Y / (N) **Batch:** N/A **Re-Prep?** Y / (N) **Batch:** N/A **Prep** (QASS) / NCR? (Y) / N 313613

Prep SOP: PAI 700 **Rev:** 9
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Derek B. Caduff DBC
Prep Date: 11/6/2006
Prep Dept: RS

Balance:
Balance:

Cocktail: UG LLT
Cocktail Pipet: T-002
Aliquot Pipet: RS-007

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq sample	Fin Alq sample	Prep Basis	Water Added(ml)	Moisture(%)	Analysis Vol.(ml)	Standards	Prep Notes

Spiked By: Derek B. Caduff DBC **Date:** 11/6/06
Witnessed By: DBC **Date:** 11/6/06

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	H-3	486.3020.23	2,383.682	DPM/ml	11/06/06	0.5	ml	ST-002

EYP 4/15/07

L59449: Page 53 of 242

Comments
UG LLT LOT #97-060701

SAMPLE CONDITION FORM (LIQUID)

ANALYST: DBC

ANALYSIS DATE: 11/6/06 METHOD: SM

WORK ORDER	SAMPLE ID	SAMPLE CONDITION pH	Color	Remarks
0610133	1	~7	clear	N/A
	2			
	3			
	4			
	5			
	6			
	7			
	8			
0610141	1			
	2			
	3			
	4			
	5			
0610164	1			
↓	2			
0611014	2			
↓	4			

DBC
11/6/06

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 7

STANDARDS TRACEABILITY DOCUMENTS

PREPARE A WORKING DILUTION OF 486.1284.85 AT ca 2500 dpm/mL

1. TRANSFER 486.1284.85 TO AN AMBER GLASS BOTTLE (3/31/06)
   MASS OF BOTTLE W/O LID: 259.20 g (Bal 26)
   MASS OF BOTTLE + STD: 261.25 g
   NET MASS OF STD: 2.05 g

2. DILUTE TO 500 mL WITH DI WATER (SEE BELOW FOR ρ DETERMINATION) (3/31/06)
   MASS OF BOTTLE + STD + H_2O: 760.0 g (BAL 26)
   MASS OF BOTTLE (from above): 259.20 g
   NET MASS OF DILUTED STD: 500.8 g

3. DETERMINE DENSITY OF DI WATER
   MASS OF 100 mL VOLUMETRIC FLASK: 56.4421 g (B-412)
   MASS OF FLASK + H_2O: 156.1980 g
   NET MASS OF H_2O: 99.7559 g
   $\rho = 0.997559$ g/mL

4. FINAL ACTIVITY CALCULATION (3/31/06)

$$\frac{(127029.4 \text{ Bq/g})(94800.38 \text{ dpm/mL})(0.99769 \text{ g/mL})(2.05 \text{ g})(2.22 \text{ dpm/Bq})}{500.8 \text{ g}} = 3871.3 \frac{\text{dpm}}{\text{mL}}$$

3/6 4/17/06

Stnd ID: **486.3020.23**

Description:	H-3	
Expiration:	4/15/07	
Activity:	3871.30	dpm/mL
2s Uncertainty:	193.57	dpm/mL
Ref. Date:	3/23/98	
Ref Time:	N/A	
Prep Date:	3/24/06	Prep by: AF
Matrix/Comp.	DI H20	
Half Life (y):	1.24E+01	

RG 4/17/06

Reverification Log		
Analysis Date	Initials	Expiration Date

Continued on Page

Read and Understood By

Signed 3/24/06 Date — Signed Renee Gallegos 4/17/06 Date

Tritium Spike Solution 486 1284.85

Soln # 486.1284.84 was diluted to form a soln approx 100,000 dpm/mL as follows:

RG 9/6/05
Stnd ID: 486.1284.85
Description: 3H
Expiration: 8/11/06
Activity: 948004.38 dpm/mL
2s Uncertainty: 47400.22 dpm/mL
Ref. Date: 3/23/98
Ref Time: N/A
Prep Date: 5/3/00 Prep by: RTS
Matrix/Comp. DI Water
Half Life (y): 1.23E+01
RG 9/6/05

Voa tare 27.9711 g

Voa + HS (486.1284.84) 42.6011 g

final (dil w/ DI H2O) 62.7170 g

dil factor

42.6011 g
− 27.9711 g
14.63 g STD
× 1014187.6 pCi/g
14837521 pCi
÷ (62.7170 g − 27.9711 g)
427,029.4 pCi/g

RG 3/28/03

Stnd ID: 486.1284.85

Description: H-3
Activity: 948004.38 dpm/ml
2s Uncertainty: 4740.02 dpm/ml
Ref. Date: 3/23/98
Ref Time: na
Prep Date: 5/3/00 Prep by: RTS
Expiration: ~~3/25/03~~ 3/25/04 RG 3/28/03
Matrix/Comp. DI H2O
Half Life (y): 1.23E+01

RG 3/28/03

MAY REQUIRE NCR FOR ICPT WORK.
RG 3/28/03

RG 8/17/04
Stnd ID: 486.1284.85

Description: 3H
Expiration: 7/30/05
Activity: 948004.38 dpm/mL
2s Uncertainty: 4740.02 dpm/mL
Ref. Date: 3/23/98
Ref Time: N/A
Prep Date: 7/29/04 Prep by: JLK
Matrix/Comp. DI H20
Half Life (y): 1.23E+01

RG 8/17/04

Stnd ID: 486.1284.85

Description: Tritium in Water Stock Solution
Activity: 427029 pCi/g or mL
Uncertainty: pCi/g or mL
Ref. Date: ~~3/30/98~~ 3/23/98 RG 1-7-02
Ref Time: 10:00 AM 3/30/98 CEM 10/4/02
Prep Date ~~3/30/98~~ Prep by: RTS
Expiration ~~3/29/03~~ ~~3/23/98~~ 3/29/03 CEM 10/4/02
Matrix/Comp. DI Water
Short Lived – Decay Correct with each use

RG 8/17/04

Verified 5/27/98 DCS

Standard re-verified 3/25/03. RG 3/28/03.
Expires 3/25/04.

Standard re-verified. New exp date: 7/30/05 RG 8/17/04 Continued on Page

Read and Understood By

[signature] ~~5/4/00~~ 5/3/00 DCS 5/22/98
Signed Date Signed Date

14 PROJECT Tritium Stock Solution 486.1284.84

Notebook No. 001204

Continued From Page

PAI solution number 486.1284.84 (Analytics SRS 55543-307) was transferred to a 40 ml TDA vial.

Certificate & RSOP not available on 3/30/98 - Will obtain tomorrow.

Activity 51.054 uCi
Volume 50.34 grams
Matrix H2O

RG 8/13/04

Stnd ID: 486.1284.84

Description: 3H
Expiration: 7/30/05
Activity: 1014184.00 pCi/g or ml
2s Uncertainty: 50709.00 pCi/g or ml
Ref. Date: 3/23/98
Ref Time: N/A
Prep Date: 7/29/04 Prep by: JLK
Matrix/Comp. DI Water
Half Life (y): 1.23E+01

RG 8/13/04

Standard reverified on on 7/30/04. Expires 7/30/05.
RG 8/13/04

DG 7/8/03

Stnd ID: 486.1284.84

Description: H-3
Activity: 1014184.00 pCi/g or ml
2s Uncertainty: 50709.00 pCi/g or ml
Ref. Date: 3/23/98
Ref Time: 0.417
Prep Date: 3/30/98 Prep by: RTS
Expiration: 7/3/04
Matrix/Comp. DI Water
Half Life (y): 1.24E+01

DG 7/8/03

Stnd ID: 486.1284.84

Description: Tritium in Water Stock Solution
Activity: 1014184 pCi/g or mL
Uncertainty: pCi/g or mL
Ref. Date: ~~3/29/98~~ 3/23/98 7-7-02
Ref Time: 10:00
Prep Date 3/30/98 Prep by: RTS
Expiration 3/29/03
Matrix/Comp. DI Water
Short Lived -- Decay Correct with each use

Verified 5/27/98 DCS

Standard re-verified on 7/3/03 Expires 7/3/04. DG 7/7/03

Continued on Page

Signed 5/5/00 Date

Read and Understood By

DCS Signed 5/27/98 Date

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.
Phone (404) 352-8677
Fax (404) 352-2837

PAID 486. Recd 3-24-98

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

55543-307

H-3 in Water 50 mL in Flame Sealed Vial

This standard radionuclide source was prepared using an aliquot measured gravimetrically from a master radionuclide solution standard. The master radionuclide solution standard was calibrated by the Department Des Applications Et De La Metrologie Des Rayonnements Ionisants (DAMRI), Paris, France, as Number 24057. The calibration was checked by liquid scintillation counting after source preparation.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

ISOTOPE:	H-3
ACTIVITY (dps):	1.889 E+06
CALIBRATION DATE:	March 23, 1998 12:00 EST
HALF-LIFE:	12.43 years
TOTAL UNCERTAINTY:	5.0%

50.34 grams of water.

P O NUMBER 21143, Item 1

PREPARED BY: M. D. Currie

M. D. Currie, Radiochemist

Q A APPROVED: CCM 3/23/98

PARAGON ANALYTICS, INC.
Radiochemistry Data Package

Section 8

CHAIN OF CUSTODY

Paragon Analytics

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 0610164
Client Name: ACZ Laboratories, Inc.
Client Project Name:
Client Project Number: L59449
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L59449-01	0610164-1		WATER	16-Oct-06	9:40
L59449-02	0610164-2		WATER	16-Oct-06	14:40

0610164

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name:	Tony Antalek
Company:	ACZ LABS, INC.
E-mail:	TAntalek@acz.com
Address:	2773 DOWNHILL DR
	STEAMBOAT SPGS, CO 80487
Telephone:	(970) 879-6590

Copy of Report to:

Name:	N/A
Company:	
E-mail:	
Telephone:	

Invoice to:

Name:	YVONNE BAKER
Company:	ACZ LAS, INC.
E-mail:	yb@acz.com
Address:	2773 DOWNHILL DR
	STEAMBOAT SPGS, CO 80487
Telephone:	(970) 870-6590

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

YES ☑ NO ☐

PROJECT INFORMATION

Quote #:	
Project/PO #:	
Shipping Co.:	
Tracking #:	
Reporting state for compliance testing:	
Are any samples NRC licensable material?	

ANALYSES REQUESTED *(attach list or use quote number)*

	SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	GAMMA SCAN	H3
1	L59449-01	10/16/2006 09:40	GW	3	✓	✓
2	L59449-02	10/16/2006 14:40	GW	3 2	✓	✓
				1 3 2 10/19/06		

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

SUBCONTRACTED - Paragon Analytical, Attn: Lance Steere, 225 Commerce Drive, Ft. Collins, CO 80524 (970) 490-1511 - PLEASE SHIP UPS GROUND SERVICE

SEND ONE EACH RRAD & TWO EACH VLUP PER SAMPLE

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
T. ANTALEK	10/19/2006 1600	John Zaff	10-20-06 1110

Page Of

FRMQA021.12.03.06

White - Return with sample. Yellow - Retain for your records.

000034

CONDITION OF SAMPLE UPON RECEIPT FORM

Paragon Analytics

Client: ACZ

Workorder No: 0610164

Project Manager: LS

Initials: SL

Date: 10.20.06

1. Does this project require any **special handling** in addition to standard Paragon procedures?		YES	(NO)
2. Are custody **seals** on **shipping containers** intact?	NONE	(YES)	NO
3. Are Custody seals on **sample containers** intact?	(NONE)	YES	NO
4. Is there a **COC (Chain-of-Custody) present** or other representative documents?		(YES)	NO
5. Are the **COC and bottle labels complete and legible**?		(YES)	NO
6. Is the **COC in agreement** with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were **airbills / shipping documents** present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous **samples requiring preservation preserved correctly?** (excluding volatiles)	N/A	(YES)	NO
9. Are all aqueous **non-preserved samples pH 4-9**?	(N/A)	YES	NO
10. Is there **sufficient sample** for the requested analyses?		(YES)	NO →
11. Were all samples placed in the **proper containers** for the requested analyses?		(YES)	NO
12. Are all samples within **holding times** for the requested analyses?		(YES)	NO
13. Were all sample containers received **intact**? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, Rx CN/S, radon), headspace free? **Size of bubble**: ____ < green pea ____ > green pea	N/A	(YES)	NO
15. Were samples checked for and free from the presence of **residual chlorine?** (Applicable when PM has indicated samples are from a chlorinated water source; note if field preservation with sodium thiosulfate was not observed.)	(N/A)	YES	NO
16. Were the samples **shipped on ice**?		(YES)	NO
17. Were cooler temperatures measured at 0.1-6.0°C? **IR gun used***: (#2) #4	RAD ONLY	(YES)	NO

Cooler #: 1

Temperature (°C): 2.4

No. of custody seals on cooler: 0

DOT Survey/ Acceptance Information

External µR/hr reading: 12

Background µR/hr reading: 12

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? (YES) / NO / NA (If no, see Form 008.)

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

→ Sample #1 (L 59449-01) recieved only 2 40 ml Vials ~~for 8260? (VL~~ ~~or H3 (if these vials are for H3, they are according to the label; Preserved with HCL~~ → 1 Liter poly pres. w. HNO3)

Sample #2 (L 59449-01) recieved only 1 40ml Vial ~~for Voc or~~ H3 ?

~~Pres with HCL~~

40 ml Vials for H3 Not preserved. Limited Vol. for H3

→ Discussed per. w/client. Enough, just

If applicable, was the client contacted? YES / NO / NA Contact: _____ Date/Time: _____

Project Manager Signature / Date: 10/23/06

SL 10.20.06

*IR Gun #2: Oakton, SN 29922500201-0066

*IR Gun #4: Oakton, SN 2372220101-0002

Form 201r19.xls (1/13/06)

0610164

SHIPPING DEPARTMENT
(970)879-6590
ACZ LABORATORIES INC
2773 DOWNHILL DRIVE
STEAMBOAT SPRIN CO 80487

15 LBS 1 OF 1

SHIP TO: LANCE STEERE
(970)490-1511
PARAGON ANALYTICAL LABS
225 COMMERCE DR[illegible]E
FT COLLINS CO 8[illegible]24

CO 805 0-01

UPS GROUND
TRACKING #: 1Z 810 130 03 9407 9509

BILLING: P/P

DWS ID Lab[illegible] 1110

1Z8101300394079509

2.4

PARAGON ANALYTICS
Radiochemistry Data Package

Section 9

ADDITIONAL SUPPORTING DOCUMENTATION

9

000037

Liquid Scintillation Counter

Instrument Calibration

Initial Efficiency Calibration Standards Traceability

LS6000 10-mL geometry Tritium Background Determination

Interim control limits are established from the initial calibration for the geometry of interest. Limits are +/- 3 standard deviations from the initial unquenched calibration blank data. Once enough historical data is acquired, new historical limits are set as follows: Control limits for reagent blanks are established from 30 individual historical data points (10 batches). Limits are +/- 3 standard deviations from 30 individual historical data points. Individual reagent blanks and the average of reagent blanks from each batch are in control if the Count Rate (CPM) is within the established control limits.

CURRENTLY UNDER HISTORICAL LIMITS!

Updated on 9/25/2006. MBC

							Individual Reagent Blanks			Average of Reagent Blanks		
CT DATE	#	Sample ID	Count Duration (m)	Count Rate (CPM)	Total Cts.	Mean	LCL	UCL	Pass ?	LCL	UCL	Pass ?
11/11/06	7	3H061106-1CB1	60	8.67	520.20		4.81	11.03	PASS			
11/12/06	8	3H061106-1CB2	60	7.53	451.80		4.81	11.03	PASS			
11/13/06	9	3H061106-1CB3	60	8.03	481.80	8.08	4.81	11.03	PASS	4.81	11.03	PASS

10-mL Tritium "Window 2" Control Limits (LS 6000)

The background count rate is determined from the average of the reagent blanks for the batch.

Window 2 control limits are established using the average count rate from the three reagent blanks associated with each prep batch +/- 3X the estimated poisson uncertainty.

UPDATED 9/26/2006 MBC

CT DATE	Sample ID	Count Duration (min.)	**Average count Duration (min.)**	Count Rate (CPM)	Batch Average Reagent Blank	**Lower Control Limit**	**Upper Control Limit**	**PASS/ FAIL**
11/11/06	3H061106-1CB1	60		28.93				
11/12/06	3H061106-1CB2	60		29.82				
11/13/06	3H061106-1CB3	60	**60**	29.68	29.48	**27.37**	**31.58**	PASS

10-mL Tritium Efficiency Calibration LS6000

10 mL sample + 10 mL Ultima Gold LLT
9/18/2006
LS6000

Standard used: 699.2613.19

94000.71	dpm/ml as of	9/3/1998
1/2 life =	12.23	yrs.
current activity =	59594.72	dpm/ml
volume =	0.1961	ml
Average Spike Activity =	11685.24	dpm

Sample ID	WIND1 cpm	WIND2 cpm	%LUMEX	SQP(E)	
0619009-S4	2859.570	27.830	0.00	141.40	
0619009-S5	2748.960	35.620	0.00	141.10	
0619009-S6	2781.280	30.210	0.00	140.70	
0619009-B4	8.050	29.050	0.17	140.80	
0619009-B5	8.770	30.400	0.17	141.00	
0619009-B6	7.700	29.180	0.19	139.30	
average LCS=	2796.603	29.543	0.09	140.72	averages
average bkg=	8.173				
net cpm=	2788.43				
/known dpm=	11685.24				
efficiency=	0.2386				

WIND2 cpm	%LUMEX	SQP(E)	
31.65	5.00	155.72	UCL
27.44	0.00	125.72	LCL
See Tech. Mgr.	See Tech. Mgr.	Std. Addition	Corrective Action

Instrument Technician: _____ 9/20/06
Signature & Date

Supervisory Review: _____ 9/25/06
Signature & Date

R:\INST\LSC\LS6000\Calibrations\Single point calibrations\091806_EFF_H3-10mL.XLS (H-3 10mL Eff CAL)

^{3}H Efficiency Calibration Verification / Method Blank Verification 09/18/06

Calibration Source Check

LS 6000
Analysis Date: 9/18/2006
Nuclide: ^{3}H
Half Life: 12.23

Calibration Check Source:

Spike Standard: 486.3020.23
Reference Date : 3/23/1998
Spiked DPM/mL : 3871.30
Spike Volume : 0.5
Spiked into : 50.0
Current Spk. Act. : 10.82

Calibration Check Source Count

Sample ID	Position	Prep Date	Cnt. Dur.	Anal. Vol.	GrsCPM	BkgCPM	Efficiency	Activity	Units	Chem. Yield	LCS Recovery:	Pass/Fail
0620022-ICV4	47-7	8/21/2006	60	9.90099	61.430	8.17	0.2386	10.20	pCi/mL	100%	94.2%	PASS
0620022-ICV5	47-8	8/21/2006	60	9.90099	59.720	8.17	0.2386	9.87	pCi/mL	100%	91.2%	PASS
0620022-ICV6	47-9	8/21/2006	60	9.90099	60.250	8.17	0.2386	9.97	pCi/mL	100%	92.1%	PASS

Method Blank Check Count

Sample ID	Rack	Prep Date	Cnt. Dur.	Anal. Vol.	GrsCPM	BkgCPM	Efficiency	Chem. Yield	k (denom.)	activity	MDC	Pass/Fail	Units	2s CU	*1 σ IU 0.056* IU	*1 σ PU 0.051* PU	2s TPU
0620022-ICB4	47-10	8/21/2006	60	10	7.32	8.17	0.2386	100%	5.275	-0.1618	0.32	PASS	pCi/mL	0.193	-0.01812	-0.01650	0.194
0620022-ICB5	47-11	8/21/2006	60	10	7.6	8.17	0.2386	100%	5.275	-0.1087	0.32	PASS	pCi/mL	0.194	-0.01217	-0.01109	0.195
0620022-ICB6	47-12	8/21/2006	60	10	7.4	8.17	0.2386	100%	5.275	-0.1466	0.32	PASS	pCi/mL	0.193	-0.01642	-0.01495	0.194

ID:3H:10-ML GEO. 18 SEP 2006 21:13

USER: 4 COMMENT:LS6000

PRESET TIME :	60.00						
DATA CALC :	CPM	H# :YES	SAMPLE REPEATS:	1	PRINTER	: STD
COUNT BLANK :	NO	IC# : NO	REPLICATES :	1	RS232	: OFF
TWO PHASE :	NO	AQC : NO	CYCLE REPEATS :	1		
SCINTILLATOR:	LIQUID	LUMEX: NO	LOW SAMPLE REJ:	0		
LOW LEVEL :	YES	HALF LIFE CORRECTION DATE:			none	

CHAN: 50.0 - 250.0 %ERROR: 1.75 FACTOR: 1.000000 BKG. SUB: 0
CHAN: 450.0 - 900.0 %ERROR:20.00 FACTOR: 1.000000 BKG. SUB: 0

ALPHA-BETA DISCRIMINATION: NO

SAM NO	POS	TIME MIN	H#	WIND1 CPM	WIND1 %ERROR	WIND2 CPM	WIND2 %ERROR	LUMEX %	ELAPSED TIME
1	47-1	4.60	141.4	2859.57	1.74	27.83	17.68	0.00	5.15
2	47-2	4.80	141.1	2748.96	1.74	35.62	15.29	0.00	10.63
3	47-3	4.70	140.7	2781.28	1.75	30.21	16.78	0.00	15.99
4	47-4	60.00	140.8	8.05	9.10	29.05	4.79	0.17	77.11
5	47-5	60.00	141.0	8.77	8.72	30.40	4.68	0.17	138.22
6	47-6	60.00	139.3	7.70	9.30	29.18	4.78	0.19	199.36
7	47-7	60.00	138.5	61.43	3.29	27.65	4.91	0.08	260.47
8	47-8	60.00	138.0	59.72	3.34	27.70	4.91	0.07	321.61
9	47-9	60.00	138.0	60.25	3.33	28.00	4.88	0.07	382.71
10	47-10	60.00	140.6	7.32	9.55	29.00	4.79	0.13	443.85
11	47-11	60.00	138.8	7.60	9.37	27.37	4.94	0.13	504.98
12	47-12	60.00	138.7	7.40	9.49	29.22	4.78	0.12	566.13

MC 9/19/06

Paragon Analytics

LSC Run Log 310836

Instrument ID: LS 6000

	Date	Sample ID	CountTime (min.)	Rack & Position	Test	User #	Batch ID	Position Check	Initials	Comments
1	8/31/06	0615035-B1-BIZ	60	54 - 1-12	H3-10mL	4	—	MC	MC	H3-10mL Q.CRV CAL (BKG)
2	9/1/06	0615032-B4-B6		49 - 1-3						ICB 5
3		-S4-S6		- 4-6						ICV 5
4	9/11/06	0621003 -S1	60	53 - 1	Th-230	17	—	MC	MC	Th-230 STD VER.
5		S2		- 2						
6		S3		- 3						
7		S4		- 4						
8		S5		- 5						
9		S6		- 6						
10		-B1		- 7						
11		B2		- 8						
12		B3		- 9						
13	9/18/06	0619009-S4	41.6	47 - 1	H3-10mL	4	—	MC	MC	H3-10mL CAL CB.
14		S5	4.8	- 2						
15		S6	4.7	- 3						
16		B4	60	- 4						
17		B5		- 5						
18		B6		- 6						
19		0620022-ICV4		- 7						
20		5		- 8						
21		6		- 9						
22		ICB4		- 10						
23		5		- 11						
24		6		- 12						
25				-						
26				- MC						
27				- 9/20/06						
28				-						
29				-						
30				-						

Reviewed by / Date MC 9/20/06

FORM 762r4.XLS (12/24/2002)

Radiochemistry Instrument Worksheet

Prep Batch: 6H060712-5

Paragon Analytics

Prep Procedure: H3 SINGLE-POINT CALIBRATION (5ML / 10ML)

Analytical QASS / NCR? Y / N _____

Prep Num	LabID	QC Type	Init Alq	Fin Alq	Units	Cnt 1 File/Inst	Cnt 1 Rack-Pos	Cnt 1 Pos Chk By	Cnt 2 File/Inst	Cnt 2 Rack-Pos	Cnt 2 Pos Chk By	Cnt 3 File/Inst	Cnt 3 Rack-Pos	Cnt 3 Pos Chk By	Notes
1	0619009-B1	MB	50	5	ml										
1	0619009-B2	MB	50	5	ml	MC 9/19/06									
1	0619009-B3	MB	50	5	ml										
1	0619009-B4	MB	50	10	ml	LS-6000	47	4 MC							
1	0619009-B5	MB	50	10	ml			5							
1	0619009-B6	MB	50	10	ml			6							
1	0619009-S1	LCS	50	4.901961	ml										
1	0619009-S2	LCS	50	4.901961	ml	MC 9/19/06									
1	0619009-S3	LCS	50	4.901961	ml										
1	0619009-S4	LCS	50	9.803922	ml	LS-6000	47	1 MC							
1	0619009-S5	LCS	50	9.803922	ml			2							
1	0619009-S6	LCS	50	9.803922	ml			3							

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	H-3	699.2613.19	60,437.998	DPM/ml	07/12/06	1	ml	RS-006

Sample Barcodes

0619009-S6LCS	0619009-S5LCS
0619009-S4LCS	0619009-S3LCS
0619009-S2LCS	0619009-S1LCS
0619009-B6MB	0619009-B5MB
0619009-B4MB	0619009-B3MB
0619009-B2MB	0619009-B1MB

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: 3H060712-5

Prep Procedure: H3

Reviewed By: JRK/RK **Review Date:** 7/13/2006

Non-Routine Pre-Treatment? Y / (N) **Batch:** NA **Re-Prep? Y / (N)** **Batch:** NA **Prep QASS / NCR? Y / (N)** NA

Prep SOP: PAI 700 **Rev:** 9
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Jeff Kujawa
Prep Date: 7/12/2006
Prep Dept: RS

Balance:
Balance:

Cocktail: UG LLT
Cocktail Pipet: T-002
Aliquot Pipet:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Water Added(ml)	Moisture(%)	Analysis Vol.(ml)	Standards	Prep Notes
1	1	0619009-B1	MB		50	5	Unfiltered	0	100	5		
2	1	0619009-B2	MB		50	5	Unfiltered	0	100	5		
3	1	0619009-B3	MB		50	5	Unfiltered	0	100	5		
4	1	0619009-B4	MB		50	10	Unfiltered	0	100	10		
5	1	0619009-B5	MB		50	10	Unfiltered	0	100	10		
6	1	0619009-B6	MB		50	10	Unfiltered	0	100	10		
7	1	0619009-S1	LCS		50	4.901961	Unfiltered	0	100	5	S1	
8	1	0619009-S2	LCS		50	4.901961	Unfiltered	0	100	5	S1	
9	1	0619009-S3	LCS		50	4.901961	Unfiltered	0	100	5	S1	
10	1	0619009-S4	LCS		50	9.803922	Unfiltered	0	100	10	S1	
11	1	0619009-S5	LCS		50	9.803922	Unfiltered	0	100	10	S1	
12	1	0619009-S6	LCS		50	9.803922	Unfiltered	0	100	10	S1	

Spiked By: Jeff Kujawa **Date:** 7/12/2006

Witnessed By: Kimberly Arnett **Date:** 7/12/2006

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	H-3	699.2613.19	60,437.998	DPM/ml	07/12/06	1	ml	RS-006

Comments
UG LLT LOT# 97-060101

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: 3H060712-5

Prep Procedure: H3

Prep Batch Not Validated!!!

Reviewed By: **Review Date:**

Non-Routine Pre-Treatment? Y / N **Batch:** **Re-Prep? Y / N** **Batch:** **Prep QASS / NCR? Y / N**

Prep SOP: PAI 700 **Rev:** 9
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Jeff Kujawa JK
Prep Date: 7/12/2006
Prep Dept: RS

Balance:
Balance:

Cocktail: UG LLT
Cocktail Pipet: T-002
Aliquot Pipet:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Water Added(ml)	Moisture(%)	Analysis Vol.(ml)	Standards	Prep Notes
1	1	0619009-B1	MB		50	5	Unfiltered	0	100	5		
2	1	0619009-B2	MB		50	5	Unfiltered	0	100	5		
3	1	0619009-B3	MB		50	5	Unfiltered	0	100	5		
4	1	0619009-B4	MB		50	10	Unfiltered	0	100	10		
5	1	0619009-B5	MB		50	10	Unfiltered	0	100	10		
6	1	0619009-B6	MB		50	10	Unfiltered	0	100	10		
7	1	0619009-S1	LCS		50	4.901961	Unfiltered	0	100	5	S1	
8	1	0619009-S2	LCS		50	4.901961	Unfiltered	0	100	5	S1	
9	1	0619009-S3	LCS		50	4.901961	Unfiltered	0	100	5	S1	
10	1	0619009-S4	LCS		50	9.803922	Unfiltered	0	100	10	S1	
11	1	0619009-S5	LCS		50	9.803922	Unfiltered	0	100	10	S1	
12	1	0619009-S6	LCS		50	9.803922	Unfiltered	0	100	10	S1	

Spiked By: JK **Date:** 7/12/06
Witnessed By: KM **Date:** 7/12/06

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	H-3	699.2613.19	60,437.998	DPM/ml	07/12/06	1	ml	RS-006

Exp. 8/11/06

Comments
UG LLT LOT# 97-060101

Paragon Analytics
LIMS Version: 5.397A

Supersedes: V4

TRITIUM RUN LOG

297950 Logbook/Page No. SOP 700 Rev 9 Form 1306r1.doc (3/30/2003)

Date	Workorder/ Sample Number	Column ID	Flask ID	Run No.	Comments	Technician's Initials
7/11/06	0607032 -BDup	B	T4	1	Batch 3H060711-1	KAA
	-16	C	T3			
	-16mS	D	604			
	-16mSD	F	608			KAA 7/11
	3H060711-1 -mB	A	T11	2		
	-LCS	B	101			
7/11/06	3H060711-1 LCSD	C	608	2	Batch 3H060711-1	KAA
7/12/06	0619009 -S1, S4	A	103	1	Batch 3H060712-5	LC
	-S2, S5	B	600			
	-S3, S6	C	609			
	-B1 B4	D	T9			
	-B2 B5	F	T10			
	-B3 B6	A	T12	2		

7/13/06

Reviewed by / Date 7/13/06

Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: 3H060821-3

Prep Procedure: H3 SINGLE POINT ICB's/ICV's (5ML/10ML) **Analytical QASS / NCR? Y / N** _____

Prep Num	LabID	QC Type	Init Alq	Fin Alq	Units	Cnt 1 File/Inst	Cnt 1 Rack-Pos	Cnt 1 Pos Chk By	Cnt 2 File/Inst	Cnt 2 Rack-Pos	Cnt 2 Pos Chk By	Cnt 3 File/Inst	Cnt 3 Rack-Pos	Cnt 3 Pos Chk By	Notes
1	0620022-ICB1	MB	50	5	ml										
1	0620022-ICB2	MB	50	MC 9/19/06	ml										
1	0620022-ICB3	MB	50	5	ml										
1	0620022-ICB4	MB	50	10	ml	LS-6000	47-10	MC							
1	0620022-ICB5	MB	50	10	ml		11								
1	0620022-ICB6	MB	50	10	ml		12								
1	0620022-ICV1	LCS	50	4.950495	ml										
1	0620022-ICV2	LCS	50	4.950495	ml	9/19/06									
1	0620022-ICV3	LCS	50	4.950495	ml										
1	0620022-ICV4	LCS	50	9.900990	ml	LS-6000	47-7	MC							
1	0620022-ICV5	LCS	50	9.900990	ml		8								
1	0620022-ICV6	LCS	50	9.900990	ml		9								

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	H-3	486.3020.23	2,412.044	DPM/ml	08/21/06	0.5	ml	ST-002

Sample Barcodes

0620022-ICV6LCS	0620022-ICV5LCS
0620022-ICV4LCS	0620022-ICV3LCS
0620022-ICV2LCS	0620022-ICV1LCS
0620022-ICB6MB	0620022-ICB5MB
0620022-ICB4MB	0620022-ICB3MB
0620022-ICB2MB	0620022-ICB1MB

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: 3H060821-3

Prep Procedure: H3

Reviewed By: JRK **Review Date:** 8/21/2006

Non-Routine Pre-Treatment? Y / (N) Batch: LA **Re-Prep? Y / (N)** Batch: LA **Prep QASS / NCR? Y / (N)** LA

Prep SOP: PAI 700 **Rev:** 9
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Jeff Kujawa
Prep Date: 8/21/2006
Prep Dept: RS

Balance:
Balance:

Cocktail: UG LLT
Cocktail Pipet: T-002
Aliquot Pipet:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Water Added(ml)	Moisture(%)	Analysis Vol.(ml)	Standards	Prep Notes
1	1	0620022-ICB1	MB		50	5	Unfiltered	0	100	5		
2	1	0620022-ICB2	MB		50	5	Unfiltered	0	100	5		
3	1	0620022-ICB3	MB		50	5	Unfiltered	0	100	5		
4	1	0620022-ICB4	MB		50	10	Unfiltered	0	100	10		
5	1	0620022-ICB5	MB		50	10	Unfiltered	0	100	10		
6	1	0620022-ICB6	MB		50	10	Unfiltered	0	100	10		
7	1	0620022-ICV1	LCS		50	4.950495	Unfiltered	0	100	5	S1	
8	1	0620022-ICV2	LCS		50	4.950495	Unfiltered	0	100	5	S1	
9	1	0620022-ICV3	LCS		50	4.950495	Unfiltered	0	100	5	S1	
10	1	0620022-ICV4	LCS		50	9.900990	Unfiltered	0	100	10	S1	
11	1	0620022-ICV5	LCS		50	9.900990	Unfiltered	0	100	10	S1	
12	1	0620022-ICV6	LCS		50	9.900990	Unfiltered	0	100	10	S1	

Spiked By: Jeff Kujawa **Date:** 8/21/2006

Witnessed By: Derek B. Caduff **Date:** 8/21/2006

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	H-3	486.3020.23	2,412.044	DPM/ml	08/21/06	0.5	ml	ST-002

Comments
UG LLT LOT# 97-060101

Supersedes: 8/21/06 14:09

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: 3H060821-3

Prep Procedure: H3

Prep Batch Not Validated!!!

Reviewed By: **Review Date:**

Non-Routine Pre-Treatment? Y / N **Batch:** **Re-Prep? Y / N** **Batch:** **Prep QASS / NCR? Y / N**

Prep SOP: PAI 700 **Rev:** 9
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Jeff Kujawa
Prep Date: 8/21/2006
Prep Dept: RS

Balance:
Balance:

Cocktail: UG LLT
Cocktail Pipet: T-002
Aliquot Pipet:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Water Added(ml)	Moisture(%)	Analysis Vol.(ml)	Standards	Prep Notes
1	1	0620022-ICB1	MB		50	5	Unfiltered	0	100	5		
2	1	0620022-ICB2	MB		50	5	Unfiltered	0	100	5		
3	1	0620022-ICB3	MB		50	5	Unfiltered	0	100	5		
4	1	0620022-ICB4	MB		50	10	Unfiltered	0	100	10		
5	1	0620022-ICB5	MB		50	10	Unfiltered	0	100	10		
6	1	0620022-ICB6	MB		50	10	Unfiltered	0	100	10		
7	1	0620022-ICV1	LCS		50	4.950495	Unfiltered	0	100	5	S1	
8	1	0620022-ICV2	LCS		50	4.950495	Unfiltered	0	100	5	S1	
9	1	0620022-ICV3	LCS		50	4.950495	Unfiltered	0	100	5	S1	
10	1	0620022-ICV4	LCS		50	9.900990	Unfiltered	0	100	10	S1	
11	1	0620022-ICV5	LCS		50	9.900990	Unfiltered	0	100	10	S1	
12	1	0620022-ICV6	LCS		50	9.900990	Unfiltered	0	100	10	S1	

Spiked By: Date: 8/21/06
Witnessed By: Date: 8/21/06

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	H-3	486.3020.23	2,412.044	DPM/ml	08/21/06	0.5	ml	ST-002

Exp: 4/1510 7

Comments
UG LLT LOT# 97-060101

Paragon Analyti

TRITIUM RUN LOG

297959 Logbook/Page No. SOP 700 Rev 9 Form 1306r1.doc (3/30/2003)

Date	Workorder/ Sample Number	Column ID	Flask ID	Run No.	Comments	Technician's Initials
8/21/06	0607066-6MS	B	604	2	Batch 3H060821-1	DBC
	-10	C	111			
	-11	D	T3			
	3H060821-1MD	E	102			
	-LCS	F	101			
8/21/06	0607077-ICB1	A	T2	3	Batch 3H060821-3	JH
	-ICV1	B	T4			
	-ICB3.6	C	600			
	-ICV1.4	D	609			
	-ICV2	G	101			
	-ICV3	F	111			

JH 8/21/06

Reviewed by / Date JH 8/21/06

Continued From Page

Prepare a working dilution at approx 90,000 dpm/mL by diluting Std 699.2613.18 with DI water.

1) See Density on page 18 of logbook 2613

2) Transfer Std 699.2613.18 to a 125 mL Amber glass bottle

Mass of bottle w/o lid	94.7389 g	Bal #12
Mass of bottle + Std	96.6785 g	
Net mass of Std	1.9396 g	

3) Add DI water to final Dilution

Mass of bottle w/o lid from above	94.7389 g	Bal #12
Mass of bottle, Std, + DI water	192.4076 g	
Net mass of Std, + DI water	97.6687 g	

4) Final Activity Calculation

$$\frac{(634.7\ kBq/g)(4.8151\ g)(60{,}000\ dpm/Bq)(1000\ Bq/kBq)(0.9958\ g/mL)(1.9396\ g)}{(38.5765\ g)\ (+\ 97.6687\ g)} = 92{,}000.7\ DPM/mL$$

Reverification Log

Analysis Date	Initials	Expiration Date
9/24/06	RG	9/24/07

Stnd ID: 699.2613.19
Description: 3H
Expiration: 8/11/06
Activity: 94000.71 dpm/mL
2s Uncertainty: 676.81 dpm/mL
Ref. Date: 9/3/98
Ref Time: N/A
Prep Date: ~~7/29/04~~ 7/28/03 Prep by: JLK
Matrix/Comp. DI Water
Half Life (y): 1.23E+01
Requires NCR for ICPT work.

Stnd ID: 699.2613.19
Description: ^{3}H
Expiration: 7/28/04
Activity: 94000.71 dpm/mL
2s Uncertainty: 676.81 dpm/mL
Ref. Date: 9/3/98
Ref Time: N/A
Prep Date: 7/28/03 Prep by: JRK
Matrix/Comp. DI Water
Half Life (y): 1.23E+01

Signed 7/28/03 Date

Stnd ID: 699.2613.19
Description: 3H
Expiration: 7/30/05
Activity: 94000.71 dpm/mL
2s Uncertainty: 676.81 dpm/mL
Ref. Date: 9/3/98
Ref Time: N/A
Prep Date: ~~7/29/04~~ 7/28/03 Prep by: JLK
Matrix/Comp. DI Water
Half Life (y): 1.23E+01

Signed 8/1/03 Date

18
PROJECT 699.2613.18 34 Notebook No. 2613
Continued From Page

Prepare a 1° dilution of Ampoule 699 by diluting with DI water.

1) Determine the density of DI water

Mass of empty Class A 100mL volumetric flask	67.7956 g	Bal #1
Mass of flask + 100mL of DI water	167.3755 g	
Net mass of DI water	99.5799 g	

$\rho = 0.99589$ g/mL

2) Transfer contents of ampoule 699 into a 40 mL Amber glass VOA vile

Mass of VOA vile w/o lid	24.3883g	Bal #2
Mass of opened ampoule before transfer	40.8432g	
Mass of opened ampoule after transfer	36.0281g	
Net mass of Std transferred	4.8151g	

3) Add DI water to final dilution

Mass of VOA vile (w/o lid) from above	24.3883g	Bal #1
Mass of VOA vile, Std, + DI water	62.9648g	
Net mass of Std + DI water	38.5765g	

4) Final Activity Calculation

$$\frac{(634.7\ \text{kBq/g})(4.8151\ \text{g})\left(60\ \frac{\text{dpm}}{\text{Bq}}\right)\left(1000\ \frac{\text{Bq}}{\text{kBq}}\right)\left(0.99589\ \frac{\text{g}}{\text{mL}}\right)}{38.5765\ \text{g}} = 4,733,412.57\ \frac{\text{dpm}}{\text{mL}}$$

U.S. Department of Commerce
National Institute of Standards and Technology
SRM 4927F
Hydrogen-3
<4 MBq in distilled water
CAUTION
RADIOACTIVE

Continued on Page

Read and Understood By

Signed — Date 7/28/03
Signed — Date 7/31/03

National Institute of Standards & Technology

Certificate

PAF, ID 0099
recd 5-09-03

Standard Reference Material 4927F
Hydrogen-3 Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive hydrogen-3, as water, in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of beta-particle counting instruments and for the monitoring of radiochemical procedures.

Radiological Hazard

The SRM ampoule contains hydrogen-3 with a total activity of approximately 3.2 MBq. Hydrogen-3 decays by beta-particle emission. None of the beta particles escape from the SRM ampoule. During the decay process no photons are emitted. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. There is no detectable external radiation. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains only distilled water. There is no chemical hazard. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least September 2008.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) because of the radioactivity.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, L.R. Karam, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas and M.P. Unterweger of the Radioactivity Group.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by J.W.L. Thomas.

Bert M. Coursey, Chief
Ionizing Radiation Division

Nancy M. Trahey, Chief
Standard Reference Materials Program

Gaithersburg, Maryland 20899
June 1999
Half-life and text revised October 2000

*Notes and references are on pages 5 and 6.

Recommended Procedure for Opening the SRM Ampoule

1) If the SRM solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the SRM solution.

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood.

3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.

4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.

5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.

8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.

*Notes and references are on pages 5 and 6.

PROPERTIES OF SRM 4927F

Certified values

Solution density	**(0.998± 0.002) g·mL^{-1} at 20.0 °C [b]***
Radionuclide	**Hydrogen-3**
Reference time	**1200 EST, 3 September 1998**
Massic activity of the solution [c]	**634.7 kBq·g^{-1}**
Relative expanded uncertainty (k=2)	**0.72% [d] [e]**

Uncertified values

Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter Wall Thickness Barium content Lead-oxide content Other heavy elements	(16.5 ± 0.5) mm (0.60 ± 0.04) mm Less than 2.5% Less than 0.02% Trace quantities	
Solution mass	Approximately 5.0 g		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol·L^{-1})	Mass Fraction (g·g^{-1})
	H_2O ^3HHO	55 6×10^{-7}	1.00 1×10^{-8}
Radiological Properties:			
Radionuclidic impurities	None detected [f]		
Half lives used	Hydrogen-3: (4500 ± 8) d [g]		
Calibration method and measuring instrument(s)	4πß gas counting of SRM 4927E using the NIST length-compensated internal gas proportional counters and intercomparison of SRMs 4927E/4927F using two 4πß liquid-scintillation counting systems [h]		

*Notes and references are on pages 5 and 6.

EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]*

Input Quantity x_i, the source of uncertainty (and individual uncertainty components where appropriate)	Method Used To Evaluate $u(x_i)$, the standard uncertainty of x_i (A) denotes evaluation by statistical methods (B) denotes evaluation by other methods	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$, (%) [i]	Relative Sensitivity Factor, $\lvert \partial y/\partial x_i \rvert \cdot (x_i/y)$ [j]	Relative Uncertainty Of Output Quantity, $u_i(y)/y$, (%) [k]
Massic count rate of SRM 4927E, corrected for background and decay [h]	Standard deviation of the mean for 23 sets of gas counting measurements (A)	0.18	1.0	0.18
Gram-mole measurements	Estimated (B)	0.20	1.0	0.20
Live-time [p]	Estimated (B)	0.10	1.0	0.10
Extrapolation of count-rate-versus-energy to zero energy	Estimated (B)	0.20	1.0	0.20
Half life of H-3	Standard uncertainty of the half life (A)	0.18 [m]	0.009 [n]	0.002
Liquid-scintillation intercomparison of SRM 4927F and SRM 4927E	Standard deviation of the mean for 7 sets of liquid-scintillation measurements (A)	0.06	1.0	0.06
Radionuclidic impurities	Limit of detection (B) [q]	100.	0.0005	0.05
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$, (%)				0.36
Coverage Factor, k				x 2
Relative Expanded Uncertainty of the Output Quantity, U/y, (%)				0.72

*Notes and references are on pages 5 and 6.

NOTES

[a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.

Distance from Ampoule (cm):	1	30	100
Approximate Dose Rate (μSv/h):	<0.1 (Not detectable)		

[b] The stated uncertainty is two times the standard uncertainty.

[c] Massic activity is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

[d] The reported value, y, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.

The value, x_i, used for each input quantity i has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in y, $u_i(y) \equiv |\partial y/\partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of y.

The **combined standard uncertainty** of y, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain U, the **expanded uncertainty** of y.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] The value of each standard uncertainty component, and hence the value of the expanded uncertainty itself, is a best estimate based upon all available information, but is only approximately known. That is to say, the "uncertainty of the uncertainty" is large and not well known. This is true for uncertainties evaluated by statistical methods (e.g., the relative standard deviation of the standard deviation of the mean for the massic response is approximately 50%) and for uncertainties evaluated by other methods (which could easily be over estimated or under estimated by substantial amounts). The unknown value of the expanded uncertainty is believed to lie in the interval $U/2$ to $2U$ (i.e., within a factor of 2 of the estimated value).

[f] The estimated limit of detection for radionuclidic impurities is 300 $Bq \cdot g^{-1}$.

[g] The stated uncertainty is the standard uncertainty. See reference [5].

[h] Extensive gas-counting measurements were made on the SRM 4927E solution during 1998 and 1999. The SRM 4927F solution was intercompared with the SRM 4927E solution using liquid-scintillation counting.

[i] Relative standard uncertainty of the input quantity x_i.

[j] The relative change in the output quantity y divided by the relative change in the input quantity x_i. If $|\partial y/\partial x_i| \cdot (x_i/y) = 1.0$, then a 1% change in x_i results in a 1% change in y. If $|\partial y/\partial x_i| \cdot (x_i/y) = 0.05$, then a 1% change in x_i results in a 0.05% change in y.

[k] Relative component of combined standard uncertainty of output quantity y, rounded to two significant figures or less. The relative component of combined standard uncertainty of y is given by $u_i(y)/y \equiv |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y/\partial x_i| \cdot (x_i/y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.

[m] The relative standard uncertainty of $\lambda \cdot t$ is determined by the relative standard uncertainty of λ (i.e., of the half life). The relative standard uncertainty of t is negligible.

[n] $|\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$

[p] The live time is determined by counting the pulses from a gated crystal-controlled oscillator.

[q] The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i = 100\%$. $|\partial y/\partial x_i| \cdot (x_i/y)$ = {(response per Bq of impurity)/(response per Bq of H-3)}·{(Bq of impurity)/(Bq of H-3)}. Thus $u_i(y)/y$ is the relative change in y if the impurity were present with a massic activity equal to the estimated limit of detection.

REFERENCES

[1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.

[2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

[3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.

[4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.

[5] L.L. Lucas and M.P. Unterweger, *Comprehensive Review and Critical Evaluation of the Half-Life of Tritium*, J. Res. Natl. Inst. Stand. Technol. 105, 541-549 (2000).

ROJECT 486.3020.23 3H

Notebook No. 3020 23

Continued From Page

PREPARE A WORKING DILUTION OF 486.1284.85 AT ~2500 dpm/ml

Q3/1/06
1. TRANSFER 486.1284.85 TO AN AMBER GLASS BOTTLE

MASS OF BOTTLE W/O LID: 259.20g Bal 26
MASS OF BOTTLE + STD: 261.25g
NET MASS OF STD: 2.05g

Q3/1/06
2. DILUTE TO 500ml WITH DI WATER (SEE BELOW FOR ρ DETERMINATION)

MASS OF BOTTLE + STD + H_2O: 760.0g BAL 26
MASS OF BOTTLE (from above): 259.20g
NET MASS OF DILUTED STD: 500.8g

3. DETERMINE DENSITY OF DI WATER

MASS OF 100ml VOLUMETRIC FLASK: 56.4421g Bal 12
MASS OF FLASK + H_2O: 156.1980g
NET MASS OF H_2O: 99.7559g
ρ = 0.997559 g/ml

4. FINAL ACTIVITY CALCULATION

$$\frac{(1127029.4\ \text{pCi/g}\ \text{[corrected from 948004.38 dpm/ml]})(0.9976\ \text{g/ml})(2.05\text{g})(2.22\ \text{dpm/pCi})}{500.8\text{g}} = 3871.3\ \frac{\text{dpm}}{\text{ml}}$$

RG 4/17/06

Stnd ID: 486.3020.23

Description: H-3
Expiration: 4/15/07
Activity: 3871.30 dpm/mL
2s Uncertainty: 193.57 dpm/mL
Ref. Date: 3/23/98
Ref Time: N/A
Prep Date: 3/24/06 Prep by: AF
Matrix/Comp. DI H20
Half Life (y): 1.24E+01

RG 4/17/06

Reverification Log

Analysis Date	Initials	Expiration Date

RG 4/17/06

RG 4/17/06

Continued on Page

Read and Understood By

[signature] 3/24/06 [signature] 4/17/06

Signed Date Signed Date

Tritium Spike Solution 486 1284.85

Soln # 486.1284.84 was diluted to form a Soln approx 100000 dpm/ml as follows:

RG 9/6/05
Stnd ID: 486.1284.85
Description: 3H
Expiration: 8/11/06
Activity: 948004.38 dpm/mL
2s Uncertainty: 47400.22 dpm/mL
Ref. Date: 3/23/98
Ref Time: N/A
Prep Date: 5/3/00 Prep by: RTS
Matrix/Comp. DI Water
Half Life (y): 1.23E+01
RG 9/6/05 RG 9/6/05 RG 9/6/05

VOA tare 27.9711 g

VOA + HS (486.1284.84) 42.6011 g

Final (dil w/ DI H2O) 62.7170 g

dil factor

42.6011 g
− 27.9711 g
14.63 g STD
× 1014189.6 pCi/g
14837521 pCi
÷ (62.7170 g − 27.9711 g)
427029.4 pCi/g

RG 3/28/03
Stnd ID: 486.1284.85
Description: H-3
Activity: 948004.38 dpm/ml
2s Uncertainty: 4740.02 dpm/ml
Ref. Date: 3/23/98
Ref Time: na
Prep Date: 5/3/00 Prep by: RTS
Expiration: ~~3/25/03~~ 3/25/04 RG 3/28/03
Matrix/Comp. DI H2O
Half Life (y): 1.23E+01
MAY REQUIRE NCR FOR ICPT WORK.
RG 3/28/03 RG 3/28/03 RG 3/28/03

RG 8/17/04
Stnd ID: 486.1284.85
Description: 3H
Expiration: 7/30/05
Activity: 948004.38 dpm/mL
2s Uncertainty: 4740.02 dpm/mL
Ref. Date: 3/23/98
Ref Time: N/A
Prep Date: 7/29/04 Prep by: JLK
Matrix/Comp. DI H20
Half Life (y): 1.23E+01
RG 8/17/04 RG 8/17/04

Stnd ID: 486.1284.85
Description: Tritium in Water Stock Solution
Activity: 427029 pCi/g or mL
Uncertainty: pCi/g or mL
Ref. Date: ~~3/30/98~~ 3/23/98 RK 1-7-02
Ref Time: 10:00 AM 3/30/98 CEM 1/4/02
Prep Date ~~3/30/98~~ Prep by: RTS
Expiration ~~3/29/03~~ ~~3/23/98~~ CEM 10/4/02
Matrix/Comp. DI Water 3/29/03 CEM 10/4/02
Short Lived – Decay Correct with each use

Verified 5/27/98 DCS

Standard re-verified 3/25/03. RG 3/28/03
Expires 3/25/04

Standard re-verified. New exp date: 7/30/05 RG 8/17/04

Continued on Page

Read and Understood By

Signed	Date	Signed	Date
[signature]	~~5/3/00~~ 5/4/00	DCS	5/22/98

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Notebook No. WI1604

PROJECT Tritium Stock Solution 486.1284.84

Continued From Page

PAI solution number 486.1284.84 (Analytics SRS 55543-327)

I was transferred to a 40 ml VOA vial.

Certificate not available on 3/30/98 - will obtain

Activity 51.054 uCi

Volume 50.34 grams

Matrix H2O

RG 8/13/04

Stnd ID: 486.1284.84

Description: 3H
Expiration: 7/30/05
Activity: 1014184.00 pCi/g or ml
2s Uncertainty: 50709.00 pCi/g or ml
Ref. Date: 3/23/98
Ref Time: N/A
Prep Date: 7/29/04 Prep by: JLK
Matrix/Comp. DI Water
Half Life (y): 1.23E+01

RG 8/13/04

Standard recertified on 7/30/04. Expires 7/30/05.

RG 8/23/04

Verified 5/19/98 DCS

7/8/03

Stnd ID: 486.1284.84

Description: H-3
Activity: 1014184.00 pCi/g or ml
2s Uncertainty: 50709.00 pCi/g or ml
Ref. Date: 3/23/98
Ref Time: 0.417
Prep Date: 3/30/98 Prep by: RTS
Expiration: 7/3/04
Matrix/Comp. DI Water
Half Life (y): 1.24E+01

DCS 7/8/03

Stnd ID: 486.1284.84

Description: Tritium in Water Stock Solution
Activity: 1014184 pCi/g or mL
Uncertainty: pCi/g or mL
Ref. Date: ~~3/30/98~~ 3/23/98 1-7-02
Ref Time: 10:00
Prep Date 3/30/98 Prep by: RTS
Expiration 3/29/03
Matrix/Comp. DI Water
Short Lived -- Decay Correct with each use

Standard re-verified on 7/3/03 DCS 7/7/03
Expires 7/3/04

Continued on Page

Read and Understood By

Signed 5/5/00 Date

Signed DCS 5/19/98 Date

000063

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.
Phone (404) 352-8677
Fax (404) 352-2837

PAID 486. rec'd 3-24-98

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

55543-307

H-3 in Water 50 mL in Flame Sealed Vial

This standard radionuclide source was prepared using an aliquot measured gravimetrically from a master radionuclide solution standard. The master radionuclide solution standard was calibrated by the Department Des Applications Et De La Metrologie Des Rayonnements Ionisants (DAMRI), Paris, France, as Number 24057. The calibration was checked by liquid scintillation counting after source preparation.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.

ISOTOPE:	H-3
ACTIVITY (dps):	1.889 E+06
CALIBRATION DATE:	March 23, 1998 12:00 EST.
HALF-LIFE:	12.43 years
TOTAL UNCERTAINTY:	5.0%

50.34 grams of water.

P O NUMBER 21143, Item 1

PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: [illegible] 3/23/98

000064

DAILY INSTRUMENT PERFORMANCE CHECKS - LS6000 (LL OFF, LUMEX OFF)

Daily IPCs consist of the following standards;

Efficiency Check -

Beckman Tritium Standard		Beckman C-14 Standard		PAI Reagent Blank
Lot HNZ0202		Lot CNZ3112		RB 5/7/03 LLT # 97-3021
101900.00	dpm	98500.0	dpm	
2/17/2005	REF	2/17/2005	REF	
2/17/2010	EXP	2/17/2010	EXP	

The quench factor is measured on the Reagent Blank

Interim Control Limits as of 9/20/06 MBC

	Decay Corrected Tritium	Carbon-14	Reagent Blank	Quench Factor
UCL	75824.8	84792.9	38.8	123.1
Mean Value	68931.6	77084.4	33.3	111.9
LCL	62038.5	69376.0	27.9	100.7

		Decay Corrected				Reagent		Quench	
Date	H-3 CPM	H-CPM	PASS?	C-14 CPM	PASS?	H-3 Bkg CPM	PASS?	H#	PASS?
9/14/2006	62988.60	68831.32	OK	76980.9	OK	35.4	OK	112.4	OK
9/18/2006	63005.30	68892.14	OK	77074.3	OK	31.9	OK	111.7	OK
9/18/2006	62900.30	68777.33	OK	77019.8	OK	30.6	OK	111.8	OK
9/18/2006	62990.50	68875.96	OK	77113.1	OK	33.3	OK	112.1	OK
9/18/2006	62957.30	68839.66	OK	77024.2	OK	32.9	OK	111.7	OK
9/18/2006	63016.50	68904.39	OK	77085.6	OK	31.4	OK	112.0	OK
9/18/2006	63036.60	68926.37	OK	77121.0	OK	33.0	OK	112.2	OK
9/18/2006	63090.50	68985.30	OK	77089.7	OK	32.7	OK	111.9	OK
9/18/2006	63225.40	69132.81	OK	77013.2	OK	36.7	OK	111.7	OK
9/18/2006	62960.90	68843.59	OK	77216.4	OK	32.2	OK	112.1	OK
9/18/2006	62982.00	68866.67	OK	77049.7	OK	34.8	OK	111.5	OK
9/19/2006	62941.50	68833.02	OK	77117.7	OK	33.4	OK	111.9	OK

Liquid Scintillation Counter

Quality Control Data

Daily Instrument Performance Checks

DAILY INSTRUMENT PERFORMANCE CHECKS - LS6000 (LL OFF, LUMEX OFF)

Daily IPCs consist of the following standards;

Efficiency Check -

Beckman Tritium Standard		**Beckman C-14 Standard**		**PAI Reagent Blank**
Lot HNZ0202		Lot CNZ3112		RB 5/7/03 LLT # 97-3021
101900.00	dpm	98500.0	dpm	
2/17/05	REF	2/17/05	REF	
2/17/10	EXP	2/17/10	EXP	
				The quench factor is measured on the Reagent Blank

Historical Control Limits as of 11/16/06 MBC

	Decay Corrected Tritium	Carbon-14	Reagent Blank	Quench Factor
UCL	70286.2	78615.0	38.2	113.1
Mean Value	68908.0	77073.5	32.9	112.0
LCL	67529.9	75532.0	27.7	111.0

		Decay Corrected				Reagent		Quench	
Date	H-3 CPM	H-CPM	PASS?	C-14 CPM	PASS?	H-3 Bkg CPM	PASS?	H#	PASS?
11/10/06	62523.30	68927.35	OK	77231.4	OK	31.8	OK	112.7	OK
11/11/06	62353.50	68750.79	OK	77020.0	OK	35.4	OK	112.1	OK
11/11/06	62382.10	68782.32	OK	77132.1	OK	31.3	OK	112.1	OK
11/13/06	62170.30	68569.98	OK	76985.7	OK	32.1	OK	112.1	OK
11/13/06	62332.40	68748.77	OK	76963.7	OK	32.7	OK	112.6	OK
11/14/06	62204.80	68618.64	OK	77096.3	OK	33.9	OK	112.0	OK

DAILY CHECK LL ON ^{99}Tc SOURCE- LS6000

	^{99}Tc standard		spike known activity	
	03/18/99	REF	488.15	dpm/mL
	03/13/07	EXP	2440.75	dpm

HISTORICAL Control Limit	as of 10/18/2006	
	blank	spike
UCL	24.98	567.20
Mean Value	19.10	516.59
LCL	14.76	477.89

Date	Blank count rate	Pass ?	Spiked count rate	Pass ?
11/10/06	19	OK	529.5	OK
11/11/06	18.8	OK	530.1	OK
11/11/06	20.2	OK	520.6	OK
11/13/06	22.7	OK	549.4	OK
11/13/06	18	OK	536.1	OK
11/14/06	19.8	OK	547.4	OK

Paragon Analytics

Radiochemistry Case Narrative
Gamma Spectroscopy

ACZ Laboratories, Inc.

L59449

Paragon Work Order 0610164

1. This report consists of analysis results for two water samples received by Paragon Analytics on 10/20/2006. The analysis results for these samples are reported in units of pCi/L. The samples were not filtered prior to analysis.
2. These samples were prepared according to Paragon Analytics procedure PA SOP739R8.
3. The samples were analyzed for the presence of gamma emitting radionuclides according to Paragon Analytics procedure PA SOP713R9. The analyses were completed on 11/5/2006.
4. Paragon Analytics has found there to be a significant low bias to ^{214}Pb and ^{214}Bi results when using a mixed nuclide gamma source for efficiency calibrations. The magnitude of this bias has been determined to be approximately 32% for ^{214}Bi, and 23% for ^{214}Pb. Therefore, any reported results for ^{214}Pb and ^{214}Bi are flagged with a "J" qualifier, indicating the activity values to be an estimated value. Results are reported without further qualification.
5. Technical considerations made in the creation of the gamma spectroscopy library used in this analysis are detailed in the document "Technical Comments Regarding Gamma Spectroscopy Libraries" found in Section 4.
6. There are cases where the magnitude of negative activity is greater than the 2σ TPU. Under typical conditions, where background data is normally distributed and analyzed by paired observations, this event is likely to occur at least 2.5% of the time. Review of the data does not indicate a problem with the instrument or reporting systems and results are reported without further qualification.
7. No problems were encountered with either the client samples or the associated quality control samples. All quality control criteria were met.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, Paragon Analytics certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Radiochemistry Instrument Technician — Date 11/20/06

Radiochemistry Final Data Review — Date 11/22/06

1

PARAGON ANALYTICS
Radiochemistry Data Package

Section 1

SAMPLE RESULTS SUMMARY

Due to the nature of gamma spectroscopy data a summary report is not provided.

Please refer to the individual sample results in Section 3.

2

PARAGON ANALYTICS

Radiochemistry Data Package

Section 2

QC RESULTS SUMMARY

Gamma Spectroscopy Results

PAI 713 Rev 9

Method Blank Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Lab ID: GS061025-4MB
Library: FANP

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 8
Date Collected: 25-Oct-06
Date Prepared: 25-Oct-06
Date Analyzed: 02-Nov-06

Prep Batch: GS061025-4
QCBatchID: GS061025-4-2
Run ID: GS061025-4A
Count Time: 400 minutes

Final Aliquot: 1000 ml
Result Units: pCi/l
File Name: 062634d06

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14331-83-0	Ac-228	-10 +/- 30	51	U
14391-76-5	Ag-110m	2.7 +/- 4.5	7.5	U
14682-66-7	Al-26	1.6 +/- 5.5	9.6	U
14596-10-2	Am-241	-12 +/- 50	86	U
13966-02-4	Be-7	-54 +/- 36	66	U
14913-49-6	Bi-212	48 +/- 66	110	U
14733-03-0	Bi-214	8 +/- 15	25	U,J
13982-30-4	Ce-139	-0.4 +/- 3.6	6.1	U
14762-78-8	Ce-144	-12 +/- 25	42	U
14093-03-9	Co-56	1.6 +/- 7.5	12.9	U
13981-50-5	Co-57	-1.8 +/- 3.5	5.9	U
13981-38-9	Co-58	1.5 +/- 4.5	7.6	U
10198-40-0	Co-60	5.8 +/- 5.5	8.8	U
14392-02-0	Cr-51	9 +/- 32	54	U
13967-70-9	Cs-134	-3.2 +/- 4.7	8.2	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSW0610164-1*

Gamma Spectroscopy Results

PAI 713 Rev 9

Method Blank Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Lab ID: GS061025-4MB
Library: FANP

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 8
Date Collected: 25-Oct-06
Date Prepared: 25-Oct-06
Date Analyzed: 02-Nov-06

Prep Batch: GS061025-4
QCBatchID: GS061025-4-2
Run ID: GS061025-4A
Count Time: 400 minutes

Final Aliquot: 1000 ml
Result Units: pCi/l
File Name: 062634d06

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	-3.8 +/- 5.0	8.9	U
14683-23-9	Eu-152	1 +/- 24	42	U
15585-10-1	Eu-154	-15 +/- 25	46	U
14391-16-3	Eu-155	24 +/- 16	26	U
14596-12-4	Fe-59	10.3 +/- 8.5	13.4	U
10043-66-0	I-131	-0.9 +/- 4.6	7.9	U
13966-00-2	K-40	30 +/- 100	180	U
13966-31-9	Mn-54	-1.2 +/- 4.8	8.5	U
13966-32-0	Na-22	2.7 +/- 4.6	7.7	U
14681-63-1	Nb-94	-2.7 +/- 4.8	8.5	U
13967-76-5	Nb-95	2.3 +/- 4.4	7.3	U
15100-28-4	Pa-234m	-180 +/- 770	1380	U
15092-94-1	Pb-212	2.1 +/- 7.3	12.2	U
15067-28-4	Pb-214	7 +/- 13	22	U,J
13967-48-1	Ru-106	-7 +/- 45	78	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSW0610164-1*

Gamma Spectroscopy Results

PAI 713 Rev 9

Method Blank Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Lab ID: GS061025-4MB
Library: FANP

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 8
Date Collected: 25-Oct-06
Date Prepared: 25-Oct-06
Date Analyzed: 02-Nov-06

Prep Batch: GS061025-4
QCBatchID: GS061025-4-2
Run ID: GS061025-4A
Count Time: 400 minutes

Final Aliquot: 1000 ml
Result Units: pCi/l
File Name: 062634d06

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14683-10-4	Sb-124	-12.5 +/- 5.4	9.8	U
14234-35-6	Sb-125	0 +/- 12	21	U
13967-63-0	Sc-46	-0.1 +/- 4.6	8.1	U
15623-47-9	Th-227	-16 +/- 25	43	U
15065-10-8	Th-234	-20 +/- 110	190	U
14913-50-9	Tl-208	-3.9 +/- 6.6	11.4	U
15117-96-1	U-235	-15 +/- 25	44	U
13982-39-3	Zn-65	-3.1 +/- 9.9	17.8	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSW0610164-1*

Gamma Spectroscopy Results

PAI 713 Rev 9

Laboratory Control Sample(s)

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Lab ID: GS061025-4LCS

Library: ANALYTICAL

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 8
Date Collected: 25-Oct-06
Date Prepared: 25-Oct-06
Date Analyzed: 03-Nov-06

Prep Batch: GS061025-4
QCBatchID: GS061025-4-2
Run ID: GS061025-4A
Count Time: 30 minutes

Final Aliquot: 1000 ml
Result Units: pCi/l
File Name: 062543d02

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14596-10-2	Am-241	97000 +/- 12000	2000	97600	99.7	85 - 115	P
10198-40-0	Co-60	41800 +/- 4900	100	42000	99.5	85 - 115	P
10045-97-3	Cs-137	38200 +/- 4500	200	37000	103	85 - 115	P,M3

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

Data Package ID: *GSW0610164-1*

Date Printed: Monday, November 20, 2006

Paragon Analytics
LIMS Version: 5.450A

PARAGON ANALYTICS
Radiochemistry Data Package

3

Section 3

INDIVIDUAL SAMPLE RESULTS

Gamma Spectroscopy Results

PAI 713 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Field ID: L59449-01
Lab ID: 0610164-1
Library: FANP

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 8
Date Collected: 16-Oct-06
Date Prepared: 25-Oct-06
Date Analyzed: 05-Nov-06

Prep Batch: GS061025-4
QCBatchID: GS061025-4-2
Run ID: GS061025-4A
Count Time: 300 minutes
Report Basis: Unfiltered

Final Aliquot: 975 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 063147d08

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14331-83-0	Ac-228	7 +/- 22	38	U
14391-76-5	Ag-110m	0.7 +/- 4.3	7.5	U
14682-66-7	Al-26	-0.2 +/- 5.5	9.9	U
14596-10-2	Am-241	0.5 +/- 5.2	8.9	U
13966-02-4	Be-7	26 +/- 40	66	U
14913-49-6	Bi-212	26 +/- 84	142	U
14733-03-0	Bi-214	2 +/- 14	23	U,J
13982-30-4	Ce-139	-0.4 +/- 2.8	4.9	U
14762-78-8	Ce-144	-3 +/- 18	31	U
14093-03-9	Co-56	-9.9 +/- 9.0	17.1	U
13981-50-5	Co-57	1.3 +/- 2.0	3.4	U
13981-38-9	Co-58	-2.4 +/- 5.1	9.2	U
10198-40-0	Co-60	-2.3 +/- 5.2	9.6	U
14392-02-0	Cr-51	-35 +/- 48	85	U
13967-70-9	Cs-134	-0.7 +/- 4.1	7.2	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSW0610164-1*

Gamma Spectroscopy Results

PAI 713 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Field ID: L59449-01
Lab ID: 0610164-1
Library: FANP

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 8
Date Collected: 16-Oct-06
Date Prepared: 25-Oct-06
Date Analyzed: 05-Nov-06

Prep Batch: GS061025-4
QCBatchID: GS061025-4-2
Run ID: GS061025-4A
Count Time: 300 minutes
Report Basis: Unfiltered

Final Aliquot: 975 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 063147d08

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	-1.4 +/- 4.7	8.3	U
14683-23-9	Eu-152	3 +/- 23	40	U
15585-10-1	Eu-154	15 +/- 26	44	U
14391-16-3	Eu-155	-2.8 +/- 7.4	12.9	U
14596-12-4	Fe-59	5 +/- 12	20	U
10043-66-0	I-131	5 +/- 19	33	U
13966-00-2	K-40	-29 +/- 78	138	U
13966-31-9	Mn-54	-1.3 +/- 4.4	7.8	U
13966-32-0	Na-22	2.1 +/- 4.8	8.2	U
14681-63-1	Nb-94	-3.0 +/- 4.3	7.8	U
13967-76-5	Nb-95	-3.2 +/- 4.6	8.5	U
15100-28-4	Pa-234m	-90 +/- 780	1380	U
15092-94-1	Pb-212	-2.8 +/- 7.2	12.4	U
15067-28-4	Pb-214	1 +/- 12	20	U,J
13967-48-1	Ru-106	-4 +/- 42	73	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSW0610164-1*

Gamma Spectroscopy Results

PAI 713 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Field ID: L59449-01
Lab ID: 0610164-1
Library: FANP

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 8
Date Collected: 16-Oct-06
Date Prepared: 25-Oct-06
Date Analyzed: 05-Nov-06

Prep Batch: GS061025-4
QCBatchID: GS061025-4-2
Run ID: GS061025-4A
Count Time: 300 minutes
Report Basis: Unfiltered

Final Aliquot: 975 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 063147d08

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14683-10-4	Sb-124	-1.8 +/- 5.0	8.9	U
14234-35-6	Sb-125	0.9 +/- 9.0	16.3	U
13967-63-0	Sc-46	1.8 +/- 4.7	8.1	U
15623-47-9	Th-227	-2 +/- 18	31	U
15065-10-8	Th-234	-29 +/- 57	97	U
14913-50-9	Tl-208	2.4 +/- 6.4	10.8	U
15117-96-1	U-235	5 +/- 17	29	U
13982-39-3	Zn-65	-2 +/- 11	19	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSW0610164-1*

Gamma Spectroscopy Results

PAI 713 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Field ID: L59449-02
Lab ID: 0610164-2
Library: FANP

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 8
Date Collected: 16-Oct-06
Date Prepared: 25-Oct-06
Date Analyzed: 05-Nov-06

Prep Batch: GS061025-4
QCBatchID: GS061025-4-2
Run ID: GS061025-4A
Count Time: 300 minutes
Report Basis: Unfiltered

Final Aliquot: 990 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 062554d02

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14331-83-0	Ac-228	1 +/- 22	38	U
14391-76-5	Ag-110m	-3.8 +/- 4.8	8.7	U
14682-66-7	Al-26	3.4 +/- 5.6	9.4	U
14596-10-2	Am-241	16 +/- 30	50	U
13966-02-4	Be-7	21 +/- 42	70	U
14913-49-6	Bi-212	58 +/- 62	100	U
14733-03-0	Bi-214	6 +/- 16	26	U,J
13982-30-4	Ce-139	-0.9 +/- 4.9	8.3	U
14762-78-8	Ce-144	-6 +/- 22	38	U
14093-03-9	Co-56	7.2 +/- 10	17.2	U
13981-50-5	Co-57	-0.7 +/- 2.9	5.1	U
13981-38-9	Co-58	-2.9 +/- 5.9	10.5	U
10198-40-0	Co-60	0.5 +/- 5.7	10.0	U
14392-02-0	Cr-51	-26 +/- 47	84	U
13967-70-9	Cs-134	-7.7 +/- 4.9	9.1	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSW0610164-1*

Gamma Spectroscopy Results

PAI 713 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Field ID: L59449-02
Lab ID: 0610164-2
Library: FANP

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 8
Date Collected: 16-Oct-06
Date Prepared: 25-Oct-06
Date Analyzed: 05-Nov-06

Prep Batch: GS061025-4
QCBatchID: GS061025-4-2
Run ID: GS061025-4A
Count Time: 300 minutes
Report Basis: Unfiltered

Final Aliquot: 990 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 062554d02

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
10045-97-3	Cs-137	4.3 +/- 5.0	8.2	U
14683-23-9	Eu-152	-4 +/- 26	47	U
15585-10-1	Eu-154	12 +/- 27	45	U
14391-16-3	Eu-155	4 +/- 11	19	U
14596-12-4	Fe-59	2 +/- 12	21	U
10043-66-0	I-131	0 +/- 22	38	U
13966-00-2	K-40	-9 +/- 85	147	U
13966-31-9	Mn-54	-0.9 +/- 5.0	8.9	U
13966-32-0	Na-22	-7.0 +/- 5.6	10.7	U
14681-63-1	Nb-94	-1.9 +/- 4.9	8.7	U
13967-76-5	Nb-95	1.7 +/- 5.5	9.4	U
15100-28-4	Pa-234m	-410 +/- 840	1520	U
15092-94-1	Pb-212	1.4 +/- 10	17.3	U
15067-28-4	Pb-214	3 +/- 13	21	U,J
13967-48-1	Ru-106	-7 +/- 45	79	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSW0610164-1*

Gamma Spectroscopy Results

PAI 713 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0610164
Client Name: ACZ Laboratories, Inc.
ClientProject ID: L59449

Field ID: L59449-02
Lab ID: 0610164-2
Library: FANP

Sample Matrix: WATER
Prep SOP: PAI 739 Rev 8
Date Collected: 16-Oct-06
Date Prepared: 25-Oct-06
Date Analyzed: 05-Nov-06

Prep Batch: GS061025-4
QCBatchID: GS061025-4-2
Run ID: GS061025-4A
Count Time: 300 minutes
Report Basis: Unfiltered

Final Aliquot: 990 ml
Prep Basis: Unfiltered
Moisture(%): NA
Result Units: pCi/l
File Name: 062554d02

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14683-10-4	Sb-124	-9.0 +/- 6.4	11.6	U
14234-35-6	Sb-125	5 +/- 11	20	U
13967-63-0	Sc-46	0.4 +/- 5.4	9.4	U
15623-47-9	Th-227	-8 +/- 22	38	U
15065-10-8	Th-234	-2 +/- 98	164	U
14913-50-9	Tl-208	-1.0 +/- 7.1	12.5	U
15117-96-1	U-235	15 +/- 17	27	U
13982-39-3	Zn-65	-10 +/- 11	20	U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *GSW0610164-1*

PARAGON ANALYTICS
Radiochemistry Data Package

4

Section 4

RAW DATA

063147D08.SPC Analyzed by

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

Geo 1 / Water

Sample ID: 0610164-1 GS061025-4

Sampling Start:	10/16/2006 12:00:00	Counting Start:	11/05/2006 09:27:20
Sampling Stop:	10/16/2006 12:00:00	Decay Time.	4.77E+002 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	18000 Sec
Sample Size	9.75E-001 L	Real Time	18036 Sec
Collection Efficiency	1.0000	Spc. File	.063147D08.SPC

Detector #: 8 (Detector 8)

Energy(keV)= -0.56 + 0.500*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 11/05/2006
FWHM(keV) = 0.72 + 0.007*En + 8.11E-04*En^2 + 0.00E+00*En^3 08/17/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.45	93.96	138	56	42	322	0.90 a	
2	53.48	108.00	13	26	21	120	0.41 a	NET< CL
3	63.28	127.58	211	60	43	348	0.93 a	
4	66.20	133.43	289	74	54	464	1.26 b	
5	74.27	149.55	90	68	54	460	1.24 a	
6	77.02	155.05	74	49	38	288	0.82 b	
7	92.59	186.17	190	58	42	322	0.91 a	
8	119.14	239.24	25	31	24	146	0.45 a	
9	139.67	280.26	145	48	35	240	0.74 a	
10	175.15	351.18	52	51	40	277	1.07 a	
11	185.82	372.50	109	55	42	305	1.11 a	
12	198.36	397.56	148	44	30	182	0.81 a	
13	238.59	477.96	75	35	25	143	0.72 a	
14	295.20	591.10	19	26	20	97	0.54 a	NET< CL
15	352.24	705.10	73	38	28	141	0.93 a	
16	511.01	1022.41	461	65	40	242	1.95 a	
17	558.48	1117.26	123	35	22	95	1.15 a	
18	596.34	1192.94	68	40	30	148	1.59 a	
19	609.33	1218.89	58	33	25	119	1.12 a	
20	802.76	1605.47	41	24	17	64	1.18 a	
21	911.04	1821.87	28	21	15	48	1.25 a	
22	927.70	1855.18	25	27	20	70	2.02 a	
23	1460.05	2919.10	40	22	15	45	1.57 a	

063147D08.SPC Analyzed by

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SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Vers. 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Background File:. . . . . DET081103.BKG (061103-8 WEEKLY BKG)

Bkg.File Detector #: 8

BACKGROUND SUBTRACT RESULTS

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
1	46.45	138	56	42	7	72	59	NET<CL
3	63.28	211	60	43	43	80	65	NET<CL
4	66.20	289	74	54	216	92	72	
5	74.27	90	68	54	26	84	68	NET<CL
6	77.02	74	49	38	8	69	57	NET<CL
7	92.59	190	58	42	-42	82	69	NET<CL
9	139.67	145	48	35	90	61	47	
11	185.82	109	55	42	1	73	60	NET<CL
12	198.36	148	44	30	83	63	50	
13	238.59	75	35	25	-22	55	46	NET<CL
14	295.20	19	26	20	-17	48	40	NET<CL
15	352.24	73	38	28	6	57	47	NET<CL
16	511.01	461	65	40	-49	101	84	NET<CL
17	558.48	123	35	22	35	51	41	NET<CL
19	609.33	58	33	25	6	53	44	NET<CL
20	802.76	41	24	17	-6	40	33	NET<CL
21	911.04	28	21	15	11	33	27	NET<CL
23	1460.05	40	22	15	-12	33	28	NET<CL

063147D08.SPC Analyzed by

SEEKER F I N A L A C T I V I T Y R E P O R T Version 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Geo 1 / Water

Sample ID: 0610164-1 GS061025-4

Sampling Start:	10/16/2006 12:00:00	Counting Start:	11/05/2006 09:27:20
Sampling Stop:	10/16/2006 12:00:00	Decay Time.	4.77e+002 Hrs
Buildup Time.	0.00e+000 Hrs	Live Time	18000 Sec
Sample Size	9.75e-001 L	Real Time	18036 Sec
Collection Efficiency	1.0000	Spectrum File	.063147D08.SPC
Cr. Level Confidence Interval:	95 %	Det. Limit Confidence Interval:	95 %

Detector #: 8 (Detector 8)

Efficiency File: (D08)(Sh01).EFF (Geo 1 Eff Cal)
Eff.=1/[6.36E-01*En^-1.19E+00 + 1.20E+02*En^9.04E-01] 09/11/2006

Library File: . . . . . .FANP.LIB (FANP (Fiss. Act. and Nat. Products))

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	NET	Concentration (pCi/L)	MDA	Critical Level	Halflife (hrs)
Th-234	92.50	N	-2.92E+01 +- 5.68E+01	9.65E+01	4.73E+01	3.92E+13
Sb-125	Average:x		9.04E-01 +- 8.98E+00	. . . .	. . . .	2.43E+04
	176.29		3.54E+01 +- 3.50E+01	5.71E+01	2.76E+01	2.43E+04
	427.95	N	-1.53E+00 +- 9.30E+00	1.63E+01	7.73E+00	2.43E+04
Pb-212	238.63	N	-2.84E+00 +- 7.23E+00	1.24E+01	6.04E+00	1.67E+04
Pb-214	351.99	N	1.17E+00 +- 1.16E+01	1.96E+01	9.53E+00	1.40E+07
Bi-214	609.32	N	1.55E+00 +- 1.38E+01	2.34E+01	1.13E+01	1.40E+07
Ac-228	911.07	N	7.29E+00 +- 2.21E+01	3.75E+01	1.79E+01	5.04E+04
K-40	1460.75	N	-2.94E+01 +- 7.81E+01	1.38E+02	6.58E+01	1.12E+13
Am-241	59.54	N	5.34E-01 +- 5.23E+00	8.88E+00B	4.28E+00	3.80E+06
Eu-155	105.31	N	-2.80E+00 +- 7.41E+00	1.29E+01	6.21E+00	4.35E+04
Co-57	122.07	N	1.31E+00 +- 2.04E+00	3.38E+00b	1.62E+00	6.48E+03
Ce-144	133.53	N	-3.46E+00 +- 1.78E+01	3.06E+01	1.48E+01	6.82E+03
U-235	143.76	N	4.96E+00 +- 1.74E+01	2.93E+01b	1.41E+01	6.17E+12
Ce-139	165.85	N	-4.30E-01 +- 2.83E+00	4.86E+00	2.35E+00	3.30E+03
Th-227	236.00	N	-1.81E+00 +- 1.83E+01	3.15E+01B	1.51E+01	1.90E+05
Cr-51	320.07	N	-3.47E+01 +- 4.83E+01	8.53E+01	4.11E+01	6.65E+02
I-131	364.48	N	4.77E+00 +- 1.92E+01	3.26E+01	1.56E+01	1.93E+02
Be-7	477.56	N	2.63E+01 +- 3.95E+01	6.56E+01	3.12E+01	1.28E+03
Tl-208	583.14	N	2.35E+00 +- 6.41E+00	1.08E+01	5.19E+00	1.67E+04
Sb-124	602.71	N	-1.82E+00 +- 5.02E+00	8.85E+00	4.22E+00	1.44E+03
Cs-134	604.66	N	-7.44E-01 +- 4.10E+00	7.16E+00B	3.41E+00	1.81E+04
Ru-106	621.84	N	-3.87E+00 +- 4.19E+01	7.29E+01	3.47E+01	8.84E+03
Ag-110M	657.75	N	6.53E-01 +- 4.35E+00	7.47E+00	3.54E+00	6.00E+03
Cs-137	661.62	N	-1.38E+00 +- 4.70E+00	8.29E+00	3.94E+00	2.64E+05

063147D08.SPC Analyzed by

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	NET	Concentration (pCi/L)		MDA	Critical Level	Halflife (hrs)
Nb-94	702.50	N	-3.01E+00	+- 4.30E+00	7.76E+00	3.69E+00	1.78E+08
Bi-212	727.17	N	2.58E+01	+- 8.43E+01	1.42E+02	6.82E+01	1.67E+04
Nb-95	765.82	N	-3.20E+00	+- 4.60E+00	8.46E+00	3.98E+00	1.54E+03
Co-58	810.75	N	-2.45E+00	+- 5.09E+00	9.17E+00	4.33E+00	1.70E+03
Mn-54	834.81	N	-1.32E+00	+- 4.38E+00	7.81E+00	3.68E+00	7.49E+03
Sc-46	889.26	N	1.77E+00	+- 4.74E+00	8.09E+00	3.78E+00	2.01E+03
Pa-234m	1001.03	N	-8.81E+01	+- 7.82E+02	1.38E+03	6.49E+02	3.92E+13
Eu-154	1004.80	N	1.53E+01	+- 2.63E+01	4.40E+01	2.06E+01	7.45E+04
Fe-59	1099.22	N	4.94E+00	+- 1.15E+01	1.95E+01	9.11E+00	1.08E+03
Zn-65	1115.52	N	-2.35E+00	+- 1.06E+01	1.88E+01	8.84E+00	5.85E+03
Co-56	1238.28	N	-9.93E+00	+- 8.88E+00	1.71E+01	8.00E+00	1.86E+03
Na-22	1274.54	N	2.10E+00	+- 4.79E+00	8.17E+00	3.77E+00	2.28E+04
Co-60	1332.51	N	-2.33E+00	+- 5.22E+00	9.58E+00	4.47E+00	4.62E+04
Eu-152	1408.08	N	3.41E+00	+- 2.26E+01	3.99E+01	1.83E+01	1.17E+05
Al-26	1808.65	N	-2.37E-01	+- 5.49E+00	9.93E+00	4.53E+00	6.31E+09

MEASURED TOTAL: 1.05E+02 +- 3.05E+02 pCi/L

UNKNOWN,SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.45	93.96	7	72	59	322	0.90	Deleted
2	53.48	108.00	13	26	21	120	0.41	Deleted
3	63.28	127.58	43	80	65	348	0.93	Deleted
4	66.20	133.43	216	92	72	464	1.26	Unknown
5	74.27	149.55	26	84	68	460	1.24	Deleted
6	77.02	155.05	8	69	57	288	0.82	Deleted
8	119.14	239.24	25	31	24	146	0.45	Unknown
9	139.67	280.26	90	61	47	240	0.74	Unknown
11	185.82	372.50	1	73	60	305	1.11	Deleted
12	198.36	397.56	83	63	50	182	0.81	Unknown
14	295.20	591.10	-17	48	40	97	0.54	Deleted
16	511.01	1022.41	-49	101	84	242	1.95	Deleted
17	558.48	1117.26	35	51	41	95	1.15	Deleted
18	596.34	1192.94	68	40	30	148	1.59	Unknown
20	802.76	1605.47	-6	40	33	64	1.18	Deleted
22	927.70	1855.18	25	27	20	70	2.02	Unknown

c:\SEEKER\BIN\063147d08.res Analysis Results Saved.

062554D02.SPC Analyzed by

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SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Geo 1 / Water

Sample ID: 0610164-2 GS061025-4

Sampling Start:	10/16/2006 12:00:00	Counting Start:	11/05/2006 09:27:05
Sampling Stop:	10/16/2006 12:00:00	Decay Time.	4.77E+002 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	18000 Sec
Sample Size	9.90E-001 L	Real Time	18007 Sec
Collection Efficiency	1.0000	Spc. File	.062554D02.SPC

Detector #: 2 (Detector 2)

Energy(keV)= -0.77 + 0.501*Ch + 2.77E-08*Ch^2 + 0.00E+00*Ch^3 11/05/2006
FWHM(keV) = 0.69 + 0.006*En + 1.18E-03*En^2 + 0.00E+00*En^3 05/16/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	66.36	134.10	116	52	39	299	0.83 a	
2	74.81	151.00	13	32	26	165	0.42 a	NET< CL
3	84.80	170.96	30	42	34	228	0.75 a	NET< CL
4	92.63	186.60	127	51	38	268	0.92 a	
5	139.97	281.17	94	38	27	165	0.62 a	
6	143.88	289.00	31	35	27	165	0.66 b	
7	174.78	350.72	39	35	27	164	0.70 a	
8	185.72	372.59	84	33	22	123	0.50 a	
9	198.23	397.58	140	52	38	247	1.09 a	
10	233.03	467.10	22	32	25	142	0.58 a	NET< CL
11	238.53	478.09	90	40	29	173	0.87 a	
12	278.67	558.28	27	33	26	132	0.76 a	
13	295.00	590.91	40	36	28	153	0.90 a	
14	351.88	704.54	77	36	26	132	1.11 a	
15	511.00	1022.42	420	66	42	240	2.27 a	Wide Pk
16	558.50	1117.31	106	35	24	103	1.25 a	
17	595.75	1191.72	36	31	24	122	1.07 a	
18	609.51	1219.20	74	37	27	132	1.61 a	
19	803.03	1605.79	42	31	23	95	1.80 a	
20	911.21	1821.88	26	18	13	39	0.97 a	
21	1461.30	2920.65	50	24	16	41	2.55 a	

062554D02.SPC Analyzed by

SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Vers. 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Background File:. . . . . DET021103.BKG (061103-2 WEEKLY BKG)

Bkg.File Detector #: 2

BACKGROUND SUBTRACT RESULTS

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
1	66.36	116	52	39	28	72	59	NET<CL
2	74.81	13	32	26	-94	103	87	NET<CL
4	92.63	127	51	38	-1	72	60	NET<CL
5	139.97	94	38	27	59	48	37	
8	185.72	84	33	22	-18	69	57	NET<CL
9	198.23	140	52	38	81	72	57	
11	238.53	90	40	29	9	66	54	NET<CL
13	295.00	40	36	28	7	46	38	NET<CL
14	351.88	77	36	26	13	53	43	NET<CL
15	511.00	420	66	42	-81	99	82	NET<CL
16	558.50	106	35	24	54	48	38	
18	609.51	74	37	27	21	53	43	NET<CL
19	803.03	42	31	23	2	42	35	NET<CL
20	911.21	26	18	13	1	30	25	NET<CL
21	1461.30	50	24	16	-3	34	28	NET<CL

062554D02.SPC Analyzed by

SEEKER F I N A L A C T I V I T Y R E P O R T Version 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Geo 1 / Water

Sample ID: 0610164-2 GS061025-4

Sampling Start:	10/16/2006 12:00:00	Counting Start:	11/05/2006 09:27:05
Sampling Stop:	10/16/2006 12:00:00	Decay Time.	4.77e+002 Hrs
Buildup Time.	0.00e+000 Hrs	Live Time	18000 Sec
Sample Size	9.90e-001 L	Real Time	18007 Sec
Collection Efficiency	1.0000	Spectrum File	.062554D02.SPC
Cr. Level Confidence Interval:	95 %	Det. Limit Confidence Interval:	95 %

Detector #: 2 (Detector 2)

Efficiency File: (D02)(Sh01).EFF (Geo 1 Eff Cal)
Eff.=1/[3.02E-03*En^-3.85E+00 + 1.33E+02*En^7.85E-01] 05/18/2006

Library File: . . . . . .FANP.LIB (FANP (Fiss. Act. and Nat. Products))

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	N E T	Concentration (pCi/L)	MDA	Critical Level	Halflife (hrs)
Th-234	92.50	N	-1.68E+00 +- 9.77E+01	1.64E+02	8.04E+01	3.92E+13
U-235	143.76		1.47E+01 +- 1.66E+01	2.71E+01	1.29E+01	6.17E+12
Sb-125	Average:x		5.27E+00 +- 1.07E+01	. . . .	. . . .	2.43E+04
	176.29		3.22E+01 +- 2.90E+01	4.68E+01	2.23E+01	2.43E+04
	427.95	N	1.05E+00 +- 1.15E+01	1.97E+01	9.38E+00	2.43E+04
Pb-212	238.63	N	1.39E+00 +- 1.03E+01	1.73E+01	8.45E+00	1.67E+04
Tl-208	Average:x		-9.67E-01 +- 7.15E+00	. . . .	. . . .	1.67E+04
	277.36		3.25E+01 +- 3.92E+01	6.46E+01	3.07E+01	1.67E+04
	583.14	N	-2.12E+00 +- 7.27E+00	1.25E+01	6.05E+00	1.67E+04
Pb-214	351.99	N	3.10E+00 +- 1.26E+01	2.12E+01	1.03E+01	1.40E+07
Bi-214	609.32	N	6.23E+00 +- 1.58E+01	2.65E+01	1.28E+01	1.40E+07
Ac-228	911.07	N	5.92E-01 +- 2.18E+01	3.78E+01	1.79E+01	5.04E+04
K-40	1460.75	N	-8.57E+00 +- 8.47E+01	1.47E+02	7.01E+01	1.12E+13
Am-241	59.54	N	1.64E+01 +- 2.97E+01	4.95E+01	2.38E+01	3.80E+06
Eu-155	105.31	N	3.85E+00 +- 1.13E+01	1.91E+01	9.14E+00	4.35E+04
Co-57	122.07	N	-7.25E-01 +- 2.94E+00	5.06E+00	2.44E+00	6.48E+03
Ce-144	133.53	N	-6.40E+00 +- 2.17E+01	3.76E+01	1.81E+01	6.82E+03
Ce-139	165.85	N	-8.55E-01 +- 4.87E+00	8.25E+00	4.03E+00	3.30E+03
Th-227	236.00	N	-7.52E+00 +- 2.20E+01	3.82E+01B	1.84E+01	1.90E+05
Cr-51	320.07	N	-2.56E+01 +- 4.72E+01	8.37E+01	4.00E+01	6.65E+02
I-131	364.48	N	0.00E+00 +- 2.21E+01	3.81E+01	1.82E+01	1.93E+02
Be-7	477.56	N	2.08E+01 +- 4.17E+01	7.00E+01	3.31E+01	1.28E+03
Sb-124	602.71	N	-8.98E+00 +- 6.28E+00	1.16E+01B	5.56E+00	1.44E+03
Cs-134	604.66	N	-7.74E+00 +- 4.84E+00	9.06E+00B	4.34E+00	1.81E+04
Ru-106	621.84	N	-7.34E+00 +- 4.52E+01	7.91E+01	3.76E+01	8.84E+03

062554D02.SPC Analyzed by

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	NET	Concentration (pCi/L)		MDA	Critical Level	Halflife (hrs)
Ag-110M	657.75	N	-3.78E+00	+- 4.78E+00	8.72E+00	4.14E+00	6.00E+03
Cs-137	661.62	N	4.28E+00	+- 5.02E+00	8.23E+00	3.88E+00	2.64E+05
Nb-94	702.50	N	-1.87E+00	+- 4.91E+00	8.69E+00	4.13E+00	1.78E+08
Bi-212	727.17	N	5.83E+01	+- 6.19E+01	1.01E+02	4.70E+01	1.67E+04
Nb-95	765.82	N	1.70E+00	+- 5.50E+00	9.39E+00	4.42E+00	1.54E+03
Co-58	810.75	N	-2.94E+00	+- 5.85E+00	1.05E+01	4.98E+00	1.70E+03
Mn-54	834.81	N	-8.68E-01	+- 5.04E+00	8.89E+00	4.20E+00	7.49E+03
Sc-46	889.26	N	4.33E-01	+- 5.41E+00	9.43E+00	4.42E+00	2.01E+03
Pa-234m	1001.03	N	-4.10E+02	+- 8.38E+02	1.53E+03	7.16E+02	3.92E+13
Eu-154	1004.80	N	1.16E+01	+- 2.66E+01	4.51E+01	2.10E+01	7.45E+04
Fe-59	1099.22	N	1.57E+00	+- 1.23E+01	2.14E+01	9.99E+00	1.08E+03
Zn-65	1115.52	N	-1.00E+01	+- 1.07E+01	2.02E+01	9.49E+00	5.85E+03
Co-56	1238.28	N	7.23E+00	+- 1.04E+01	1.72E+01	8.02E+00	1.86E+03
Na-22	1274.54	N	-7.05E+00	+- 5.49E+00	1.07E+01	5.01E+00	2.28E+04
Co-60	1332.51	N	5.08E-01	+- 5.70E+00	9.99E+00	4.65E+00	4.62E+04
Eu-152	1408.08	N	-3.77E+00	+- 2.63E+01	4.72E+01	2.19E+01	1.17E+05
Al-26	1808.65	N	3.43E+00	+- 5.61E+00	9.43E+00	4.28E+00	6.31E+09

MEASURED TOTAL: 1.61E+02 +- 3.09E+02 pCi/L

UNKNOWN, SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	66.36	134.10	28	72	59	299	0.83	Deleted
2	74.81	151.00	-94	103	87	165	0.42	Deleted
3	84.80	170.96	30	42	34	228	0.75	Deleted
5	139.97	281.17	59	48	37	165	0.62	Unknown
8	185.72	372.59	-18	69	57	123	0.50	Deleted
9	198.23	397.58	81	72	57	247	1.09	Unknown
10	233.03	467.10	22	32	25	142	0.58	Deleted
13	295.00	590.91	7	46	38	153	0.90	Deleted
15	511.00	1022.42	-81	99	82	240	2.27	Deleted
16	558.50	1117.31	54	48	38	103	1.25	Unknown
17	595.75	1191.72	36	31	24	122	1.07	Unknown
19	803.03	1605.79	2	42	35	95	1.80	Deleted

c:\SEEKER\BIN\062554d02.res Analysis Results Saved.

062634D06.SPC Analyzed by

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

Geo 1 / Water

Sample ID: GS061025-4MB GS061025-4

Sampling Start:	11/02/2006 22:00:00	Counting Start:	11/02/2006 22:36:31
Sampling Stop:	11/02/2006 22:00:00	Decay Time.	6.09E-001 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	24000 Sec
Sample Size	1.00E+000 L	Real Time	24010 Sec
Collection Efficiency	1.0000	Spc. File	.062634D06.SPC

Detector #: 6 (Detector 6)

Energy(keV)= -0.65 + 0.501*Ch +-2.97E-08*Ch^2 + 0.00E+00*Ch^3 11/02/2006
FWHM(keV) = 1.19 + -0.002*En + 7.29E-04*En^2 + 0.00E+00*En^3 07/24/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)		FLAG
1	66.38	133.81	162	63	47	471	0.94	a	
2	139.89	280.55	113	55	42	364	0.95	a	
3	159.00	318.70	29	41	32	256	0.64	a	NET< CL
4	185.92	372.45	53	39	30	220	0.65	a	
5	198.44	397.44	191	54	38	310	0.95	a	
6	237.62	475.64	31	84	68	657	2.15	a	NET< CL Wide Pk
7	352.05	704.08	90	44	32	207	1.09	a	
8	500.25	999.94	49	39	30	176	1.49	a	
9	511.23	1021.88	570	76	48	320	2.77	a	Wide Pk
10	558.39	1116.02	155	39	25	129	1.31	a	
11	596.05	1191.22	99	33	22	112	0.91	a	
12	609.20	1217.47	78	34	24	125	1.16	a	
13	803.10	1604.59	25	29	23	96	1.68	a	
14	1460.95	2918.12	142	31	16	46	2.02	a	
15	1763.65	3522.60	21	16	11	25	1.66	a	

062634D06.SPC Analyzed by

SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Vers. 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Background File:. . . . . DET061027.BKG (061027-6 WEEKLY BKG)

Bkg.File Detector #: 6

BACKGROUND SUBTRACT RESULTS

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
1	66.38	162	63	47	112	86	69	
2	139.89	113	55	42	53	80	65	NET<CL
4	185.92	53	39	30	14	59	48	NET<CL
5	198.44	191	54	38	118	80	63	
6	237.62	31	84	68	-12	100	82	NET<CL
7	352.05	90	44	32	36	66	54	NET<CL
9	511.23	570	76	48	74	117	95	NET<CL
10	558.39	155	39	25	105	55	42	
11	596.05	99	33	22	68	57	45	
12	609.20	78	34	24	30	59	48	NET<CL
13	803.10	25	29	23	-21	44	37	NET<CL
14	1460.95	142	31	16	12	47	38	NET<CL
15	1763.65	21	16	11	2	30	25	NET<CL

062634D06.SPC Analyzed by

SEEKER F I N A L A C T I V I T Y R E P O R T Version 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Geo 1 / Water

Sample ID: GS061025-4MB GS061025-4

Sampling Start: 11/02/2006 22:00:00	Counting Start: 11/02/2006 22:36:31
Sampling Stop: 11/02/2006 22:00:00	Decay Time. . . . . 6.09e-001 Hrs
Buildup Time. . . . . 0.00e+000 Hrs	Live Time . . . . . 24000 Sec
Sample Size . . . . . 1.00e+000 L	Real Time . . . . . 24010 Sec
Collection Efficiency 1.0000	Spectrum File 062634D06.SPC
Cr. Level Confidence Interval: 95 %	Det. Limit Confidence Interval: 95 %

Detector #: 6 (Detector 6)

Efficiency File: (D06)(Sh01).EFF (Geo 1 Eff Cal)
Eff=10^[-2.87E+01 +2.52E+01*L +-5.85E+00*L^2 +0.00E+00*L^3] 09/11/2006
Eff.=10^[-1.40E+00 +1.00E+00*L +-6.55E-01*L^2 +7.72E-02*L^3] Above 180.00 keV

Library File: . . . . . .FANP.LIB (FANP (Fiss. Act. and Nat. Products))

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	N E T	Concentration (pCi/L)	MDA	Critical Level	Halflife (hrs)
Pb-214	351.99	N	7.06E+00 +- 1.31E+01	2.18E+01	1.06E+01	1.40E+07
Bi-214	609.32	N	7.51E+00 +- 1.50E+01	2.50E+01	1.22E+01	1.40E+07
K-40	1460.75	N	2.60E+01 +- 1.04E+02	1.76E+02	8.50E+01	1.12E+13
Am-241	59.54	N	-1.22E+01 +- 5.02E+01	8.55E+01	4.16E+01	3.80E+06
Th-234	92.50	N	-1.58E+01 +- 1.11E+02	1.87E+02	9.18E+01	3.92E+13
Eu-155	105.31	N	2.39E+01 +- 1.60E+01	2.58E+01	1.25E+01	4.35E+04
Co-57	122.07	N	-1.75E+00 +- 3.44E+00	5.90E+00	2.88E+00	6.48E+03
Ce-144	133.53	N	-1.25E+01 +- 2.46E+01	4.23E+01	2.06E+01	6.82E+03
U-235	143.76	N	-1.49E+01 +- 2.53E+01	4.35E+01b	2.12E+01	6.17E+12
Ce-139	165.85	N	-4.07E-01 +- 3.63E+00	6.14E+00	2.99E+00	3.30E+03
Th-227	236.00	N	-1.56E+01 +- 2.51E+01	4.34E+01	2.11E+01	1.90E+05
Pb-212	238.63	N	2.11E+00 +- 7.30E+00	1.22E+01	5.94E+00	1.67E+04
Cr-51	320.07	N	8.89E+00 +- 3.18E+01	5.36E+01	2.59E+01	6.65E+02
I-131	364.48	N	-9.18E-01 +- 4.60E+00	7.89E+00	3.82E+00	1.93E+02
Sb-125	427.95	N	-4.34E-01 +- 1.20E+01	2.05E+01	9.87E+00	2.43E+04
Be-7	477.56	N	-5.40E+01 +- 3.59E+01	6.58E+01	3.17E+01	1.28E+03
Tl-208	583.14	N	-3.86E+00 +- 6.58E+00	1.14E+01	5.54E+00	1.67E+04
Sb-124	602.71	N	-1.25E+01 +- 5.22E+00	9.79E+00B	4.74E+00	1.44E+03
Cs-134	604.66	N	-3.21E+00 +- 4.65E+00	8.23E+00B	3.96E+00	1.81E+04
Ru-106	621.84	N	-7.28E+00 +- 4.49E+01	7.77E+01	3.72E+01	8.84E+03
Ag-110M	657.75	N	2.68E+00 +- 4.52E+00	7.53E+00	3.58E+00	6.00E+03
Cs-137	661.62	N	-3.83E+00 +- 4.93E+00	8.88E+00	4.24E+00	2.64E+05
Nb-94	702.50	N	-2.70E+00 +- 4.78E+00	8.47E+00	4.05E+00	1.78E+08
Bi-212	727.17	N	4.75E+01 +- 6.62E+01	1.10E+02	5.20E+01	1.67E+04

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062634D06.SPC Analyzed by

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	NET	Concentration (pCi/L)		MDA	Critical Level	Halflife (hrs)
Nb-95	765.82	N	2.28E+00	+- 4.35E+00	7.30E+00	3.46E+00	1.54E+03
Co-58	810.75	N	1.46E+00	+- 4.50E+00	7.64E+00	3.62E+00	1.70E+03
Mn-54	834.81	N	-1.24E+00	+- 4.82E+00	8.47E+00	4.03E+00	7.49E+03
Sc-46	889.26	N	-1.45E-01	+- 4.62E+00	8.05E+00	3.81E+00	2.01E+03
Ac-228	911.07	N	-9.96E+00	+- 2.96E+01	5.11E+01	2.47E+01	5.04E+04
Pa-234m	1001.03	N	-1.79E+02	+- 7.74E+02	1.38E+03	6.48E+02	3.92E+13
Eu-154	1004.80	N	-1.55E+01	+- 2.52E+01	4.62E+01	2.17E+01	7.45E+04
Fe-59	1099.22	N	1.03E+01	+- 8.43E+00	1.33E+01	6.21E+00	1.08E+03
Zn-65	1115.52	N	-3.09E+00	+- 9.94E+00	1.78E+01	8.37E+00	5.85E+03
Co-56	1238.28	N	1.58E+00	+- 7.49E+00	1.30E+01	6.05E+00	1.86E+03
Na-22	1274.54	N	2.69E+00	+- 4.61E+00	7.74E+00	3.58E+00	2.28E+04
Co-60	1332.51	N	5.79E+00	+- 5.45E+00	8.75E+00	4.07E+00	4.62E+04
Eu-152	1408.08	N	1.03E+00	+- 2.38E+01	4.21E+01	1.95E+01	1.17E+05
Al-26	1808.65	N	1.60E+00	+- 5.52E+00	9.59E+00	4.40E+00	6.31E+09

MEASURED TOTAL: 1.52E+02 +- 3.23E+02 pCi/L

UNKNOWN, SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	66.38	133.81	112	86	69	471	0.94	Unknown
2	139.89	280.55	53	80	65	364	0.95	Deleted
3	159.00	318.70	29	41	32	256	0.64	Deleted
4	185.92	372.45	14	59	48	220	0.65	Deleted
5	198.44	397.44	118	80	63	310	0.95	Unknown
6	237.62	475.64	-12	100	82	657	2.15	Deleted
8	500.25	999.94	49	39	30	176	1.49	Unknown
9	511.23	1021.88	74	117	95	320	2.77	Deleted
10	558.39	1116.02	105	55	42	129	1.31	Unknown
11	596.05	1191.22	68	57	45	112	0.91	Unknown
13	803.10	1604.59	-21	44	37	96	1.68	Deleted
15	1763.65	3522.60	2	30	25	25	1.66	Deleted

c:\SEEKER\BIN\062634d06.res Analysis Results Saved.

062727D06.SPC Analyzed by

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SEEKER C A L I B R A T I O N R E S U L T S Version 2.0.4

****

Sample ID: DAILY CHECK

Stds. Match Tolerance: 2.00 keV

Detector Number: 06 Calibration Date. . . 11/16/2006 12:59:26

Energy(keV) = -0.69 + 0.501*Ch +-9.15e-09*Ch^2 + 0.00e+00*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	120.21	59.50	59.50	0.00
2	1322.80	661.64	661.64	-0.00
3	2344.58	1173.22	1173.21	0.00
4	2662.65	1332.47	1332.48	-0.00

Calibration Results Saved.

062543D02.SPC Analyzed by

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

Geo 1 / Water

Sample ID: GS061025-4LCS GS061025-4

Sampling Start:	11/03/2006 07:00:00	Counting Start:	11/03/2006 07:20:43
Sampling Stop:	11/03/2006 07:00:00	Decay Time.	3.45E-001 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	1800 Sec
Sample Size	1.00E+000 L	Real Time	1825 Sec
Collection Efficiency	1.0000	Spc. File	.062543D02.SPC

Detector #: 2 (Detector 2)

Energy(keV)= -0.77 + 0.500*Ch + 4.01E-08*Ch^2 + 0.00E+00*Ch^3 11/03/2006
FWHM(keV) = 0.69 + 0.006*En + 1.18E-03*En^2 + 0.00E+00*En^3 05/16/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	50.98	103.45	210	196	159	4320	1.18 a	
2	58.37	118.21	713	286	231	6570	1.91 a	Wide Pk
3	59.55	120.56	13622	268	108	2329	0.85 b	
4	70.41	142.26	96	100	81	1453	0.73 a	
5	87.98	177.38	10504	233	91	1659	0.87 a	
6	98.92	199.25	48	70	56	780	0.44 a	NET< CL
7	99.47	200.36	21	84	68	1039	0.61 b	NET< CL
8	103.05	207.52	87	71	56	780	0.53 c	
9	122.08	245.53	2326	138	82	1343	0.86 a	
10	136.61	274.58	346	131	103	1827	1.17 a	
11	166.07	333.46	142	99	79	1261	0.86 a	
12	186.81	374.92	74	118	96	1690	0.90 a	NET< CL
13	317.55	636.20	32	88	72	1099	0.93 a	NET< CL
14	353.32	707.68	40	65	52	670	0.61 a	NET< CL
15	476.30	953.46	81	62	49	583	0.69 a	
16	511.10	1023.01	61	104	84	1170	1.58 a	NET< CL
17	630.53	1261.68	41	57	46	481	1.05 a	NET< CL
18	644.13	1288.86	49	60	48	524	1.04 a	
19	661.74	1324.03	22572	312	68	852	1.63 a	
20	1173.40	2346.41	18534	280	54	501	2.33 a	
21	1332.64	2664.55	16729	261	26	109	2.52 a	HiResid

062543D02.SPC Analyzed by

SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Vers. 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Background File:. . . . . DET021027.BKG (061027-2 WEEKLY BKG)

Bkg.File Detector #: 2

BACKGROUND SUBTRACT RESULTS

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
5	87.98	10504	233	91	10504	233	91	
12	186.81	74	118	96	67	118	96	NET<CL
14	353.32	40	65	52	34	65	52	NET<CL
16	511.10	61	104	84	11	104	85	NET<CL

062543D02.SPC Analyzed by

SEEKER F I N A L A C T I V I T Y R E P O R T Version 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Geo 1 / Water

Sample ID: GS061025-4LCS GS061025-4

Sampling Start:	11/03/2006 07:00:00	Counting Start:	11/03/2006 07:20:43
Sampling Stop:	11/03/2006 07:00:00	Decay Time.	3.45e-001 Hrs
Buildup Time.	0.00e+000 Hrs	Live Time	1800 Sec
Sample Size	1.00e+000 L	Real Time	1825 Sec
Collection Efficiency	1.0000	Spectrum File	.062543D02.SPC
Cr. Level Confidence Interval:	95 %	Det. Limit Confidence Interval:	95 %

Detector #: 2 (Detector 2)

Efficiency File: (D02)(Sh01).EFF (Geo 1 Eff Cal)
Eff.=1/[3.02E-03*En^-3.85E+00 + 1.33E+02*En^7.85E-01] 05/18/2006

Library File: . . . .ANALYTICAL.LIB (Analytical)

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	NET	Concentration (pCi/L)	MDA	Critical Level	Halflife (hrs)
Am-241	59.54		9.74E+04 +- 1.91E+03	1.56E+03	7.69E+02	3.79E+06
Cd-109	88.02		2.38E+05 +- 5.27E+03	4.17E+03	2.06E+03	1.11E+04
Co-57	122.07		1.44E+03 +- 8.58E+01	1.03E+02	5.06E+01	6.50E+03
Ce-139	165.85		9.42E+01 +- 6.56E+01	1.06E+02	5.24E+01	3.30E+03
Cs-137	661.62		3.82E+04 +- 5.27E+02	2.34E+02	1.15E+02	2.64E+05
Co-60	Average:x		4.18E+04 +- 4.54E+02	. . . .	. . . .	4.62E+04
	1173.21		4.19E+04 +- 6.33E+02	2.51E+02	1.22E+02	4.62E+04
	1332.48		4.18E+04 +- 6.51E+02	1.35E+02	6.43E+01	4.62E+04
Hg-203	279.18		MDA	1.71E+02	8.40E+01	1.12E+03
Sn-113	391.68		MDA	2.51E+02	1.24E+02	2.76E+03
Y-88	898.02		MDA	3.31E+02	1.63E+02	2.56E+03

MEASURED TOTAL: 4.17E+05 +- 8.32E+03 pCi/L

UNKNOWN,SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	50.98	103.45	210	196	159	4320	1.18	Unknown
2	58.37	118.21	713	286	231	6570	1.91	Unknown
4	70.41	142.26	96	100	81	1453	0.73	Unknown
6	98.92	199.25	48	70	56	780	0.44	Deleted
7	99.47	200.36	21	84	68	1039	0.61	Deleted

062543D02.SPC Analyzed by

UNKNOWN,SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
8	103.05	207.52	87	71	56	780	0.53	Unknown
10	136.61	274.58	346	131	104	1827	1.17	Unknown
12	186.81	374.92	67	118	96	1690	0.90	Deleted
13	317.55	636.20	32	88	72	1099	0.93	Deleted
14	353.32	707.68	34	65	52	670	0.61	Deleted
15	476.30	953.46	81	62	49	583	0.69	Unknown
16	511.10	1023.01	11	104	85	1170	1.58	Deleted
17	630.53	1261.68	41	57	46	481	1.05	Deleted
18	644.13	1288.86	49	60	48	524	1.04	Unknown

c:\SEEKER\BIN\062543d02.res Analysis Results Saved.

Gamma Spectrometer Run Log

Date: 11/2/06

Reviewed By/Date: JP 11/3/06

Sample ID	Ver[1]	Det. No.	Geo[2]	Count Dur. (min.)[3]	Start Time	Analyst	File ID/Comments	Saved?
0610189-1	JP	2	13	30	8:11	JP	062535D02.SPC	JP
↓ -2	JP	9	↓	↓	↓	↓	061306D09.SPC	JP
0610197-2	JP	6	13	↓	8:33	JP	062627D06.SPC	JP
0610189-3	JP	2	13	30	9:07	JP	062536D02.SPC	JP
↓ -1D	JP	9	↓	↓	↓	↓	061307D09.SPC	JP
0610197-3	JP	6	↓	↓	↓	↓	062628D06.SPC	JP
0613011-8(799)	JP	8	18	30	9:24	JP	063124D08.SPC	JP
0610189-4	JP	2	13	30	9:45	JP	062537D02.SPC	JP
GS061027-2MB	JP	9	↓	↓	↓	↓	061308D09.SPC	JP
GS061027-1MB	JP	6	↓	↓	↓	↓	062629D06.SPC	JP
0610074-1	JP	8	1	210	9:57	JP	063126D08.SPC	JP
0610197-2D	JP	9	13	30	10:35	JP	061309D09.SPC	JP
GS061027-2LCS	JP	2	↓	30	↓	↓	062538D02.SPC	JP
GS061027-1LCS	JP	6	13	30	11:06	JP	062630D06.SPC	JP
0610161-1	JP	9	1	330	11:09	JP	061310D09.SPC	JP
↓ -4	JP	2	↓	↓	↓	↓	062539D02.SPC	JP
↓ -6	JP	6	1	315	11:37	JP	062632D06.SPC	JP
0610161-9	JP	8	1	200	13:34	JP	063127D08.SPC	JP
↓ -1D	JP	2	1	315	~~4:55~~ 16:57	JP	062540D02.SPC	JP JP 11/2/06
0610179-1	JP	9	↓	330	↓	↓	061311D09.SPC	JP
↓ -2	JP	8	↓	300	↓	↓	063128D08.SPC	JP
↓ -4	JP	6	1	315	17:05	JP	062633D06.SPC	JP
0610179-3	JP	9	1	400	22:36	JP	061312D09.SPC	JP
GS061025-4MB	JP	6	↓	↓	↓	↓	062634D06.SPC	JP

1 Analyst will verify the position, detector, and geometry when the sample is removed from the detector.

2 Calibration geometry.

3 Count duration.

KEY: * sample was counted on a puck
↑ sample was counted with air flow arrow pointing up
↓ sample was counted with air flow arrow pointing down

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Gamma Spectrometer Run Log

Date: 11/3/06

Reviewed By/Date: JP 11/4/06

Sample ID	Ver[1]	Det. No.	Geo[2]	Count Dur. (min.)[3]	Start Time	Analyst	File ID/Comments	Saved?
GS061025-4LCS	JP	2	1	30	7:21	JP	062543D02SPC	JP
0610179-1D	JP	8	1	180	7:28	JP	063132D08.SPC	JP
0610141-1	"	9	1	300	7:46	JP	061315D09.SPC	"
0611025-1	SI	2	7*	60	10:23	JP	062544D02.SPC	SI
↓ -9	SI	6	↓		↓	↓	062636D06.SPC	SI
0611025-17	SL	8	7*		10:33	JP	063134D08.SPC 063133D08.SPC	SI
0611025-9D	"	2	7*		12:09	SI	062545D02.SPC	"
0611025-26		6	7*		12:11	SL	062637D06.SPC	"
0611025-27	↓	8			12:11	SI	063135D08.SPC	"
0611025-28	"	2	↓		1322	"	062547D02.SPC	SL
~~0611025-30~~		~~6~~ 8	6/11/06				~~062636D06.SPC~~ 062636D06.SPC	SL
~~0611025-31~~		~~8~~			↓	↓	063136D08.SPC	SI
GS061103-1MB	SL	6	7*	↓	~~14:54~~ ~~14:58~~	SL	062640D06.SPC	SI
GS061103-1LCS	SL	8	↓	30	1548 ~~14:55~~	"	063141D08.SPC	" 11/3/06
~~0611025-29~~		6	↓	~~300~~	6/11/06			
0611025.29	SI	2	7*	60	1452	SL	062548D02.SPC	SL
↓ .30	"	6	7*	60	1322	"	062638D06.SPC	"
↓ .31	↓	8	↓	↓	↓	↓	063138D08.SPC	"
061103.2	JP	2	NA	1000	1704	"	062549D02.SPC	JP
↓ .6	JP	6	↓	↓	↓	↓	062641D06.SPC	JP
↓ .8	JP	8	↓	↓	↓	↓	063142D08.SPC	JP
↓ .9	JP	9	↓	↓	↓	↓	061316D09.SPC	JP
								JP 11/4/06

1 Analyst will verify the position, detector, and geometry when the sample is removed from the detector.

2 Calibration geometry.

3 Count duration.

KEY: * sample was counted on a puck
↑ sample was counted with air flow arrow pointing up
↓ sample was counted with air flow arrow pointing down

318721 B

Paragon Analytics

Gamma Spectrometer Run Log

Date: 11/5/06 Reviewed By/Date: 11/7/06

Sample ID	Ver[1]	Det. No.	Geo[2]	Count Dur. (min.)[3]	Start Time	Analyst	File ID/Comments	Saved?
0610164-1	MC	8	1	300	9:27	JP	063147D08.SPC	MC
↓ -2	↓	2	↓	↓	↓	↓	062554D07.SPC	↓
GS061019-1MB	MC	6	1	335	↓	↓	062648D06.SPC	MC
0610045-4	MC	9	↓	335°	9:45	JP	061322D09.SPC	MC MC 11/5/06
0608143-17	"	6	1	1000	16:07	MC	062649D06.SPC	"
↓ -18	↓	8	↓	↓	↓	↓	063148D08.SPC	"
GS061024-1MB (2nd)		9					061323D09.SPC	"
0613011-2	↓	2	18	1000	↓	MC	062555D02.SPC	"

MC 11/5/06

1 Analyst will verify the position, detector, and geometry when the sample is removed from the detector.

2 Calibration geometry.

3 Count duration. OCT. TIME = 330 MIN.

KEY: * sample was counted on a puck
↑ sample was counted with air flow arrow pointing up
↓ sample was counted with air flow arrow pointing down

318723 B

MC 11/5/06

Technical Comments Regarding Analysis using the FANP Gamma Spectroscopic Library

Analysis using the **FANP** (Fission, Activation, and Natural Products) library is limited to the list of gamma emitting radionuclides specified by Paragon Analytics. Paragon Analytics specifies all values assigned to the nuclides in this library. In cases where multiple gamma emissions are used to quantify activity, the most abundant emission is used for quantification in the absence of any supporting gamma emissions. It should be noted that the current software program used for gamma spectroscopic analysis is limited to a +/- 2.0 keV photo-peak resolution tolerance. Thus, any gamma emissions occurring within the same +/- 2.0 keV range will suffer interference, consequently preventing accurate quantification. Nuclide specific information regarding analysis using the FANP library is as follows:

Nuclide: ^{228}Ac Energy: various Photon Abundance: various

All activity values for ^{228}Ac are calculated using the half-life, $t_{1/2}$=5.75 years, of the long-lived ^{228}Ra parent. It is assumed that secular equilibrium is achieved between the ^{228}Ra parent and the ^{228}Ac progeny.

Nuclide: ^{212}Bi, ^{212}Pb, ^{208}Tl Energy: various Photon Abundance: various

All activity values for ^{212}Bi, ^{212}Pb, and ^{208}Tl are calculated using the half-life, $t_{1/2}$=1.91 years, of the long-lived ^{228}Th parent. It is assumed that secular equilibrium is achieved between the ^{228}Th parent and the ^{212}Bi, ^{212}Pb, ^{208}Tl progeny.

Nuclide: ^{214}Bi, ^{214}Pb Energy: various Photon Abundance: various

All activity values for ^{214}Bi and ^{214}Pb are calculated using the half-life, $t_{1/2}$=1600 years, of the long-lived ^{226}Ra parent. It is assumed that secular equilibrium is achieved between the ^{226}Ra parent and the ^{214}Bi and ^{214}Pb progeny.

Nuclide: ^{56}Co Energy: 1175.13 keV Photon Abundance: 0.0228

This emission for this nuclide suffers from possible resolution interference due to the ^{60}Co gamma emission occurring at 1173.23 keV (0.9997, abundance). Therefore, this emission will be used as an identifier only and not in the activity calculations for this nuclide.

Nuclides: ^{57}Co Energy: 122.07 Photon Abundance: 0.8560

The most abundant gamma emission specified for quantification of this nuclide suffers from possible resolution interference due to the ^{152}Eu gamma emission occurring at 121.78 keV (0.2050, abundance). Therefore, a possibility of a high bias to the ^{57}Co results may occur in the presence of elevated ^{152}Eu activity.

Nuclide: ^{134}Cs Energy: 604.66 Photon Abundance: 0.9762

The most abundant gamma emission specified for quantification of this nuclide suffers from possible resolution interference due to the ^{124}Sb gamma emission occurring at 602.71 keV (0.9826, abundance). Therefore, a possibility of a high bias to the ^{134}Cs results may occur in the presence of elevated ^{124}Sb activity.

Other gamma emissions used for quantification of this nuclide suffer from possible resolution interference due to multiple gamma emissions of ^{228}Ac. Therefore, a possible high bias to the ^{134}Cs activity results may occur in the presence of elevated ^{228}Ac activity.

Nuclide: ^{137}Cs Energy: 661.62 keV Photon Abundance: 0.8512

Cesium-137 does not emit any gamma photons useful for quantification. However, it can be assumed to be in secular equilibrium with the short-lived ^{137m}Ba daughter product. Therefore, the activity for ^{137}Cs is determined from the 661.62 keV gamma emission of the ^{137m}Ba daughter product. The calculated gamma photon abundance used in the library is the product of the 0.8998 abundance of the 661.62 keV ^{137m}Ba photon and the 0.946 branching ratio between ^{137}Ba and ^{137m}Ba.

Nuclide: ^{155}Eu Energy: 105.31 Photon Abundance: 0.2120

The only gamma emission useful for quantification of this nuclide suffers from possible resolution interference due to the ^{235}U gamma emission occurring at 105 keV (0.0210, abundance). Therefore, a possibility of a high bias to the ^{155}Eu results may occur in the presence of elevated ^{235}U activity.

Nuclide: ^{40}K Energy: 1460.75 Photon Abundance: 0.1100

The only gamma emission useful for quantification of this nuclide suffers from possible resolution interference due to the ^{228}Ac gamma emission occurring at 1459.2 keV (0.0104, abundance). Therefore, a possibility of a high bias to the ^{40}K results may occur in the presence of elevated ^{228}Ac activity.

Nuclide: ^{54}Mn Energy: 834.81 Photon Abundance: 0.9997

The only gamma emission useful for quantification of this nuclide suffers from possible resolution interference due to the ^{228}Ac gamma emission occurring at 835.6 keV (0.0182, abundance). Therefore, a possibility of a high bias to the ^{54}Mn results may occur in the presence of elevated ^{228}Ac activity.

Nuclide: ^{95}Nb Energy: 765.82 Photon Abundance: 0.9999

All activity values for ^{95}Nb are calculated using the half-life, $t_{1/2}$=64.02 days, of the ^{95}Zr parent. It is assumed that a transient equilibrium is achieved between the ^{95}Zr parent and the ^{95}Nb progeny.

The only gamma emission useful for quantification of this nuclide suffers from possible resolution interference due to the ^{234m}Pa gamma emission occurring at 766.6 keV (0.0020, abundance). Therefore, a possibility of a high bias to the ^{95}Nb results may occur in the presence of elevated ^{234m}Pa activity.

Nuclide: ^{234m}Pa Energy: 1001.03 Photon Abundance: 0.0059

All activity values for ^{234m}Pa are calculated using the half-life, $t_{1/2}$=4.468E+09 yrs, of the long-lived ^{238}U parent. It is assumed that secular equilibrium is achieved between the ^{238}U parent and the ^{234m}Pa progeny.

Nuclide: ^{106}Ru Energy: various Photon Abundance: various

Ru-106 does not emit any gamma photons. Therefore, all activity values for ^{106}Ru are calculated using the gamma emissions of the short-lived ^{106}Rh daughter. The half-life, $t_{1/2}$=368.2 days, of the ^{106}Ru parent is used in the activity calculations. It is assumed that a secular equilibrium is achieved between the ^{106}Ru parent and the ^{106}Rh progeny.

Nuclide: ^{124}Sb Energy: 602.71 Photon Abundance: 0.9826

The most abundant gamma emission specified for quantification of this nuclide suffers from possible resolution interference due to the ^{134}Cs gamma emission occurring at 604.66 keV (0.9762, abundance). Therefore, a possibility of a high bias to the ^{124}Sb results may occur in the presence of elevated ^{134}Cs activity.

Nuclide: ^{125}Sb Energy: 600.77 Photon Abundance: 0.1786

The gamma emission specified for quantification of this nuclide that occurs at 600.77 keV suffers from possible resolution interference due to the ^{124}Sb gamma emission occurring at 602.71 keV (0.9826, abundance). Therefore, this photo-peak will be used as an identifier only and not in the activity calculations for this nuclide.

Nuclide: ^{227}Th Energy: 236.00 Photon Abundance: 0.1230

All activity values for ^{227}Th are calculated using the half-life, $t_{1/2}$=21.7 yrs, of the long-lived ^{227}Ac parent. It is assumed that secular equilibrium is achieved between the ^{227}Ac parent and the ^{227}Th progeny.

Nuclide: ^{234}Th Energy: 92.50 Photon Abundance: 0.0553

The 92.50 keV photo-peak used in this library for Th-234 quantification is actually two separate photo-peaks, occurring at 92.4 keV and 92.8 keV. The current software used for gamma spectroscopic analysis cannot resolve two photo-peaks that occur within the 2-keV resolution tolerance. Therefore, these two photopeaks are observed as a single photo-peak. Therefore, the average of the two photo-peak energies is used in this library. Also, the sum of the two photo-peak abundances, 0.0553, is used in the activity calculations for this observed 'single' photo-peak.

All activity values for ^{234}Th are calculated using the half-life, $t_{1/2}$=4.468E+09 yrs, of the long-lived ^{238}U parent. It is assumed that secular equilibrium is achieved between the ^{238}U parent and the ^{234}Th progeny.

Nuclide: ^{235}U Energy: 185.70 Photon Abundance: 0.5720

Quantifying ^{235}U activity using the 185.70 keV photo-peak is vulnerable to a significant high bias due to interference from gamma emissions from ^{226}Ra occurring at 186.21 keV (0.0328, abundance). Therefore, this emission will be used as an identifier only and not in the activity calculations for this nuclide.

Gamma Spectroscopist — Date: 2-23-05
Radiochemistry Instrumentation Laboratory

Radiochemistry Manager — Date: 2/23/05

Library File: FANP.lib
File I.D.: FANP (Fiss. Act. and Nat. Products)

OKJB 2/23/05

Pk. #	Energy (keV)	Isotope Name	2ndary Pk #	Type	Gamma Fraction	Halflife
24	338.40	Ac-228	61	QUANT	0.1127	5.7500E+00 yrs
61	911.07	Ac-228	63	NET	0.2580	5.7500E+00 yrs
63	968.90	Ac-228	24	QUANT	0.1580	5.7500E+00 yrs
41	657.75	Ag-110M	43	NET	0.9314	2.4990E+02 dys
43	677.71	Ag-110M	46	QUANT	0.1054	2.4990E+02 dys
46	706.67	Ag-110M	49	QUANT	0.1646	2.4990E+02 dys
49	763.93	Ag-110M	59	QUANT	0.2198	2.4990E+02 dys
59	884.67	Ag-110M	62	QUANT	0.7163	2.4990E+02 dys
62	937.48	Ag-110M	84	QUANT	0.3375	2.4990E+02 dys
84	1384.27	Ag-110M	87	QUANT	0.2394	2.4990E+02 dys
87	1505.00	Ag-110M	41	QUANT	0.1289	2.4990E+02 dys
90	1808.65	Al-26	0	NET	0.9973	7.2000E+05 yrs
1	59.54	Am-241	0	NET	0.3590	4.3310E+02 yrs
30	477.56	Be-7	0	NET	0.1052	5.3440E+01 dys
48	727.17	Bi-212	0	NET	0.0658	1.9100E+00 yrs
38	609.32	Bi-214	73	NET	0.4609	1.6000E+03 yrs
73	1120.28	Bi-214	38	QUANT	0.1510	1.6000E+03 yrs
11	165.85	Ce-139	0	NET	0.8035	1.3766E+02 dys
7	133.53	Ce-144	44	NET	0.1109	2.8414E+02 dys
44	696.49	Ce-144	7	QUANT	0.0130	2.8414E+02 dys
56	846.81	Co-56	67	QUANT	0.9999	7.7300E+01 dys
67	1037.83	Co-56	76	QUANT	0.1400	7.7300E+01 dys
76	1175.13	Co-56	77	ID	0.0228	7.7300E+01 dys
77	1238.28	Co-56	81	NET	0.6760	7.7300E+01 dys
81	1360.22	Co-56	89	QUANT	0.0429	7.7300E+01 dys
89	1771.49	Co-56	56	QUANT	0.1570	7.7300E+01 dys
6	122.07	Co-57	8	NET	0.8560	2.7000E+02 dys
8	136.43	Co-57	6	QUANT	0.1068	2.7000E+02 dys
54	810.75	Co-58	0	NET	0.9945	7.0780E+01 dys
75	1173.23	Co-60	80	QUANT	0.9997	5.2721E+00 yrs
80	1332.51	Co-60	75	NET	0.9998	5.2721E+00 yrs
23	320.07	Cr-51	0	NET	0.1000	2.7700E+01 dys
31	563.26	Cs-134	32	QUANT	0.0835	2.0623E+00 yrs
32	569.29	Cs-134	37	QUANT	0.1538	2.0623E+00 yrs
37	604.66	Cs-134	52	NET	0.9762	2.0623E+00 yrs
52	795.76	Cs-134	53	QUANT	0.8553	2.0623E+00 yrs
53	801.84	Cs-134	74	QUANT	0.0869	2.0623E+00 yrs
74	1167.86	Cs-134	82	QUANT	0.0180	2.0623E+00 yrs
82	1365.13	Cs-134	31	QUANT	0.0304	2.0623E+00 yrs
42	661.62	Cs-137	0	NET	0.8512	3.0104E+01 yrs
25	344.30	Eu-152	51	QUANT	0.2650	1.3330E+01 yrs
51	778.90	Eu-152	69	QUANT	0.1294	1.3330E+01 yrs
69	1085.80	Eu-152	71	QUANT	0.1021	1.3330E+01 yrs
71	1112.07	Eu-152	85	QUANT	0.1364	1.3330E+01 yrs
85	1408.08	Eu-152	25	NET	0.2100	1.3330E+01 yrs
18	248.04	Eu-154	34	QUANT	0.0660	8.5019E+00 yrs
34	591.70	Eu-154	58	QUANT	0.0460	8.5019E+00 yrs
58	873.20	Eu-154	64	QUANT	0.1227	8.5019E+00 yrs
64	996.30	Eu-154	66	QUANT	0.1030	8.5019E+00 yrs
66	1004.80	Eu-154	18	NET	0.1801	8.5019E+00 yrs
4	105.31	Eu-155	0	NET	0.2120	4.9600E+00 yrs

Pk. #	Energy (keV)	Isotope Name	2ndary Pk #	Type	Gamma Fraction	Halflife
14	192.34	Fe-59	70	QUANT	0.0308	4.5100E+01 dys
70	1099.22	Fe-59	79	NET	0.5650	4.5100E+01 dys
79	1291.56	Fe-59	14	QUANT	0.4320	4.5100E+01 dys
20	284.29	I-131	27	QUANT	0.0614	8.0405E+00 dys
27	364.48	I-131	20	NET	0.8170	8.0405E+00 dys
86	1460.75	K-40	0	NET	0.1100	1.2800E+09 yrs
55	834.81	Mn-54	0	NET	0.9997	3.1220E+02 dys
78	1274.54	Na-22	0	NET	0.9994	2.6000E+00 yrs
45	702.50	Nb-94	0	NET	0.9790	2.0300E+04 yrs
50	765.82	Nb-95	0	NET	0.9999	6.4020E+01 dys
65	1001.03	Pa-234m	0	NET	0.0059	4.4680E+09 yrs
5	115.18	Pb-212	17	QUANT	0.0059	1.9100E+00 yrs
17	238.63	Pb-212	22	NET	0.4330	1.9100E+00 yrs
22	300.09	Pb-212	5	QUANT	0.0327	1.9100E+00 yrs
21	295.22	Pb-214	26	QUANT	0.1920	1.6000E+03 yrs
26	351.99	Pb-214	21	NET	0.3710	1.6000E+03 yrs
39	621.84	Ru-106	68	NET	0.0981	3.6820E+02 dys
68	1050.47	Ru-106	39	QUANT	0.0173	3.6820E+02 dys
36	602.71	Sb-124	40	NET	0.9826	6.0200E+01 dys
40	645.84	Sb-124	47	QUANT	0.0745	6.0200E+01 dys
47	713.82	Sb-124	83	QUANT	0.0238	6.0200E+01 dys
83	1368.21	Sb-124	88	QUANT	0.0251	6.0200E+01 dys
88	1691.04	Sb-124	36	QUANT	0.4779	6.0200E+01 dys
12	176.29	Sb-125	28	QUANT	0.0682	2.7702E+00 yrs
28	427.95	Sb-125	29	NET	0.3000	2.7702E+00 yrs
29	463.51	Sb-125	35	QUANT	0.1049	2.7702E+00 yrs
35	600.77	Sb-125	12	ID	0.1786	2.7702E+00 yrs
60	889.26	Sc-46	0	NET	0.9998	8.3850E+01 dys
16	236.00	Th-227	0	NET	0.1230	2.1700E+01 yrs
2	63.29	Th-234	3	QUANT	0.0390	4.4680E+09 yrs
3	92.50	Th-234	2	NET	0.0553	4.4680E+09 yrs
19	277.36	Tl-208	33	QUANT	0.0631	1.9100E+00 yrs
33	583.14	Tl-208	57	NET	0.8450	1.9100E+00 yrs
57	860.47	Tl-208	19	QUANT	0.1242	1.9100E+00 yrs
9	143.76	U-235	10	NET	0.1096	7.0379E+08 yrs
10	163.35	U-235	13	QUANT	0.0508	7.0379E+08 yrs
13	185.72	U-235	15	ID	0.5720	7.0379E+08 yrs
15	205.31	U-235	9	QUANT	0.0501	7.0379E+08 yrs
72	1115.52	Zn-65	0	NET	0.5060	2.4380E+02 dys

PARAGON ANALYTICS
Radiochemistry Data Package

Section 5

5

QUALITY ASSURANCE SUMMARY REPORTS

No NON-CONFORMANCE REPORTS or QUALITY ASSURANCE SUMMARY SHEETS are included in this data package.

PARAGON ANALYTICS
Radiochemistry Data Package

Section 6

LABORATORY BENCH SHEETS

6

Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Analytical QASS / NCR? Y / (N) N/A

Prep Num	Lab ID Collection Date	QC Type	Init Alq	Fin Alq	Units Geo.	Cnt 1 File Cnt Dur (min)	Cnt 1 Inst/Det	Cnt 1 Count Date	Cnt 2 File Cnt Dur (min)	Cnt 2 Inst/Det	Cnt 2 Count Date	Cnt 3 File Cnt Dur (min)	Cnt 3 Inst/Det	Cnt 3 Count Date	Notes
1	0610141-1 10/17/06 08:45	SMP	1000	1000	ml 01	See Previous									
1	0610141-2 10/17/06 09:30	SMP	1000	1000	ml 01										
1	0610141-3 10/17/06 10:08	SMP	1000	1000	ml 01										
1	0610141-4 10/17/06 10:47	SMP	1000	1000	ml 01										
1	0610141-5 10/17/06 12:40	SMP	1000	1000	ml 01										
1	0610161-1 10/19/06 09:50	SMP	1000	1000	ml 01										
1	0610161-1 10/19/06 09:50	DUP	1000	1000	ml 01										
1	0610161-4 10/19/06 09:15	SMP	930	930	ml 01										
1	0610161-6 10/19/06 09:27	SMP	1000	1000	ml 01										
1	0610161-9 10/19/06 09:00	SMP	1000	1000	ml 01										
1	0610164-1 10/16/06 09:40	SMP	975	975	ml 01										
1	0610164-2 10/16/06 14:40	SMP	990	990	ml 01										
1	0610178-1 10/23/06 08:40	SMP	1000	1000	ml 01										
1	0610178-1 10/23/06 08:40	DUP	1000	1000	ml 01										
1	0610179-1 10/19/06 13:45	SMP	1000	1000	ml 01										
1	0610179-1 10/19/06 13:45	DUP	1000	1000	ml 01										
1	0610179-2 10/19/06 13:35	SMP	1000	1000	ml 01										
1	0610179-3 10/19/06 13:25	SMP	970	970	ml 01										
1	0610179-4 10/19/06 14:05	SMP	1000	1000	ml 01										
1	GS061025-4A 10/25/06 14:16	MB	1000	1000	ml 01										
1	GS061025-4B 10/25/06 14:16	MB	1000	1000	ml 01										
1	GS061025-4C 10/25/06 14:16	MB	1000	1000	ml 01										
1	GS061025-4 10/25/06 14:16	MB	1000	1000	ml 01										
1	GS061025-4 10/25/06 14:16	LCS	1000	1000	ml 01										

11/18/06

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Paragon Analytics
LIMS Version: 5.450A

Supersedes: 10/21/06 9:36

Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Analytical QASS / NCR? Y / (N) NA

Prep Num	Lab ID Collection Date	QC Type	Init Alq	Fin Alq	Units Geo.	Cnt 1 File Cnt Dur (min)	Cnt 1 Inst/Det	Cnt 1 Count Date	Cnt 2 File Cnt Dur (min)	Cnt 2 Inst/Det	Cnt 2 Count Date	Cnt 3 File Cnt Dur (min)	Cnt 3 Inst/Det	Cnt 3 Count Date	Notes

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	AM-241	718	216.780	DPM/ml	10/25/06	1000	ml	
S1	CO-60	718	93.625	DPM/ml	10/25/06	1000	ml	
S1	CS-137	718	82.285	DPM/ml	10/25/06	1000	ml	

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000042

Sample Barcodes

0610161-1		0610178-1	
0610164-1		0610179-1	
0610141-1		0610164-2	
0610179-2		0610141-2	
0610141-3		0610179-3	
0610141-4		0610161-4	
0610179-4		0610141-5	
0610161-6		0610161-9	
0610179-1DUP		0610161-1DUP	
0610178-1DUP		GS061025-4LCS	
GS061025-4LCS		GS061025-4LCS	
GS061025-4LCS		GS061025-4BMB	
GS061025-4MB		GS061025-4AMB	
GS061025-4CMB			

11/15 * CAR

Paragon Analytics

Radiochemistry Instrument Worksheet

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Analytical QASS / NCR? Y / (N) N/A

Prep Num	Lab ID / Collection Date	QC Type	Init Alq	Fin Alq	Units / Geo.	Cnt 1 File / Cnt Dur (min)	Cnt 1 Inst/Det	Cnt 1 Count Date	Cnt 2 File / Cnt Dur (min)	Cnt 2 Inst/Det	Cnt 2 Count Date	Cnt 3 File / Cnt Dur (min)	Cnt 3 Inst/Det	Cnt 3 Count Date	Notes
1	0610141-1 10/17/06 08:45	SMP	1000	1000	ml 01	300	9	11/3/06							FANP
1	0610141-2 10/17/06 09:30	SMP	1000	1000	ml 01	251	2	11/4/06							
1	0610141-3 10/17/06 10:08	SMP	1000	1000	ml 01	265	6								RG 11/22/06
1	0610141-4 10/17/06 10:47	SMP	1000	1000	ml 01	251	8								
1	0610141-5 10/17/06 12:40	SMP	1000	1000	ml 01	↓	9								
1	0610161-1 * 10/19/06 09:50	SMP	1000	1000	ml 01	330	9	11/2/06							RG 11/22/06
1	0610161-1 * 10/19/06 09:50	DUP	1000	1000	ml 01	315	2								CT Dup
1	0610161-4 * 10/19/06 09:15	SMP	930	930	ml 01	330	2								
1	0610161-6 * 10/19/06 09:27	SMP	1000	1000	ml 01	315	6								
1	0610161-9 * 10/19/06 09:00	SMP	1000	1000	ml 01	200	8								RG 11/22/06
1	0610164-1 10/16/06 09:40	SMP	975	975	ml 01	300	8	11/5/06							
1	0610164-2 10/16/06 14:40	SMP	990	990	ml 01	↓	2								
1	0610178-1 10/23/06 08:40	SMP	1000	1000	ml 01	1000	2	11/6/06	1000	8	11/9/06				TIM
1	0610178-1 10/23/06 08:40	DUP	1000	1000	ml 01	1000	6	11/7/06							CT Dup
1	0610179-1 * 10/19/06 13:45	SMP	1000	1000	ml 01	330	9	11/2/06							* FANP
1	0610179-1 * 10/19/06 13:45	DUP	1000	1000	ml 01	180	8	11/3/06							CT Dup
1	0610179-2 * 10/19/06 13:35	SMP	1000	1000	ml 01	300	8	11/2/06							
1	0610179-3 * 10/19/06 13:25	SMP	970	970	ml 01	400	9								RG 11/22/06
1	0610179-4 * 10/19/06 14:05	SMP	1000	1000	ml 01	315	6								
1	GS061025-4A 10/25/06 14:16	MB	1000	1000	ml 01	1000	8	11/6/06							RG 11/22/06
1	GS061025-4B * 10/25/06 14:16	MB	1000	1000	ml 01	400	6	11/2/06							TIM FANP
1	GS061025-4C 10/25/06 14:16	MB	1000	1000	ml 01	↓	↓	↓							↓
1	GS061025-4 10/25/06 14:16	MB	1000	1000	ml 01										
1	GS061025-4 10/25/06 14:16	LCS	1000	1000	ml 01	30	2	11/3/06							

* PRINT SPECTRA ● RECOUNT - DET 2 OK ON 11/7/06

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Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Analytical QASS / NCR? Y / N _____

Prep Num	Lab ID Collection Date	QC Type	Init Alq	Fin Alq	Units Geo.	Cnt 1 File Cnt Dur (min)	Cnt 1 Inst/Det	Cnt 1 Count Date	Cnt 2 File Cnt Dur (min)	Cnt 2 Inst/Det	Cnt 2 Count Date	Cnt 3 File Cnt Dur (min)	Cnt 3 Inst/Det	Cnt 3 Count Date	Notes

Spike Solution Information

Soln #	Nuclide	Soln ID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	AM-241	798	225.652	DPM/ml	10/25/06	1000	ml	
S1	CO-60	798	125.472	DPM/ml	10/25/06	1000	ml	
S1	CS-137	798	86.704	DPM/ml	10/25/06	1000	ml	

718

10/27/06

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Sample Barcodes

0610161-1		0610178-1	
0610164-1		0610179-1	
0610141-1		0610164-2	
0610179-2		0610141-2	
0610141-3		0610179-3	
0610141-4		0610161-4	
0610179-4		0610141-5	
0610161-6		0610161-9	
0610179-1DUP		0610161-1DUP	
0610178-1DUP		GS061025-4LCS	
GS061025-4LCS		GS061025-4LCS	
GS061025-4LCS		GS061025-4BMB	
GS061025-4MB		GS061025-4AMB	
GS061025-4CMB			

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Reviewed By: atf **Review Date:** 11/18/2006

Non-Routine Pre-Treatment? Y / (N) **Batch:** NA **Re-Prep?** Y / (N) **Batch:** NA **Prep QA(SS) / NCR?** (Y) / N

Prep SOP: PAI 739 **Rev:** 8
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Krystal A. Brown
Prep Date: 10/25/2006
Prep Dept: GM

Balance:
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Geometry	Standards	Prep Notes
1	1	0610141-1	SMP		1000	1000	Unfiltered	01		
2	1	0610141-2	SMP		1000	1000	Unfiltered	01		
3	1	0610141-3	SMP		1000	1000	Unfiltered	01		
4	1	0610141-4	SMP		1000	1000	Unfiltered	01		
5	1	0610141-5	SMP		1000	1000	Unfiltered	01		
6	1	0610161-1	SMP		1000	1000	Filtered	01		
7	1	0610161-1	DUP		1000	1000	Filtered	01		Count dup due to insufficient volume
8	1	0610161-4	SMP		930	930	Unfiltered	01		Brought up to 1000 ml with DI water
9	1	0610161-6	SMP		1000	1000	Unfiltered	01		
10	1	0610161-9	SMP		1000	1000	Unfiltered	01		
11	1	0610164-1	SMP		975	975	Unfiltered	01		Brought up to 1000 ml with DI water
12	1	0610164-2	SMP		990	990	Unfiltered	01		Brought up to 1000 ml with DI water
13	1	0610178-1	SMP		1000	1000	Unfiltered	01		
14	1	0610178-1	DUP		1000	1000	Unfiltered	01		Count dup due to insufficient volume
15	1	0610179-1	SMP		1000	1000	Filtered	01		
16	1	0610179-1	DUP		1000	1000	Filtered	01		Count Dup due to insufficient volume
17	1	0610179-2	SMP		1000	1000	Unfiltered	01		
18	1	0610179-3	SMP		970	970	Unfiltered	01		Brought up to 1000 ml with DI water
19	1	0610179-4	SMP		1000	1000	Unfiltered	01		
20	1	GS061025-4A	MB		1000	1000	Unfiltered	01		
21	1	GS061025-4B	MB		1000	1000	Unfiltered	01		
22	1	GS061025-4C	MB		1000	1000	Unfiltered	01		
23	1	GS061025-4	MB		1000	1000	Unfiltered	01		
24	1	GS061025-4	LCS		1000	1000	Unfiltered	01	S1	

L59449: Date 11/18/06 52

Comments

Paragon Analytics
LIMS Version: 5.450A

Supersedes: 10/27/06 9:36

Radiochemistry Prep Worksheet

Prep Batch: GS061025-4

Paragon Analytics

Prep Procedure: GAMMASCAN

Reviewed By: atf **Review Date:** 11/18/2006

Non-Routine Pre-Treatment? Y / (N) **Batch:** NA **Re-Prep?** Y / (N) **Batch:** NA **Prep QASS / NCR?** (Y) / N

Prep SOP: PAI 739 **Rev:** 8
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Krystal A. Brown
Prep Date: 10/25/2006
Prep Dept: GM

Balance:
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Geometry	Standards	Prep Notes

Spiked By: N/A **Date:** N/A

Witnessed By: N/A **Date:** N/A

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	AM-241	718	216.780	DPM/ml	10/25/06	1000	ml	
S1	CO-60	718	93.625	DPM/ml	10/25/06	1000	ml	
S1	CS-137	718	82.285	DPM/ml	10/25/06	1000	ml	

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Comments

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Reviewed By: kab KAB **Review Date:** 11/20/2006 11/20/06

Non-Routine Pre-Treatment? Y / (N) **Batch:** N/A **Re-Prep?** Y / (N) **Batch:** N/A **Prep QASS / NCR?** (Y) / N 318815

Prep SOP: PAI 739 **Rev:** 8
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Krystal A. Brown
Prep Date: 10/25/2006
Prep Dept: GM

Balance:
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Geometry	Standards	Prep Notes
1	1	0610141-1	SMP		1000	1000	Unfiltered	01		
2	1	0610141-2	SMP		1000	1000	Unfiltered	01		
3	1	0610141-3	SMP		1000	1000	Unfiltered	01		
4	1	0610141-4	SMP		1000	1000	Unfiltered	01		
5	1	0610141-5	SMP		1000	1000	Unfiltered	01		
6	1	0610161-1	SMP		1000	1000	Filtered	01		
7	1	0610161-1	DUP		1000	1000	Filtered	01		Count dup due to insufficient volume
8	1	0610161-4	SMP		930	930	Unfiltered	01		Brought up to 1000 ml with DI water
9	1	0610161-6	SMP		1000	1000	Unfiltered	01		
10	1	0610161-9	SMP		1000	1000	Unfiltered	01		
11	1	0610164-1	SMP		975	975	Unfiltered	01		Brought up to 1000 ml with DI water
12	1	0610164-2	SMP		990	990	Unfiltered	01		Brought up to 1000 ml with DI water
13	1	0610178-1	SMP		1000	1000	Unfiltered	01		
14	1	0610178-1	DUP		1000	1000	Unfiltered	01		Count dup due to insufficient volume
15	1	0610179-1	SMP		1000	1000	Unfiltered	01		
16	1	0610179-1	DUP		1000	1000	Unfiltered	01		Count Dup due to insufficient volume
17	1	0610179-2	SMP		1000	1000	Unfiltered	01		
18	1	0610179-3	SMP		970	970	Unfiltered	01		Brought up to 1000 ml with DI water
19	1	0610179-4	SMP		1000	1000	Unfiltered	01		
20	1	GS061025-4A	MB		1000	1000	Unfiltered	01		
21	1	GS061025-4B	MB		1000	1000	Unfiltered	01		
22	1	GS061025-4C	MB		1000	1000	Unfiltered	01		
23	1	GS061025-4	MB		1000	1000	Unfiltered	01		
24	1	GS061025-4	LCS		1000	1000	Unfiltered	01	S1	

KAB 11/20/06

KAB 11/20/06

KAB 11/20/06

KAB 11/20/06

KAB 11/20/06

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Comments

Date Printed: 11/20/2006 10:25

Paragon Analytics
LIMS Version: 5.450A

Supersedes: 10/27/06 9:30

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Reviewed By: kab KAB **Review Date:** 11/20/2006 11/20/06

Non-Routine Pre-Treatment? Y / (N) **Batch:** NA **Re-Prep?** Y / (N) **Batch:** NA **Prep (QASS) / NCR? (Y) / N** 318815

Prep SOP: PAI 739 **Rev:** 8
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Krystal A. Brown
Prep Date: 10/25/2006
Prep Dept: GM

Balance:
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Geometry	Standards	Prep Notes

Spiked By: N/A **Date:** N/A

Witnessed By: N/A **Date:** N/A

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	AM-241	718	216.780	DPM/ml	10/25/06	1000	ml	
S1	CO-60	718	93.625	DPM/ml	10/25/06	1000	ml	
S1	CS-137	718	82.285	DPM/ml	10/25/06	1000	ml	

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Comments

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Reviewed By: kab KAB **Review Date:** 10/27/06 10/27/2006

Non-Routine Pre-Treatment? Y /(N) **Batch:** N/A **Re-Prep?** Y /(N) **Batch:** N/A **Prep QASS / NCR?** Y /(N) N/A

Prep SOP: PAI 739 **Rev:** 8
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Krystal A. Brown
Prep Date: 10/25/2006
Prep Dept: GM

Balance:
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Geometry	Standards	Prep Notes
1	1	0610141-1	SMP		1000	1000	Unfiltered	01		KAB 10/27/06
2	1	0610141-2	SMP		1000	1000	Unfiltered	01		
3	1	0610141-3	SMP		1000	1000	Unfiltered	01		
4	1	0610141-4	SMP		1000	1000	Unfiltered	01		
5	1	0610141-5	SMP		1000	1000	Unfiltered	01		
6	1	0610161-1	SMP		1000	1000	Unfiltered	01		
7	1	0610161-1	DUP		1000	1000	Unfiltered	01		Count dup due to insufficient volume
8	1	0610161-4	SMP		930	930	Unfiltered	01		Brought up to 1000 ml with DI water
9	1	0610161-6	SMP		1000	1000	Unfiltered	01		KAB 10/27/06
10	1	0610161-9	SMP		1000	1000	Unfiltered	01		
11	1	0610164-1	SMP		975	975	Unfiltered	01		Brought up to 1000 ml with DI water
12	1	0610164-2	SMP		990	990	Unfiltered	01		Brought up to 1000 ml with DI water
13	1	0610178-1	SMP		1000	1000	Unfiltered	01		KAB 10/27/06
14	1	0610178-1	DUP		1000	1000	Unfiltered	01		Count dup due to insufficient volume
15	1	0610179-1	SMP		1000	1000	Unfiltered	01		KAB 10/27/06
16	1	0610179-1	DUP		1000	1000	Unfiltered	01		Count Dup due to insufficient volume
17	1	0610179-2	SMP		1000	1000	Unfiltered	01		KAB 10/27/06
18	1	0610179-3	SMP		970	970	Unfiltered	01		Brought up to 1000 ml with DI water
19	1	0610179-4	SMP		1000	1000	Unfiltered	01		KAB 10/27/06
20	1	GS061025-4A	MB		1000	1000	Unfiltered	01		
21	1	GS061025-4B	MB		1000	1000	Unfiltered	01		
22	1	GS061025-4C	MB		1000	1000	Unfiltered	01		
23	1	GS061025-4	MB		1000	1000	Unfiltered	01		
24	1	GS061025-4	LCS		1000	1000	Unfiltered	01	S1	

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Comments

Paragon Analytics
LIMS Version: 5.439A

Supersedes: 10/25/06 14:49

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Reviewed By: kab **Review Date:** 10/27/2006

Non-Routine Pre-Treatment? Y / N **Batch:** _____ **Re-Prep? Y / N** **Batch:** _____ **Prep QASS / NCR? Y / N** _____

Prep SOP: PAI 739 **Rev:** 8
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Krystal A. Brown
Prep Date: 10/25/2006
Prep Dept: GM

Balance:
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Geometry	Standards	Prep Notes

Spiked By: N/A **Date:** N/A

Witnessed By: N/A **Date:** N/A

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	AM-241	798	225.652	DPM/ml	10/25/06	1000	ml	
S1	CO-60	798	125.472	DPM/ml	10/25/06	1000	ml	
S1	CS-137	798	86.704	DPM/ml	10/25/06	1000	ml	

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Comments

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Prep Batch Not Validated!!!

Reviewed By: **Review Date:**

Non-Routine Pre-Treatment? Y / N **Batch:** _____ **Re-Prep? Y / N** **Batch:** _____ **Prep QASS / NCR? Y / N** _____

Prep SOP: PAI 739 **Rev:** 8
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Krystal A. Brown KAB
Prep Date: 10/25/2006
Prep Dept: GM

Balance:
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Geometry	Standards	Prep Notes
1	1	0610141-1	SMP		1000	1000	Unfiltered	01		
2	1	0610141-2	SMP		1000	1000	Unfiltered	01		
3	1	0610141-3	SMP		1000	1000	Unfiltered	01		
4	1	0610141-4	SMP		1000	1000	Unfiltered			
5	1	0610141-5	SMP		1000	1000	~~Unfiltered~~ Filtered	01		
6	1	0610161-1	SMP		1000	1000	~~Unfiltered~~ Filtered	01		
7	1	0610161-1	DUP		1000	1000	~~Unfiltered~~ Filtered	01		Count dup due to insufficient volume
8	1	0610161-4	SMP		1000	1000	Unfiltered	01	* 930 ml + 70ml DI H_2O	
9	1	0610161-6	SMP		1000	1000	Unfiltered	01		
10	1	0610161-9	SMP		1000	1000	Unfiltered	01		
11	1	0610164-1	SMP		1000	1000	Unfiltered	01	* 975 ml + 25 ml DI H_2O	
12	1	0610164-2	SMP		1000	1000	Unfiltered	01	* 990 ml + 10 ml DI H_2O	
13	1	0610178-1	SMP		1000	1000	Unfiltered	01		
14	1	0610179-1	SMP		1000	1000	~~Unfiltered~~ Filtered	01		
15	1	0610179-1	DUP		1000	1000	~~Unfiltered~~ Filtered	01		Count Dup due to insufficient volume
16	1	0610179-2	SMP		1000	1000	Unfiltered	01		
17	1	0610179-3	SMP		1000	1000	Unfiltered	01	* 970 ml + 30 ml DI H_2O	
18	1	0610179-4	SMP		1000	1000	Unfiltered	01		
19	1	GS061025-4A	MB		1000	1000	Unfiltered	01		
20	1	GS061025-4B	MB		1000	1000	Unfiltered	01		
21	1	GS061025-4C	MB		1000	1000	Unfiltered	01		
22	1	GS061025-4	MB		1000	1000	Unfiltered	01		
23	1	GS061025-4	LCS		1000	1000	Unfiltered	01	S1	

C610178-1 Dup* KAB 10/27/06

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Comments

Paragon Analytics

Radiochemistry Prep Worksheet

Prep Batch: GS061025-4

Prep Procedure: GAMMASCAN

Prep Batch Not Validated!!!

Reviewed By:

Review Date:

Non-Routine Pre-Treatment? Y / N **Batch:** _____ **Re-Prep? Y / N** **Batch:** _____ **Prep QASS / NCR? Y / N** _____

Prep SOP: PAI 739 **Rev:** 8
Prep SOP: NONE
Matrix Class: liquid

Prep Analyst: Krystal A. Brown KAB
Prep Date: 10/25/2006
Prep Dept: GM

Balance:
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq ml	Fin Alq ml	Prep Basis	Geometry	Standards	Prep Notes

Spiked By: N/A **Date:** N/A

Witnessed By: _____ **Date:** _____

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	AM-241	798	225.652	DPM/ml	10/25/06	1000	ml	
S1	CO-60	798	125.472	DPM/ml	10/25/06	1000	ml	
S1	CS-137	798	86.704	DPM/ml	10/25/06	1000	ml	

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Comments

SAMPLE CONDITION FORM (LIQUID)

ANALYST: KAB

ANALYSIS DATE: 10/25/06 METHOD: Prep

WORK ORDER	SAMPLE ID	SAMPLE CONDITION pH	Color	Remarks
0610161	1	<2	Clear	Filtered
	4			Unfiltered
	6			
	9			
0610164	1			
	2			
0610178	1			
0610179	1			Filtered
	2			Unfiltered
	3			
	4			
0610141	1			
	2			
	3			
	4			
	5			
			KAB	10/25/06

PARAGON ANALYTICS
Radiochemistry Data Package

Section 7

STANDARDS TRACEABILITY DOCUMENTS

7

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

PAI I.D 02718
recd 8-205-03

66352-307

1.0 Liter Solid in 138G GA-MA Beaker

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

US Patent 4,430,258; UK Patent GB2,149,194B; CA Patent 1,196,776.
Density of solid matrix 1.15 g/cc.

Calibration date: July 1, 2003 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	1304	3.0
Cd-109	88	462.6	d	1862	3.3
Co-57	122	271.79	d	1032	2.8
Ce-139	166	137.6	d	1419	2.8
Hg-203	279	46.61	d	3194	2.7
Sn-113	392	115.1	d	1960	2.6
Cs-137	662	30.07	y	1260	3.0
Y-88	898	106.6	d	5060	2.6
Co-60	1173	5.2714	y	2402	2.7
Co-60	1332	5.2714	y	2427	2.6
Y-88	1836	106.6	d	5287	2.6

P O NUMBER EW060303, Item 2

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: M. Mty 8-1-03

This standard will expire one year after the calibration date.

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318-U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837
email: analytics@mindspring.com
www.analyticsinc.com

ANALYSIS OF UNCERTAINTY FOR

MIXED GAMMA STANDARDS
BATCH 113

CALIBRATION DATE: JULY 1, 2003 12:00 EST

ISOTOPE	ENERGY (keV)	CALIBRATION METHOD[1]	STATISTICS[2]	CALIBRATION[2]	PEAK FITTING[2]	GEOMETRY[2]	IMPURITIES[2]	WEIGHING[2]	COMBINED STANDARD UNCERTAINTY[2]	RELATIVE EXPANDED UNCERTAINTY[2] (K=2)
Cd-109	88	HPGe	0.16	1.1	0.88	0.8	0	0.2	1.64	3.3
Co-57	122	HPGe	0.23	0.93	0.71	0.7	0	0.2	1.40	2.8
Ce-139	166	HPGe	0.17	1.0	0.58	0.7	0	0.2	1.38	2.8
Hg-203	279	HPGe	0.11	1.1	0.34	0.7	0	0.2	1.37	2.7
Sn-113	392	HPGe	0.21	1.0	0.35	0.7	0	0.2	1.30	2.6
Cs-137	662	HPGe	0.36	1.1	0.60	0.7	0	0.2	1.49	3.0
Y-88	898	HPGe	0.19	1.0	0.33	0.7	0	0.2	1.29	2.6
Co-60	1173	HPGe	0.31	0.97	0.45	0.7	0	0.2	1.33	2.7
Co-60	1332	HPGe	0.33	0.93	0.48	0.7	0	0.2	1.32	2.6
Y-88	1836	HPGe	0.24	1.0	0.35	0.7	0	0.2	1.31	2.6

OPTIONAL ADDITIONAL ISOTOPES

Pb-210	46.5	4ΠLS	0.33	1.1	0	0.9	0.30	0.2	1.50	3.0
Am-241	59.5	4ΠLS	0.33	1.1	0	0.9	0.30	0.2	1.50	3.0
Sr-85	514	IC	0.30	1.1	0	0.7	0.17	0.2	1.36	2.7
Cs-134	605	IC	0.30	1.0	0	0.8	0.17	0.2	1.34	2.7
Cs-134	796	IC	0.30	1.0	0	0.8	0.17	0.2	1.34	2.7
Mn-54	835	IC	0.30	1.0	0	0.8	0.17	0.2	1.34	2.7
Zn-65	1116	IC	0.30	1.0	0	0.8	0.17	0.2	1.34	2.7

[1]Calibration Methods:
- 4ΠLS (4 pi Liquid Scintillation Counting)
- HPGe (High Purity Germanium Gamma Ray Spectrometer)
- IC (Gamma Ray Ionization Chamber)

[2]As Percent (%)

No interfering gamma emitting impurities were detected during calibration. Depending on the resolution and energy dispersion (keV/channel) of the measuring system, the following spectral conflicts may occur: (1) between the 88 keV gamma-ray and the X-rays emitted in the decay of Hg-203, (2) between the 1333 keV gamma-ray and the 1325 keV single escape peak from the 1836 keV gamma-ray.

PARAGON ANALYTICS
Radiochemistry Data Package

Section 8

CHAIN OF CUSTODY

8

Paragon Analytics

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 0610164
Client Name: ACZ Laboratories, Inc.
Client Project Name:
Client Project Number: L59449
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
L59449-01	0610164-1		WATER	16-Oct-06	9:40
L59449-02	0610164-2		WATER	16-Oct-06	14:40

06010164

ACZ Laboratories, Inc.

2773 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493

CHAIN of CUSTODY

Report to:

Name:	Tony Antalek
Company:	ACZ LABS, INC.
E-mail:	TAntalek@acz.com
Address:	2773 DOWNHILL DR
	STEAMBOAT SPGS, CO 80487
Telephone:	(970) 879-6590

Copy of Report to:

Name:	N/A
Company:	
E-mail:	
Telephone:	

Invoice to:

Name:	YVONNE BAKER
Company:	ACZ LAS, INC.
E-mail:	yb@acz.com
Address:	2773 DOWNHILL DR
	STEAMBOAT SPGS, CO 80487
Telephone:	(970) 870-6590

If sample(s) received past holding time (HT), or if insufficient HT remains to complete analysis before expiration, shall ACZ proceed with requested short HT analyses? YES ☑ NO ☐

If "NO" then ACZ will contact client for further instruction. If neither "YES" nor "NO" is indicated, ACZ will proceed with the requested analyses, even if HT is expired, and data will be qualified.

PROJECT INFORMATION

Quote #:
Project/PO #:
Shipping Co.:
Tracking #:
Reporting state for compliance testing:
Are any samples NRC licensable material?

ANALYSES REQUESTED *(attach list or use quote number)*

	SAMPLE IDENTIFICATION	DATE:TIME	Matrix	# of Containers	GAMMA SCAN	H3
1	L59449-01	10/16/2006 09:40	GW	3	✓	✓
2	L59449-02	10/16/2006 14:40	GW	3 2	✓	✓
				1 1 0 10/19/06		

Matrix: SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW (Drinking Water) · SL (Sludge) · SO (Soil) · OL (Oil) · Other (Specify)

REMARKS

SUBCONTRACTED - Paragon Analytical, Attn: Lance Steere, 225 Commerce Drive, Ft. Collins, CO 80524 (970) 490-1511 - PLEASE SHIP UPS GROUND SERVICE

SEND ONE EACH RRAD & TWO EACH VLUP PER SAMPLE

RELINQUISHED BY:	DATE:TIME	RECEIVED BY:	DATE:TIME
T. ANTALEK	10/19/2006 1600	[signature]	10.20.06 1110

Page Of

FRMQA021.12.03.06

White - Return with sample. Yellow - Retain for your records.

CONDITION OF SAMPLE UPON RECEIPT FORM

Paragon Analytics

Client: ACZ

Workorder No: 0610164

Project Manager: LS

Initials: SL Date: 10-20-06

1. Does this project require any **special handling** in addition to standard Paragon procedures?		YES	(NO)
2. Are custody **seals on shipping containers** intact?	NONE	(YES)	NO
3. Are Custody seals on **sample containers** intact?	(NONE)	YES	NO
4. Is there a **COC (Chain-of-Custody) present** or other representative documents?		(YES)	NO
5. Are the **COC and bottle labels complete and legible**?		(YES)	NO
6. Is the **COC in agreement** with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were **airbills / shipping documents** present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous **samples requiring preservation preserved correctly?** (excluding volatiles)	N/A	(YES)	NO
9. Are all aqueous **non-preserved samples pH 4-9**?	(N/A)	YES	NO
10. Is there **sufficient sample** for the requested analyses?		(YES)	NO →
11. Were all samples placed in the **proper containers** for the requested analyses?		(YES)	NO
12. Are all samples within **holding times** for the requested analyses?		(YES)	NO
13. Were all sample containers received **intact**? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, Rx CN/S, radon), headspace free? **Size of bubble:** ____ < green pea ____ > green pea	N/A	(YES)	NO
15. Were samples checked for and free from the presence of **residual chlorine?** (Applicable when PM has indicated samples are from a chlorinated water source; note if field preservation with sodium thiosulfate was not observed.)	(N/A)	YES	NO
16. Were the samples **shipped on ice**?		(YES)	NO
17. Were cooler temperatures measured at 0.1-6.0°C? **IR gun used*:** (#2) #4	RAD ONLY	(YES)	NO

Cooler #: 1

Temperature (°C): 2.4

No. of custody seals on cooler: 0

DOT Survey/ Acceptance Information

External µR/hr reading: 12

Background µR/hr reading: 12

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? (YES) / NO / NA (If no, see Form 008.)

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

→ Sample #1 (L 59449-01) recieved only 2 40 ml Vials ~~for 8260? (VL)~~ ~~or H3 (if these vials are for H3, they are according to the label; Preserved with HCL~~ 1 Liter poly pres. w. HNO3)

Sample #2 (L 59449-01) recieved only 1 40ml Vial ~~for Voc or~~ H3 ?

~~Pres with HCL~~

40 ml Vials for H3 Not preserved. Limited Vol. for H3

→ Discussed per. w/client. Enough, just

If applicable, was the client contacted? YES / NO / NA Contact: _____ Date/Time: _____

Project Manager Signature / Date: 10/23/06

SL 10.20.06

*IR Gun #2: Oakton, SN 29922500201-0066

*IR Gun #4: Oakton, SN 2372220101-0002

Form 201r19.xls (1/13/06)

0610164

SHIPPING DEPARTMENT
(970)879-6590
ACZ LABORATORIES INC
2773 DOWNHILL DRIVE
STEAMBOAT SPRIN CO 80487

15 LBS 1 OF 1

SHIP TO: LANCE STEERE
(970)490-1511
PARAGON ANALYTICAL LABS
225 COMMERCE DR[illegible]E
FT COLLINS CO 8[illegible]24

CO 805 0-01

2.4

UPS GROUND
TRACKING #: 1Z 810 130 03 9407 9509

BILLING: P/P

DWS ID Lab[redacted] 1110

1ZB101300394079509

000068

PARAGON ANALYTICS
Radiochemistry Data Package

Section 9

ADDITIONAL SUPPORTING DOCUMENTATION

9

Gamma Spectroscopy

Initial Calibration
Standards Traceability

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

RSO#817
Rec'd 3/10/06
803

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

72391-307

Sand in 16 Ounce PP MRP Jar

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

Calibration date: January 1, 2006 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	1329	3.0
Cd-109	88	462.6	d	1875	3.3
Co-57	122	271.79	d	996.0	3.0
Ce-139	166	137.6	d	1400	2.8
Hg-203	279	46.61	d	3215	2.7
Sn-113	392	115.1	d	1939	2.6
Cs-137	662	30.07	y	1252	3.0
Y-88	898	106.6	d	4692	2.6
Co-60	1173	5.2714	y	2378	2.7
Co-60	1332	5.2714	y	2399	2.6
Y-88	1836	106.6	d	4875	2.6

500 grams/290 mL of customer supplied sand.
P O NUMBER 71239, Rev., 2/3/06 REL., Item 3

SOURCE PREPARED BY: M Taskaeva
M. Taskaeva, Radiochemist

Q A APPROVED: 03-07-2006

This standard will expire one year after the calibration date.

061202D02.SPC Analyzed by MC

****

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

****

Geo 13 / Solid

Sample ID: 0613003-2 FWHM CAL (817)

Sampling Start:	01/01/2006 12:00:00	Counting Start:	05/16/2006 20:43:28
Sampling Stop:	01/01/2006 12:00:00	Decay Time.	3.25E+003 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	2700 Sec
Sample Size	5.00E+002 g	Real Time	2811 Sec
Collection Efficiency	1.0000	Spc. File	.061202D02.SPC

Detector #: 2 (Detector 2)

Energy(keV) = -0.77 + 0.501*Ch + 3.48E-08*Ch^2 + 0.00E+00*Ch^3 05/16/2006
FWHM(keV) = 0.65 + 0.009*En + 1.05E-03*En^2 + 0.00E+00*En^3 03/27/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)		FLAG
1	59.52	120.43	15714	364	217	9518	0.81	a	
2	70.81	142.98	389	247	201	8923	0.68	a	
3	72.86	147.07	779	250	201	8923	0.72	b	
4	82.54	166.41	2090	451	363	19473	1.54	a	HiResid Wide Pk
5	85.06	171.44	4401	687	554	32455	2.48	b	HiResid
6	87.96	177.24	72878	609	232	10818	0.83	c	HiResid
7	122.09	245.41	46605	523	243	10903	0.92	a	
8	136.52	274.22	6040	319	229	9690	0.96	a	
9	165.85	332.82	48502	510	212	8297	0.97	a	
10	255.14	511.16	1549	248	194	6400	1.12	a	
11	279.19	559.20	22194	369	179	5488	1.11	a	
12	391.73	783.97	34450	415	153	4302	1.27	a	
13	511.02	1022.22	730	230	184	4986	2.04	a	
14	565.63	1131.29	61	96	78	1506	0.73	a	NET< CL
15	661.72	1323.19	33826	408	145	3865	1.62	a	
16	813.63	1626.56	707	144	110	2366	1.44	a	HiResid
17	821.66	1642.61	222	190	155	3681	2.27	b	HiResid
18	898.12	1795.31	39719	432	136	3430	1.93	a	
19	1173.34	2344.89	38827	414	104	1854	2.26	a	
20	1325.10	2647.92	1131	168	126	1863	4.33	a	Wide Pk
21	1332.56	2662.82	35672	390	81	1075	2.50	b	
22	1836.13	3668.26	24519	319	48	326	3.10	a	HiResid

061201D02.SPC Analyzed by

****

SEEKER C A L I B R A T I O N R E S U L T S Version 2.0.4

****

Sample ID: DAILY CHECK
Stds. Match Tolerance: 2.00 keV

Detector Number: 02 Calibration Date. . . 05/16/2006 20:14:57

Energy(keV) = -0.77 + 0.501*Ch + 3.48e-08*Ch^2 + 0.00e+00*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	120.40	59.51	59.50	0.01
2	1322.99	661.62	661.64	-0.00
3	2344.74	1173.26	1173.21	0.00
4	2662.59	1332.45	1332.48	-0.00

Calibration Results Saved.

061202D02.SPC Analyzed by

****

SEEKER C A L I B R A T I O N R E S U L T S Version 2.0.4

****

Sample ID: 0613003-2 FWHM CAL (817)
Stds. Match Tolerance: 2.00 keV

Detector Number: 02 Calibration Date. . . 05/16/2006 20:43:28

FWHM(keV) = 0.69 + 0.006*En + 1.18e-03*En^2 + 0.00e+00*En^3
(Where En = SQR(Energy in keV))

Pk. #	Energy (kev)	Measured FWHM(keV)	% Diff.	Calculated FWHM(keV)	% Diff.	Prev.Calc. FWHM(kev)
1	59.50	0.808	-0.03	0.808	-2.65	0.787
2	88.04	0.833	2.18	0.851	-2.33	0.832
3	122.06	0.922	-2.25	0.901	-2.11	0.883
4	165.85	0.972	-0.89	0.964	-1.97	0.945
5	279.00	1.112	0.75	1.120	-1.95	1.099
6	391.68	1.269	0.18	1.271	-2.13	1.245
7	661.64	1.622	0.17	1.625	-2.73	1.581
8	898.02	1.929	-0.04	1.928	-3.25	1.868
9	1173.21	2.264	0.59	2.278	-3.79	2.195
10	1332.48	2.500	-0.85	2.479	-4.07	2.382
11	1836.01	3.104	0.18	3.109	-4.81	2.967

Calibration Results Saved.

061950D06.SPC Analyzed by CW

****

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

****

Geo 13 / Solid

Sample ID: 0613003-6 FWHM CAL (817)

ok DLB 3/25/06

Sampling Start:	01/01/2006 12:00:00	Counting Start:	07/24/2006 15:42:28
Sampling Stop:	01/01/2006 12:00:00	Decay Time.	4.90E+003 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	3600 Sec
Sample Size	5.00E+002 g	Real Time	3727 Sec
Collection Efficiency	1.0000	Spc. File	.061950D06.SPC

Detector #: 6 (Detector 6)

Energy(keV)= -0.68 + 0.501*Ch +-1.46E-08*Ch^2 + 0.00E+00*Ch^3 07/24/2006
FWHM(keV) = 0.72 + 0.012*En + 5.28E-04*En^2 + 0.00E+00*En^3 09/15/2005
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.49	120.17	10241	363	248	10458	1.21 a	HiResid
2	72.99	147.12	281	261	213	9168	0.82 a	
3	82.47	166.05	1593	452	366	18532	1.56 a	HiResid Wide Pk
4	84.96	171.03	4655	673	542	29651	2.63 b	HiResid
5	87.99	177.07	60307	616	306	14825	1.31 c	HiResid
6	122.08	245.14	40603	536	290	13353	1.23 a	
7	136.56	274.05	5061	326	241	9910	1.08 a	
8	165.87	332.59	37403	494	253	10113	1.28 a	
9	255.28	511.13	854	238	190	6148	1.07 a	
10	279.26	559.02	8775	304	197	6128	1.30 a	
11	391.78	783.71	25487	380	170	5004	1.43 a	
12	491.58	983.00	5	103	85	1760	0.63 a	NET< CL
13	510.52	1020.83	581	243	196	5393	2.09 a	Wide Pk
14	511.88	1023.55	238	181	147	3734	1.50 b	
15	512.86	1025.50	52	101	82	1660	0.63 c	NET< CL
16	575.83	1151.25	104	109	88	1769	0.84 a	
17	661.69	1322.70	37171	427	151	3724	1.64 a	
18	814.03	1626.93	437	188	151	3368	1.92 a	
19	898.14	1794.91	28356	378	141	3477	1.80 a	
20	1173.31	2344.44	42262	428	99	1654	1.99 a	
21	1325.43	2648.25	611	122	92	1250	2.93 a	HiResid Wide Pk
22	1332.55	2662.48	38425	402	71	902	2.09 b	HiResid

000075

061950D06.SPC Analyzed by

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
23	1570.93	3138.57	14	55	45	492	1.02	a NET< CL
24	1835.94	3667.86	17334	267	37	221	2.42	a HiResid

061950D06.SPC Analyzed by

****

SEEKER C A L I B R A T I O N R E S U L T S Version 2.0.4

****

Sample ID: 0613003-6 FWHM CAL (817)
Stds. Match Tolerance: 2.00 keV

Detector Number: 06 Calibration Date. . . 07/24/2006 15:42:28

FWHM(keV) = 1.19 + -0.002*En + 7.29e-04*En^2 + 0.00e+00*En^3
(Where En = SQR(Energy in keV))

Pk. #	Energy (kev)	Measured FWHM(keV)	% Diff.	Calculated FWHM(keV)	% Diff.	Prev.Calc. FWHM(kev)
1	59.50	1.206	1.04	1.219	-43.87	0.847
2	88.04	1.313	-6.18	1.236	-40.09	0.883
3	122.06	1.231	2.13	1.258	-36.61	0.921
4	165.85	1.276	0.77	1.286	-33.13	0.966
5	279.00	1.299	4.50	1.361	-26.93	1.072
6	391.68	1.432	0.33	1.437	-22.90	1.169
7	661.64	1.642	-1.27	1.621	-17.22	1.383
8	898.02	1.803	-1.01	1.785	-14.48	1.559
9	1173.21	1.994	-0.85	1.977	-12.56	1.756
10	1332.48	2.091	-0.11	2.088	-11.82	1.867
11	1836.01	2.423	0.78	2.443	-10.52	2.210

Calibration Results Saved.

OK
DS
7/25/06

062429D08.SPC Analyzed by CW

****

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

****

Geo 13 / Solid

Sample ID: 0613003-8 FWHM CAL (817)

Sampling Start:	01/01/2006 12:00:00	Counting Start:	08/17/2006 10:06:09
Sampling Stop:	01/01/2006 12:00:00	Decay Time.	5.47E+003 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	1800 Sec
Sample Size	5.00E+002 g	Real Time	1908 Sec
Collection Efficiency	1.0000	Spc. File	.062429D08.SPC

Detector #: 8 (Detector 8)

Energy(keV)= -0.37 + 0.500*Ch +-4.29E-08*Ch^2 + 6.41E-11*Ch^3 08/17/2006
FWHM(keV) = 0.68 + 0.014*En + 5.09E-04*En^2 + 0.00E+00*En^3 12/14/2005
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)		FLAG
1	49.65	100.03	2072	410	329	15977	1.52	a	Wide Pk
2	59.55	119.83	58326	557	228	10450	0.83	a	
3	66.82	134.36	3680	574	462	22523	2.49	a	HiResid Wide Pk
4	72.39	145.50	2223	506	409	19520	2.14	b	HiResid
5	74.85	150.42	294	203	165	6006	0.60	c	HiResid
6	85.43	171.58	1866	630	514	26576	2.56	a	Wide Pk
7	88.08	176.87	67069	566	187	7029	0.87	b	
8	122.07	244.84	28275	377	141	3985	0.89	a	
9	136.50	273.70	3465	211	144	3820	0.92	a	.
10	165.88	332.44	19459	322	133	3271	0.91	a	
11	199.17	399.02	337	174	140	3351	1.21	a	
12	255.20	511.05	560	126	96	1873	0.87	a	
13	279.25	559.14	3487	184	116	2276	1.07	a	
14	310.01	620.64	57	105	86	1476	0.75	a	NET< CL
15	391.74	784.07	11961	249	99	1661	1.18	a	
16	511.45	1023.40	302	125	99	1690	1.55	a	
17	661.78	1323.90	19881	303	92	1467	1.45	a	
18	714.54	1429.33	56	93	76	1057	1.39	a	NET< CL
19	814.00	1628.10	204	95	74	1020	1.27	a	
20	898.10	1796.12	12812	252	92	1557	1.62	a	
21	1173.41	2345.92	22012	307	64	697	1.92	a	
22	1325.55	2649.54	412	84	61	484	3.54	a	Wide Pk
23	1332.70	2663.80	20223	289	40	286	2.07	b	

000078

062429D08.SPC Analyzed by

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
24	1836.98	3668.79	7861	179	21	75	2.50	a

062429D08.SPC Analyzed by

****

SEEKER C A L I B R A T I O N R E S U L T S Version 2.0.4

****

Sample ID: 0613003-8 FWHM CAL (817)
Stds. Match Tolerance: 2.00 keV

Detector Number: 08 Calibration Date. . . 08/17/2006 10:06:09

FWHM(keV) = 0.72 + 0.007*En + 8.11e-04*En^2 + 0.00e+00*En^3
(Where En = SQR(Energy in keV))

Pk. #	Energy (kev)	Measured FWHM(keV)	% Diff.	Calculated FWHM(keV)	% Diff.	Prev.Calc. FWHM(kev)
1	59.50	0.834	-1.06	0.825	-0.66	0.820
2	88.04	0.872	-1.42	0.860	-0.28	0.857
3	122.06	0.894	0.55	0.899	-0.13	0.898
4	165.85	0.914	3.44	0.947	-0.18	0.945
5	279.00	1.073	-0.77	1.065	-0.88	1.055
6	391.68	1.183	-0.51	1.177	-1.89	1.155
7	661.64	1.453	-1.16	1.436	-4.52	1.374
8	898.02	1.624	2.00	1.657	-6.69	1.553
9	1173.21	1.922	-0.64	1.909	-8.97	1.752
10	1332.48	2.069	-0.75	2.054	-10.16	1.864
11	1836.01	2.496	0.36	2.505	-13.46	2.208

Calibration Results Saved.

ANALYTICS

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 · U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837

RSO # 798
Rec'd 8/5/05
OS

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

71035A-307

1.0 Liter Solid in 138G GA-MA Beaker

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

US Patent 4,430,258; UK Patent GB2,149,194B; CA Patent 1,196,776.
Density of solid matrix 1.15 g/cc.

Calibration date: July 1, 2005 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	1353	3.0
Cd-109	88	462.6	d	1912	3.3
Co-57	122	271.79	d	1048	3.0
Ce-139	166	137.6	d	1426	2.8
Hg-203	279	46.61	d	3260	2.7
Sn-113	392	115.1	d	2038	2.6
Cs-137	662	30.07	y	1268	3.0
Y-88	898	106.6	d	5008	2.6
Co-60	1173	5.2714	y	2475	2.7
Co-60	1332	5.2714	y	2499	2.6
Y-88	1836	106.6	d	5224	2.6

P O NUMBER 71239, Rel. 5/20/05, Item 1

SOURCE PREPARED BY: M Taskaeva for
M. D. Currie, Radiochemist

Q A APPROVED: [signature] 8-1-05

This standard will expire one year after the calibration date.

ANALYTICS
An Isotope Products Laboratories Company

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404·352·8677
Fax 404·352·2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

73487-307 RSO# 824 Rec'd 8/29/06 JVB

1.0 Solid in 138G GA-MA Beaker

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

US Patent 4,430,258; UK Patent GB2,149,194B; CA Patent 1,196,776.
Density of solid matrix 1.15 g/cc.

Calibration date: July 1, 2006 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	1323	3.0
Cd-109	88	462.6	d	1872	3.3
Co-57	122	271.79	d	984.9	3.0
Ce-139	166	137.6	d	1391	2.8
Hg-203	279	46.61	d	3088	2.7
Sn-113	392	115.1	d	1971	2.6
Cs-137	662	30.07	y	1256	3.0
Y-88	898	106.6	d	4857	2.6
Co-60	1173	5.2714	y	2377	2.7
Co-60	1332	5.2714	y	2374	2.6
Y-88	1836	106.6	d	5084	2.6

P O NUMBER 71239, Rel. 7/31/06, Item 1

SOURCE PREPARED BY: M Taskaeva
M. Taskaeva, Radiochemist

Q A APPROVED: 8-24-06

This standard will expire one year after the calibration date.

061207D02.SPC Analyzed by CW

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

Geo 1 / Water

Sample ID: 0613004-2 GEO 1 EFF CAL (798)

Sampling Start:	07/01/2005 12:00:00	Counting Start:	05/18/2006 09:12:40
Sampling Stop:	07/01/2005 12:00:00	Decay Time.	7.70E+003 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	3600 Sec
Sample Size	1.00E+000 L	Real Time	3704 Sec
Collection Efficiency	1.0000	Spc. File	.061207D02.SPC

Detector #: 2 (Detector 2)

Energy(keV)= -0.85 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 05/18/2006
FWHM(keV) = 0.69 + 0.006*En + 1.18E-03*En^2 + 0.00E+00*En^3 05/16/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.47	120.46	27378	422	215	9358	0.80 a	HiResid
2	69.30	140.11	727	471	385	20558	1.59 a	Wide Pk
3	87.94	177.34	81294	632	224	10141	0.85 a	
4	122.05	245.44	45606	480	179	6492	0.89 a	
5	136.50	274.32	5577	250	165	5456	0.80 a	HiResid
6	165.83	332.89	28936	404	180	5965	0.94 a	
7	255.13	511.23	862	223	177	5336	1.07 a	
8	279.18	559.26	2006	201	148	4041	1.01 a	
9	310.08	620.98	191	209	171	4619	1.34 a	
10	337.03	674.80	112	133	108	2661	0.76 a	
11	391.75	784.10	17389	317	144	3832	1.23 a	
12	511.32	1022.89	485	226	182	4669	2.05 a	
13	513.40	1027.05	52	109	89	1796	0.87 b	NET< CL
14	661.77	1323.35	47362	462	127	2989	1.57 a	
15	813.72	1626.83	267	140	112	2433	1.43 a	
16	898.19	1795.52	18141	315	134	3467	1.86 a	
17	1115.40	2229.34	132	119	96	1955	1.55 a	
18	1173.43	2345.22	52613	474	97	1671	2.20 a	
19	1332.63	2663.19	47485	443	66	726	2.38 a	HiResid
20	1836.11	3668.71	10531	210	37	198	2.97 a	HiResid

061207D02.SPC Analyzed by

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SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Version 1.8.2

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Background File:. . . . . DET020517.BKG (060517-2 WEEKLY BKGD)

Bkg.File Detector #: 2

BACKGROUND SUBTRACT RESULTS

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
1	59.47	27378	422	215	27376	422	216	
2	69.30	727	471	385	725	471	385	
3	87.94	81294	632	224	81288	632	224	
4	122.05	45606	480	179	45605	480	180	
10	337.03	112	133	108	109	133	108	
12	511.32	485	226	182	388	226	183	

061207D02.SPC Analyzed by

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SEEKER C A L I B R A T I O N R E S U L T S Version 2.0.4

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Sample ID: 0613004-2 GEO 1 EFF CAL (798)
Stds. Match Tolerance: 2.00 keV

Detector Number: 02 Calibration Date. . . 05/18/2006 09:12:40
Geometry File (D02)(Sh01).EFF ID. Geo 1 Eff Cal
Amount of Std. in Calib. Source: 1.000000 gm

Eff = 1 / [3.02e-03*En^-3.85e+00 + 1.33e+02*En^ 7.85e-01]
(Where En = Energy in MeV)) (Exponential)

Pk. #	Energy (kev)	Measured Efficiency	% Difference	Calculated Efficiency	% Difference	Prev.Calc. Efficiency
1	59.50	5.63e-03	3.56	5.84e-03	0.32	5.86e-03
2	88.04	1.91e-02	-3.95	1.84e-02	-0.41	1.83e-02
3	122.06	2.74e-02	3.19	2.83e-02	0.09	2.83e-02
4	165.85	2.84e-02	-0.48	2.82e-02	0.63	2.84e-02
5	279.00	2.02e-02	0.64	2.04e-02	0.79	2.05e-02
6	391.68	1.64e-02	-4.30	1.57e-02	0.68	1.58e-02
7	661.64	1.06e-02	-1.63	1.04e-02	0.46	1.05e-02
8	898.02	8.10e-03	1.14	8.20e-03	0.33	8.22e-03
9	1173.21	6.63e-03	0.25	6.64e-03	0.21	6.66e-03
10	1332.48	5.92e-03	1.46	6.01e-03	0.15	6.02e-03
11	1836.01	4.51e-03	3.48	4.67e-03	0.01	4.68e-03

Calibration Results Saved.

Geometry 01 Calibration Verification: Gamma Mixed Nuclide Source														
Std. #	718	Detector	2											
				REF DATE :	7/1/2003				count date		5/18/2006			
FROM CALIBRATION CERTIFICATE				FROM ANALYTICS.LIB			EXPECTED ACTIVITY							
					Mass of									# of half-lives
Isotope	KeV	Half Life(y)	Gammas/Sec.	Gamma Fraction:	Standard			DPS	pCi/L	Activity	Recovery	Pass/Fail		expired
Am-241	59.9	432.0000	1304	0.3590	1	L	Am-241	3632.3	98170.6	98900	101%	Pass		0.01
Cd-109	88	1.2666	1862	0.0361			Cd-109	51578.9	1394025.6	1440000	103%	Pass		2.27
Co-57	122	0.7441	1032	0.8551			Co-57	1206.9	32618.3	31900	98%	Pass		3.87
Ce-139	166	0.3768	1419	0.8035			Ce-139	1766.0	47730.4	>5 h-lives	>5 h-lives	>5 h-lives		7.64
Hg-203	279	0.1276	3194	0.7730			Hg-203	4132.0	111674.4	>5 h-lives	>5 h-lives	>5 h-lives		22.58
Sn-113	392	0.3151	1960	0.6490			Sn-113	3020.0	81622.5	>5 h-lives	>5 h-lives	>5 h-lives		9.14
Cs-137	662	30.0000	1260	0.8512			Cs-137	1480.3	40007.1	41100	103%	Pass		0.10
Y-88	898	0.2919	5060	0.9340			Y-88	5417.6	146420.5	>5 h-lives	>5 h-lives	>5 h-lives		9.87
Co-60	1173	5.2714	2402	1.0000			Co-60	2402.0	64918.9	64300	99%	Pass		0.55
Co-60	1332	5.2714	2427	1.0000			Co-60	2427.0	65594.6	64300	98%	Pass		0.55
Y-88	1836	0.2919	5287	0.9938			Y-88	5320.0	143783.3	>5 h-lives	>5 h-lives	>5 h-lives		9.87

061208D02.SPC Analyzed by CW

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SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Geo 1 / Water

Sample ID: 0613004-2A GEO 1 CAL VER (718)

Sampling Start:	07/01/2003 12:00:00	Counting Start:	05/18/2006 10:32:24
Sampling Stop:	07/01/2003 12:00:00	Decay Time.	2.52E+004 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	1800 Sec
Sample Size	1.00E+000 L	Real Time	1829 Sec
Collection Efficiency	1.0000	Spc. File	.061208D02.SPC

Detector #: 2 (Detector 2)

Energy(keV)= -0.85 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 05/18/2006
FWHM(keV) = 0.69 + 0.006*En + 1.18E-03*En^2 + 0.00E+00*En^3 05/16/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	42.76	87.09	92	115	93	1925	0.71 a	NET< CL
2	59.48	120.49	13766	274	116	2693	0.83 a	
3	66.05	133.61	95	87	69	1189	0.41 a	
4	87.93	177.31	13237	261	101	2052	0.83 a	
5	122.06	245.46	3486	157	85	1471	0.83 a	
6	136.40	274.10	473	125	96	1720	0.95 a	
7	165.84	332.91	358	119	92	1577	1.00 a	
8	175.42	352.04	76	98	79	1262	0.83 a	NET< CL
9	194.02	389.18	93	102	83	1382	0.80 a	
10	310.09	621.00	7	75	61	834	0.58 a	NET< CL
11	318.89	638.57	69	79	64	918	0.74 a	
12	343.65	688.02	40	87	71	1070	1.04 a	NET< CL
13	353.24	707.17	73	87	70	1046	0.99 a	
14	367.64	735.93	45	64	52	657	0.62 a	NET< CL
15	391.82	784.22	151	107	85	1350	1.34 a	
16	661.73	1323.28	22741	313	70	894	1.58 a	
17	762.31	1524.16	53	99	81	1050	2.21 a	NET< CL
18	1173.35	2345.07	19174	284	53	498	2.06 a	HiResid
19	1332.58	2663.08	17943	270	28	133	2.39 a	
20	1836.22	3668.92	31	17	11	21	1.91 a	

061208D02.SPC Analyzed by

SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Vers. 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Background File:. . . . . DET020517.BKG (060517-2 WEEKLY BKGD)

Bkg.File Detector #: 2

BACKGROUND SUBTRACT RESULTS

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
2	59.48	13766	274	116	13765	274	116	
3	66.05	95	87	69	89	87	70	
4	87.93	13237	261	101	13234	261	101	
5	122.06	3486	157	85	3486	157	85	
13	353.24	73	87	70	68	87	71	NET<CL

061208D02.SPC Analyzed by

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SEEKER F I N A L A C T I V I T Y R E P O R T Version 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Geo 1 / Water

Sample ID: 0613004-2A GEO 1 CAL VER (718)

Sampling Start:	07/01/2003 12:00:00	Counting Start:	05/18/2006 10:32:24
Sampling Stop:	07/01/2003 12:00:00	Decay Time.	2.52e+004 Hrs
Buildup Time.	0.00e+000 Hrs	Live Time	1800 Sec
Sample Size	1.00e+000 L	Real Time	1829 Sec
Collection Efficiency	1.0000	Spectrum File	.061208D02.SPC
Cr. Level Confidence Interval:	95 %	Det. Limit Confidence Interval:	95 %

Detector #: 2 (Detector 2)

Efficiency File: (D02)(Sh01).EFF (Geo 1 Eff Cal)
Eff.=1/[3.02E-03*En^-3.85E+00 + 1.33E+02*En^7.85E-01] 05/18/2006

Library File: . . . .ANALYTICAL.LIB (Analytical)

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	N E T	Concentration (pCi/L)	MDA	Critical Level	Halflife (hrs)
Am-241	59.54		9.89E+04 +- 1.96E+03	1.68E+03	8.31E+02	3.79E+06
Cd-109	88.02		1.44E+06 +- 2.84E+04	2.23E+04	1.10E+04	1.11E+04
Co-57	122.07		3.19E+04 +- 1.44E+03	1.59E+03	7.81E+02	6.50E+03
Ce-139	165.85		4.73E+04 +- 1.56E+04	2.47E+04	1.22E+04	3.30E+03
Cs-137	661.62		4.11E+04 +- 5.66E+02	2.56E+02	1.26E+02	2.64E+05
Co-60	Average:x		6.43E+04 +- 6.80E+02	. . . .	. . . .	4.62E+04
	1173.21		6.33E+04 +- 9.39E+02	3.59E+02	1.75E+02	4.62E+04
	1332.48		6.55E+04 +- 9.85E+02	2.17E+02	1.04E+02	4.62E+04
Hg-203	279.18		MDA	1.09E+09	5.37E+08	1.12E+03
Sn-113	391.68		MDA	8.95E+04r	4.36E+04	2.76E+03
Y-88	898.02		MDA	3.20E+05	1.58E+05	2.56E+03

MEASURED TOTAL: 1.73E+06 +- 4.87E+04 pCi/L

UNKNOWN,SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	42.76	87.09	92	115	93	1925	0.71	Deleted
3	66.05	133.61	89	87	70	1189	0.41	Unknown
6	136.40	274.10	473	125	96	1720	0.95	Unknown
8	175.42	352.04	76	98	79	1262	0.83	Deleted
9	194.02	389.18	93	102	83	1382	0.80	Unknown

061208D02.SPC Analyzed by

UNKNOWN,SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
10	310.09	621.00	7	75	61	834	0.58	Deleted
11	318.89	638.57	69	79	64	918	0.74	Unknown
12	343.65	688.02	40	87	71	1070	1.04	Deleted
13	353.24	707.17	68	87	71	1046	0.99	Deleted
14	367.64	735.93	45	64	52	657	0.62	Deleted
15	391.82	784.22	151	107	85	1350	1.34	Unknown
17	762.31	1524.16	53	99	81	1050	2.21	Deleted
20	1836.22	3668.92	31	17	11	21	1.91	Unknown

062299D06.SPC Analyzed by CW

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SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Geo 1 / Water

Sample ID: 0613004-6 GEO 1 EFF CAL (824)

Sampling Start:	07/01/2006 12:00:00	Counting Start:	09/11/2006 10:06:11
Sampling Stop:	07/01/2006 12:00:00	Decay Time.	1.73E+003 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	3600 Sec
Sample Size	1.00E+000 L	Real Time	3816 Sec
Collection Efficiency	1.0000	Spc. File	.062299D06.SPC

Detector #: 6 (Detector 6)

Energy(keV)= -0.69 + 0.501*Ch +-1.21E-08*Ch^2 + 0.00E+00*Ch^3 09/11/2006
FWHM(keV) = 1.19 + -0.002*En + 7.29E-04*En^2 + 0.00E+00*En^3 07/24/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)		FLAG
1	59.52	120.20	17321	432	282	16764	0.97	a	
2	68.57	138.27	869	573	469	34236	1.81	a	
3	70.84	142.82	2134	456	367	24899	1.33	b	
4	72.87	146.86	2689	335	262	15562	0.90	c	
5	82.43	165.95	3002	571	461	33017	1.82	a	Wide Pk
6	85.57	172.22	9260	1014	819	66033	3.56	b	
7	88.01	177.10	89635	696	292	18009	1.00	c	
8	122.08	245.12	67543	624	284	17005	1.04	a	
9	136.50	273.92	9248	419	306	18487	1.07	a	
10	165.87	332.56	85526	661	253	13482	1.04	a	HiResid Wide Pk
11	169.73	340.25	7	895	736	51681	3.84	b	NET< CL HiResid
12	255.20	510.90	3206	298	227	10112	1.21	a	
13	279.25	558.93	70487	588	208	8536	1.18	a	
14	291.15	582.70	135	161	131	4242	0.68	a	
15	391.79	783.63	64255	552	181	6023	1.27	a	HiResid
16	486.62	972.99	90	162	132	3675	0.94	a	NET< CL
17	511.23	1022.12	1613	274	216	7476	2.15	a	
18	661.70	1322.56	40791	452	167	5398	1.50	a	
19	814.06	1626.80	1148	160	120	2938	1.38	a	
20	898.14	1794.69	74717	574	144	3827	1.67	a	HiResid
21	1173.29	2344.11	46124	448	106	2151	1.85	a	
22	1325.16	2647.37	1580	178	131	2472	3.03	a	

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062299D06.SPC Analyzed by

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
23	1332.56	2662.15	41933	425	92	1561	1.98	b
24	1835.95	3667.36	43750	422	46	363	2.29	a HiResid

062299D06.SPC Analyzed by

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SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Version 1.8.2

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Background File:. . . . . DET060908.BKG (060908-6 WEEKLY BKGD)

Bkg.File Detector #: 6

BACKGROUND SUBTRACT RESULTS

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
17	511.23	1613	274	216	1535	275	216	

062299D06.SPC Analyzed by

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SEEKER C A L I B R A T I O N R E S U L T S Version 2.0.4

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Sample ID: 0613004-6 GEO 1 EFF CAL (824)
Stds. Match Tolerance: 2.00 keV

Detector Number: 06 Calibration Date. . . 09/11/2006 10:06:11
Geometry File (D06)(Sh01).EFF ID. Geo 1 Eff Cal
Amount of Std. in Calib. Source: 1.000000 gm

Crossover: 180.00 keV

Below Crossover Efficiency Fit:
Eff = 10 ^ [-2.87e+01 + 2.52e+01*En +-5.85e+00*En^2 + 0.00e+00*En^3]
(Where En = LOG(Energy in keV)) (Polynomial)
Above Knee Efficiency Fit:
Eff = 10 ^ [-1.40e+00 + 1.00e+00*En +-6.55e-01*En^2 + 7.72e-02*En^3]
(Where En = LOG(Energy in keV)) (Polynomial)

Pk. #	Energy (kev)	Measured Efficiency	% Difference	Calculated Efficiency	% Difference	Prev.Calc. Efficiency
1	59.50	3.64e-03	1.22	3.68e-03	-0.85	3.65e-03
2	88.04	1.48e-02	-4.48	1.42e-02	1.50	1.44e-02
3	122.06	2.29e-02	4.81	2.40e-02	2.25	2.46e-02
4	165.85	2.45e-02	-1.80	2.41e-02	1.96	2.46e-02
5	279.00	1.85e-02	0.02	1.85e-02	1.23	1.87e-02
6	391.68	1.40e-02	0.07	1.40e-02	1.78	1.42e-02
7	661.64	9.06e-03	-0.92	8.98e-03	1.35	9.10e-03
8	898.02	6.82e-03	1.55	6.93e-03	1.11	7.01e-03
9	1173.21	5.53e-03	0.06	5.53e-03	1.33	5.61e-03
10	1332.48	5.04e-03	-1.14	4.98e-03	1.66	5.06e-03
11	1836.01	3.82e-03	0.34	3.83e-03	3.40	3.97e-03

Calibration Results Saved.

OK
9/11/06

000094

Geometry 01 Calibration Verification: Gamma Mixed Nuclide Source

Std. #	798	Detector	6										
NEW SOURCE :	**798**		**REF DATE :**	**7/1/2005**				count date		9/11/2006			
FROM CALIBRATION CERTIFICATE			FROM ANALYTICS.LIB			EXPECTED ACTIVITY							# of half-lives
Isotope	KeV	Half Life(y)	Gammas/Sec.	Gamma Fraction:	Mass of Standard			DPS	pCi/g	Activity	Recovery	Pass/Fail	expired
Am-241	59.9	432.0000	1353	0.3590	1	L	Am-241	3768.8	101859.5	97000	95%	Pass	0.00
Cd-109	88	1.2666	1912	0.0361			Cd-109	52964.0	1431459.2	1490000	104%	Pass	0.94
Co-57	122	0.7441	1048	0.8551			Co-57	1225.6	33124.0	32000	97%	Pass	1.61
Ce-139	166	0.3768	1426	0.8035			Ce-139	1774.7	47965.8	48500	101%	Pass	3.17
Hg-203	279	0.1276	3260	0.7730			Hg-203	4217.3	113982.0	NA	>5 h-lives	>5 h-lives	9.38
Sn-113	392	0.3151	2038	0.6490			Sn-113	3140.2	84870.7	88200	104%	Pass	3.80
Cs-137	662	30.0000	1268	0.8512			Cs-137	1489.7	40261.1	41000	102%	Pass	0.04
Y-88	898	0.2919	5008	0.9340			Y-88	5361.9	144915.8	146000	101%	Pass	4.10
Co-60	1173	5.2714	2475	1.0000			Co-60	2475.0	66891.9	68600	103%	Pass	0.23
Co-60	1332	5.2714	2499	1.0000			Co-60	2499.0	67540.5	68100	101%	Pass	0.23
Y-88	1836	0.2919	5224	0.9938			Y-88	5256.6	142070.0	144000	101%	Pass	4.10
											R:\Inst\gamma\ST798.xls		

062302D06.SPC Analyzed by CW

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SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Geo 1 / Water

Sample ID: 0613004-6A GEO 1 CAL VER (798)

Sampling Start: 07/01/2005 12:00:00	Counting Start: 09/11/2006 11:24:12
Sampling Stop: 07/01/2005 12:00:00	Decay Time. . . . . 1.05E+004 Hrs
Buildup Time. . . . . 0.00E+000 Hrs	Live Time . . . . . 5400 Sec
Sample Size . . . . . 1.00E+000 L	Real Time . . . . . 5543 Sec
Collection Efficiency 1.0000	Spc. File 062302D06.SPC

Detector #: 6 (Detector 6)

Energy(keV)= -0.69 + 0.501*Ch +-1.21E-08*Ch^2 + 0.00E+00*Ch^3 09/11/2006
FWHM(keV) = 1.19 + -0.002*En + 7.29E-04*En^2 + 0.00E+00*En^3 07/24/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)		FLAG
1	59.48	120.14	25644	420	224	10565	0.93	a	HiResid
2	86.98	175.03	3233	643	521	33393	2.65	a	Wide Pk
3	88.01	177.10	79514	632	236	11715	1.03	b	
4	122.07	245.11	43091	497	224	9901	1.08	a	
5	136.45	273.81	5438	271	187	7422	1.00	a	
6	165.85	332.52	20801	379	202	8020	1.08	a	
7	255.21	510.93	358	180	145	4784	0.82	a	
8	279.26	558.95	327	168	135	4143	0.77	a	
9	391.77	783.60	11517	287	157	4568	1.31	a	
10	432.05	864.01	65	158	129	3513	1.00	a	NET< CL
11	510.34	1020.35	452	205	165	4781	1.82	a	
12	512.17	1024.00	224	133	106	2608	1.05	b	
13	611.66	1222.65	131	130	105	2407	1.22	a	
14	661.68	1322.53	60926	518	128	3184	1.50	a	
15	813.20	1625.08	362	282	230	6496	3.23	a	Wide Pk
16	815.26	1629.18	-99	97	81	1624	0.86	b	NET< CL
17	836.24	1671.08	248	176	143	3578	1.88	a	
18	898.13	1794.65	11035	274	145	3901	1.63	a	
19	1173.29	2344.11	64793	522	94	1687	1.87	a	HiResid
20	1324.43	2645.91	169	88	69	780	2.54	a	
21	1332.56	2662.14	57861	487	64	749	1.96	a	
22	1460.94	2918.51	46	52	41	325	1.76	a	
23	1835.94	3667.35	6407	163	25	111	2.29	a	

000096

062302D06.SPC Analyzed by

SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Vers. 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Background File:. . . . . DET060908.BKG (060908-6 WEEKLY BKGD)

Bkg.File Detector #: 6

BACKGROUND SUBTRACT RESULTS

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
11	510.34	452	205	165	336	206	167	
22	1460.94	46	52	41	21	52	42	NET<CL

062302D06.SPC Analyzed by

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SEEKER F I N A L A C T I V I T Y R E P O R T Version 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Geo 1 / Water

Sample ID: 0613004-6A GEO 1 CAL VER (798)

Sampling Start: 07/01/2005 12:00:00	Counting Start: 09/11/2006 11:24:12
Sampling Stop: 07/01/2005 12:00:00	Decay Time. . . . . 1.05e+004 Hrs
Buildup Time. . . . . 0.00e+000 Hrs	Live Time . . . . . 5400 Sec
Sample Size . . . . . 1.00e+000 L	Real Time . . . . . 5543 Sec
Collection Efficiency 1.0000	Spectrum File 062302D06.SPC
Cr. Level Confidence Interval: 95 %	Det. Limit Confidence Interval: 95 %

Detector #: 6 (Detector 6)

Efficiency File: (D06)(Sh01).EFF (Geo 1 Eff Cal)
Eff=10^[-2.87E+01 +2.52E+01*L +-5.85E+00*L^2 +0.00E+00*L^3] 09/11/2006
Eff.=10^[-1.40E+00 +1.00E+00*L +-6.55E-01*L^2 +7.72E-02*L^3] Above 180.00 keV

Library File: . . . .ANALYTICAL.LIB (Analytical)

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	N E T	Concentration (pCi/L)	MDA	Critical Level	Halflife (hrs)
Am-241	59.54		9.70E+04 +- 1.59E+03	1.70E+03	8.46E+02	3.79E+06
Cd-109	88.02		1.49E+06 +- 1.19E+04	8.90E+03	4.43E+03	1.11E+04
Co-57	122.07		3.20E+04 +- 3.69E+02	3.35E+02	1.67E+02	6.50E+03
Ce-139	165.85		4.85E+04 +- 8.83E+02	9.47E+02	4.70E+02	3.30E+03
Sn-113	391.68		8.82E+04 +- 2.20E+03	2.43E+03	1.20E+03	2.76E+03
Cs-137	661.62		4.10E+04 +- 3.48E+02	1.74E+02	8.60E+01	2.64E+05
Y-88	Average:x		1.45E+05 +- 2.58E+03	. . . .	. . . .	2.56E+03
	898.02		1.46E+05 +- 3.64E+03	3.89E+03	1.92E+03	2.56E+03
	1836.01		1.44E+05 +- 3.67E+03	1.21E+03	5.74E+02	2.56E+03
Co-60	Average:x		6.84E+04 +- 3.98E+02	. . . .	. . . .	4.62E+04
	1173.21		6.86E+04 +- 5.52E+02	2.01E+02	9.90E+01	4.62E+04
	1332.48		6.81E+04 +- 5.73E+02	1.53E+02	7.49E+01	4.62E+04
Hg-203	279.18		MDA	5.19E+04r	2.57E+04	1.12E+03

MEASURED TOTAL: 2.01E+06 +- 2.03E+04 pCi/L

UNKNOWN, SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
2	86.98	175.03	3233	643	521	33393	2.65	Unknown
5	136.45	273.81	5439	271	187	7422	1.00	Unknown

062302D06.SPC Analyzed by

UNKNOWN,SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
7	255.21	510.93	358	180	145	4784	0.82	Unknown
8	279.26	558.95	328	168	135	4143	0.77	Unknown
10	432.05	864.01	65	158	129	3513	1.00	Deleted
11	510.34	1020.35	336	206	167	4781	1.82	Unknown
12	512.17	1024.00	224	133	106	2608	1.05	Unknown
13	611.66	1222.65	131	130	105	2407	1.22	Unknown
15	813.20	1625.08	362	282	230	6496	3.23	1836DEsc
16	815.26	1629.18	-99	97	81	1624	0.86	Deleted
17	836.24	1671.08	248	176	143	3578	1.88	Unknown
20	1324.43	2645.91	169	88	69	780	2.54	1836SEsc
22	1460.94	2918.51	21	52	42	325	1.76	Deleted

c:\SEEKER\BIN\062302d06.res Analysis Results Saved.

062650D08.SPC Analyzed by CW

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SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Geo 1 / Water

Sample ID: 0613004-8 GEO 1 EFF CAL (824)

Sampling Start:	07/01/2006 12:00:00	Counting Start:	09/11/2006 14:14:16
Sampling Stop:	07/01/2006 12:00:00	Decay Time.	1.73E+003 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	1800 Sec
Sample Size	1.00E+000 L	Real Time	2049 Sec
Collection Efficiency	1.0000	Spc. File	.062650D08.SPC

Detector #: 8 (Detector 8)

Energy(keV)= -0.62 + 0.500*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 09/11/2006
FWHM(keV) = 0.72 + 0.007*En + 8.11E-04*En^2 + 0.00E+00*En^3 08/17/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	49.61	100.41	7127	827	666	49210	2.31 a	Wide Pk
2	59.28	119.74	86857	697	305	18791	0.81 a	
3	67.15	135.46	7399	791	635	42570	2.50 a	Wide Pk
4	70.44	142.04	8866	709	562	36894	2.05 b	
5	72.65	146.46	7162	406	304	17028	0.98 c	
6	82.26	165.68	1162	306	245	13315	0.72 a	
7	87.83	176.81	118764	766	274	15139	0.85 a	
8	121.85	244.80	58833	546	206	8546	0.88 a	
9	135.93	272.96	1240	572	467	22990	2.38 a	Wide Pk
10	136.29	273.67	6261	285	195	7663	0.82 b	
11	165.69	332.44	60012	549	204	7690	0.93 a	HiResid
12	198.98	398.98	1062	259	206	7259	1.11 a	
13	255.03	511.01	1843	214	161	4782	0.99 a	
14	279.11	559.15	47051	469	146	3944	1.04 a	
15	306.95	614.81	81	158	129	3091	0.91 a	NET< CL
16	391.68	784.17	42631	439	122	2923	1.14 a	
17	502.80	1006.30	87	130	105	2194	1.17 a	NET< CL
18	511.08	1022.85	871	229	182	4431	2.37 a	Wide Pk
19	661.79	1324.10	26514	360	126	2914	1.33 a	
20	697.35	1395.17	89	162	132	3044	1.41 a	NET< CL
21	698.28	1397.03	112	107	86	1691	0.83 b	
22	813.99	1628.32	720	111	80	1376	1.22 a	
23	898.11	1796.49	48656	459	104	2086	1.53 a	
24	1006.86	2013.86	66	85	69	1093	0.94 a	NET< CL

062650D08.SPC Analyzed by

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
25	1173.24	2346.45	30086	360	80	1224	1.76 a	
26	1324.94	2649.68	1091	137	99	1397	3.10 a	HiResid
27	1332.32	2664.43	27403	340	65	809	1.87 b	HiResid
28	1465.23	2930.10	56	68	55	661	1.36 a	
29	1835.26	3669.76	28566	341	39	272	2.14 a	HiResid
30	1849.43	3698.08	46	54	43	242	3.65 a	
31	1856.91	3713.03	43	28	20	88	1.36 b	

062650D08.SPC Analyzed by

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SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Version 1.8.2

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Background File:. . . . . DET080908.BKG (060809-8 WEEKLY BKGD)

Bkg.File Detector #: 8

BACKGROUND SUBTRACT RESULTS

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
3	67.15	7399	791	635	7394	791	635	
12	198.98	1062	259	206	1056	259	206	
18	511.08	871	229	182	820	229	182	
23	898.11	48656	459	104	48654	459	104	

062650D08.SPC Analyzed by

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SEEKER C A L I B R A T I O N R E S U L T S Version 2.0.4

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Sample ID: 0613004-8 GEO 1 EFF CAL (824)
Stds. Match Tolerance: 2.00 keV

Detector Number: 08 Calibration Date. . . 09/11/2006 14:14:16
Geometry File (D08)(Sh01).EFF ID. Geo 1 Eff Cal
Amount of Std. in Calib. Source: 1.000000 gm

Eff = 1 / [6.36e-01*En^-1.19e+00 + 1.20e+02*En^ 9.04e-01]
(Where En = Energy in MeV)) (Exponential)

Pk. #	Energy (kev)	Measured Efficiency	% Difference	Calculated Efficiency	% Difference	Prev.Calc. Efficiency
1	59.50	3.65e-02	-0.92	3.62e-02	0.52	3.63e-02
2	88.04	3.93e-02	2.60	4.03e-02	0.69	4.06e-02
3	122.06	3.99e-02	-2.42	3.89e-02	0.25	3.90e-02
4	165.85	3.45e-02	0.02	3.45e-02	-0.24	3.44e-02
5	279.00	2.48e-02	-0.71	2.46e-02	-0.61	2.44e-02
6	391.68	1.86e-02	1.17	1.88e-02	-0.51	1.87e-02
7	661.64	1.18e-02	1.67	1.20e-02	0.01	1.20e-02
8	898.02	8.90e-03	2.72	9.14e-03	0.42	9.18e-03
9	1173.21	7.22e-03	-0.21	7.20e-03	0.82	7.26e-03
10	1332.48	6.58e-03	-2.44	6.43e-03	1.01	6.49e-03
11	1836.01	4.99e-03	-3.63	4.82e-03	1.52	4.89e-03

Calibration Results Saved.

OK
JJR
9/11/06

000103

Geometry 01 Calibration Verification: Gamma Mixed Nuclide Source													
Std. #	798	Detector	8										
NEW SOURCE :	798		REF DATE :	7/1/2005					count date		9/11/2006		
FROM CALIBRATION CERTIFICATE			FROM ANALYTICS.LIB			EXPECTED ACTIVITY							
					Mass of								# of half-lives
Isotope	KeV	Half Life(y)	Gammas/Sec.	Gamma Fraction:	Standard			DPS	pCi/g	Activity	Recovery	Pass/Fail	expired
Am-241	59.9	432.0000	1353	0.3590	1	L	Am-241	3768.8	101859.5	104000	102%	Pass	0.00
Cd-109	88	1.2666	1912	0.0361			Cd-109	52964.0	1431459.2	1400000	98%	Pass	0.94
Co-57	122	0.7441	1048	0.8551			Co-57	1225.6	33124.0	33900	102%	Pass	1.61
Ce-139	166	0.3768	1426	0.8035			Ce-139	1774.7	47965.8	47700	99%	Pass	3.17
Hg-203	279	0.1276	3260	0.7730			Hg-203	4217.3	113982.0	NA	>5 h-lives	>5 h-lives	9.38
Sn-113	392	0.3151	2038	0.6490			Sn-113	3140.2	84870.7	81700	96%	Pass	3.80
Cs-137	662	30.0000	1268	0.8512			Cs-137	1489.7	40261.1	39300	98%	Pass	0.04
Y-88	898	0.2919	5008	0.9340			Y-88	5361.9	144915.8	144000	99%	Pass	4.10
Co-60	1173	5.2714	2475	1.0000			Co-60	2475.0	66891.9	67500	101%	Pass	0.23
Co-60	1332	5.2714	2499	1.0000			Co-60	2499.0	67540.5	68000	101%	Pass	0.23
Y-88	1836	0.2919	5224	0.9938			Y-88	5256.6	142070.0	151000	106%	Pass	4.10
											R:\inst\gamma\ST798.xls		

062651D08.SPC Analyzed by CW

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SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Geo 1 / Water

Sample ID: 0613004-8A GEO 1 CAL VER (798)

Sampling Start:	07/01/2005 12:00:00	Counting Start:	09/11/2006 14:56:51
Sampling Stop:	07/01/2005 12:00:00	Decay Time.	1.05E+004 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	1800 Sec
Sample Size	1.00E+000 L	Real Time	1921 Sec
Collection Efficiency	1.0000	Spc. File	062651D08.SPC

Detector #: 8 (Detector 8)

Energy(keV)= -0.62 + 0.500*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 09/11/2006
FWHM(keV) = 0.72 + 0.007*En + 8.11E-04*En^2 + 0.00E+00*En^3 08/17/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)		FLAG
1	43.03	87.26	399	315	257	11298	1.15	a	
2	48.88	98.95	2906	406	322	17672	1.09	a	HiResid Wide Pk
3	50.16	101.51	3433	512	410	24876	1.50	b	HiResid
4	51.68	104.54	523	186	148	6097	0.41	c	HiResid
5	59.26	119.70	89666	661	230	10678	0.83	a	
6	65.67	132.50	726	296	239	9759	1.15	a	HiResid Wide Pk
7	67.33	135.83	3785	555	445	20913	2.50	b	HiResid
8	87.81	176.76	70894	578	184	6817	0.84	a	
9	121.82	244.75	24618	345	118	2828	0.88	a	
10	136.24	273.57	2838	168	107	2308	0.84	a	
11	165.66	332.38	9742	240	113	2344	0.93	a	
12	255.06	511.09	204	115	91	1686	0.89	a	
13	279.10	559.13	240	120	96	1692	1.00	a	
14	391.62	784.06	4771	175	89	1549	1.10	a	
15	510.79	1022.26	57	75	60	831	0.83	a	NET< CL
16	661.73	1323.98	25997	336	76	1079	1.37	a	
17	898.03	1796.32	4783	172	84	1373	1.55	a	
18	1115.21	2230.44	80	101	82	1238	2.03	a	NET< CL
19	1173.14	2346.24	27650	340	59	676	1.73	a	
20	1323.29	2646.38	18	35	28	194	1.02	a	NET< CL
21	1332.20	2664.18	24848	318	36	252	1.82	a	HiResid
22	1835.09	3669.41	2799	108	16	47	2.20	a	

062651D08.SPC Analyzed by

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SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Vers. 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

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Background File:. . . . . DET080908.BKG (060809-8 WEEKLY BKGD)

Bkg.File Detector #: 8

BACKGROUND SUBTRACT RESULTS

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
4	51.68	523	186	148	522	186	148	
6	65.67	726	296	239	721	296	239	
15	510.79	57	75	60	7	75	62	NET<CL
17	898.03	4783	172	84	4781	172	84	

062651D08.SPC Analyzed by

SEEKER F I N A L A C T I V I T Y R E P O R T Version 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Geo 1 / Water

Sample ID: 0613004-8A GEO 1 CAL VER (798)

Sampling Start: 07/01/2005 12:00:00	Counting Start: 09/11/2006 14:56:51
Sampling Stop: 07/01/2005 12:00:00	Decay Time. . . . . 1.05e+004 Hrs
Buildup Time. . . . . 0.00e+000 Hrs	Live Time . . . . . 1800 Sec
Sample Size . . . . . 1.00e+000 L	Real Time . . . . . 1921 Sec
Collection Efficiency 1.0000	Spectrum File 062651D08.SPC
Cr. Level Confidence Interval: 95 %	Det. Limit Confidence Interval: 95 %

Detector #: 8 (Detector 8)
Efficiency File: (D08)(Sh01).EFF (Geo 1 Eff Cal)
Eff.=1/[6.36E-01*En^-1.19E+00 + 1.20E+02*En^9.04E-01] 09/11/2006

Library File: . . . .ANALYTICAL.LIB (Analytical)

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	N E T	Concentration (pCi/L)	MDA	Critical Level	Halflife (hrs)
Am-241	59.54		1.04E+05 +- 7.66E+02	5.37E+02	2.67E+02	3.79E+06
Cd-109	88.02		1.40E+06 +- 1.14E+04	7.34E+03	3.64E+03	1.11E+04
Co-57	122.07		3.39E+04 +- 4.76E+02	3.30E+02	1.63E+02	6.50E+03
Ce-139	165.85		4.77E+04 +- 1.18E+03	1.12E+03	5.51E+02	3.30E+03
Sn-113	391.68		8.17E+04 +- 3.00E+03	3.08E+03	1.52E+03	2.76E+03
Cs-137	661.62		3.93E+04 +- 5.07E+02	2.35E+02	1.16E+02	2.64E+05
Y-88	Average:x		1.47E+05 +- 3.86E+03	. . . .	. . . .	2.56E+03
	898.02		1.44E+05 +- 5.18E+03	5.15E+03	2.53E+03	2.56E+03
	1836.01		1.51E+05 +- 5.79E+03	1.89E+03	8.72E+02	2.56E+03
Co-60	Average:x		6.77E+04 +- 6.01E+02	. . . .	. . . .	4.62E+04
	1173.21		6.75E+04 +- 8.31E+02	2.96E+02	1.44E+02	4.62E+04
	1332.48		6.80E+04 +- 8.71E+02	2.05E+02	9.89E+01	4.62E+04
Hg-203	279.18		MDA	7.24E+04r	3.55E+04	1.12E+03

MEASURED TOTAL: 1.93E+06 +- 2.18E+04 pCi/L

UNKNOWN,SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	43.03	87.26	399	315	257	11298	1.15	Unknown
2	48.88	98.95	2906	406	322	17672	1.09	Unknown
3	50.16	101.51	3433	512	410	24876	1.50	Unknown

062651D08.SPC Analyzed by

UNKNOWN,SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
4	51.68	104.54	522	186	148	6097	0.41	Unknown
6	65.67	132.50	721	296	239	9759	1.15	Unknown
7	67.33	135.83	3785	555	445	20913	2.50	Unknown
10	136.24	273.57	2838	168	107	2308	0.84	Unknown
12	255.06	511.09	204	115	91	1686	0.89	Unknown
13	279.10	559.13	240	120	96	1692	1.00	Unknown
15	510.79	1022.26	7	75	62	831	0.83	Deleted
18	1115.21	2230.44	80	101	82	1238	2.03	Deleted
20	1323.29	2646.38	18	35	28	194	1.02	Deleted

c:\SEEKER\BIN\062651d08.res Analysis Results Saved.

Gamma Spectroscopy

Quality Control Data

Weekly Background Calibrations

Paragon Analytics

Gamma Spectrometer Calibration Log

Date: 10/27/06 Reviewed By/Date: JP 10/27/06

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP	/	/	/	/			/		
2.		GB	JP	JP	/	662 FWHM	JP			
3.	JP	/	/	/	/					
4.		GB	*	JP	/	1332 Centroid	JP			
5.	JP	/	/	/	/					
6.		GB	JP	JP	JP					
7.	JP	/	/	/	/					
8.		GB	JP	JP	/	60 FWHM	JP			
9.		GB	JP	JP	JP					
10.	JP	/	/	/	/					
11.										
12.										

** Corrective Action:

* Recount. Peak Shift JP 10/30/06

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Form 754r11a.doc (6/13/2005)

000110

062512D02.SPC Analyzed by

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SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

****

Weekly Background Check

Sample ID: 061027-2 WEEKLY BKG

Sampling Start: 10/27/2006 18:03:56	Counting Start: 10/27/2006 18:03:56
Sampling Stop: 10/27/2006 18:03:56	Decay Time. . . . . 0.00E+000 Hrs
Buildup Time. . . . . 0.00E+000 Hrs	Live Time . . . . . 60000 Sec
Sample Size . . . . . 1.00E+000 L	Real Time . . . . . 60060 Sec
Collection Efficiency 1.0000	Spc. File 062512D02.SPC

Detector #: 2 (Detector 2)

Energy(keV)= -0.72 + 0.500*Ch + 9.30E-09*Ch^2 + 0.00E+00*Ch^3 10/27/2006
FWHM(keV) = 0.69 + 0.006*En + 1.18E-03*En^2 + 0.00E+00*En^3 05/16/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.60	94.54	78	81	65	790	1.01 a	
2	63.30	127.90	200	75	57	650	0.77 a	
3	66.26	133.82	160	83	65	780	0.97 b	
4	74.97	151.23	101	75	59	709	0.76 a	
5	77.13	155.54	169	57	42	426	0.42 b	
6	84.33	169.93	69	79	63	740	0.97 a	
7	87.36	175.99	13	48	39	370	0.43 b	NET< CL
8	92.71	186.67	436	92	67	776	1.10 a	
9	140.17	281.50	164	75	58	621	0.96 a	
10	144.03	289.21	49	45	36	311	0.47 b	
11	169.79	340.69	51	77	62	656	1.09 a	NET< CL
12	185.76	372.58	232	68	50	512	0.80 a	
13	198.39	397.82	191	67	50	509	0.76 a	
14	238.67	478.30	310	73	53	510	1.00 a	
15	241.95	484.86	87	74	59	595	1.14 b	
16	268.30	537.51	21	76	62	609	1.24 a	NET< CL
17	295.28	591.41	92	57	44	386	0.88 a	
18	351.81	704.35	216	63	46	421	1.15 a	
19	511.12	1022.65	1648	126	79	733	2.77 a	Wide Pk
20	558.51	1117.33	157	49	35	235	1.21 a	
21	570.32	1140.93	86	54	42	339	1.43 a	
22	583.45	1167.15	169	65	49	407	2.00 a	
23	609.40	1219.01	197	61	44	399	1.31 a	
24	669.46	1339.00	36	34	27	163	1.00 a	

062512D02.SPC Analyzed by

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
25	692.63	1385.29	33	55	44	375	1.43 a	NET< CL
26	803.47	1606.73	159	51	37	252	1.67 a	
27	911.75	1823.06	92	40	29	168	1.56 a	
28	962.18	1923.82	42	37	29	168	1.60 a	
29	1120.54	2240.21	36	32	24	122	1.41 a	
30	1461.13	2920.64	221	46	29	126	2.87 a	

062512D02.SPC Analyzed by

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SEEKER B A C K G R O U N D Q. C. A N A L Y S I S Version 2.2.2

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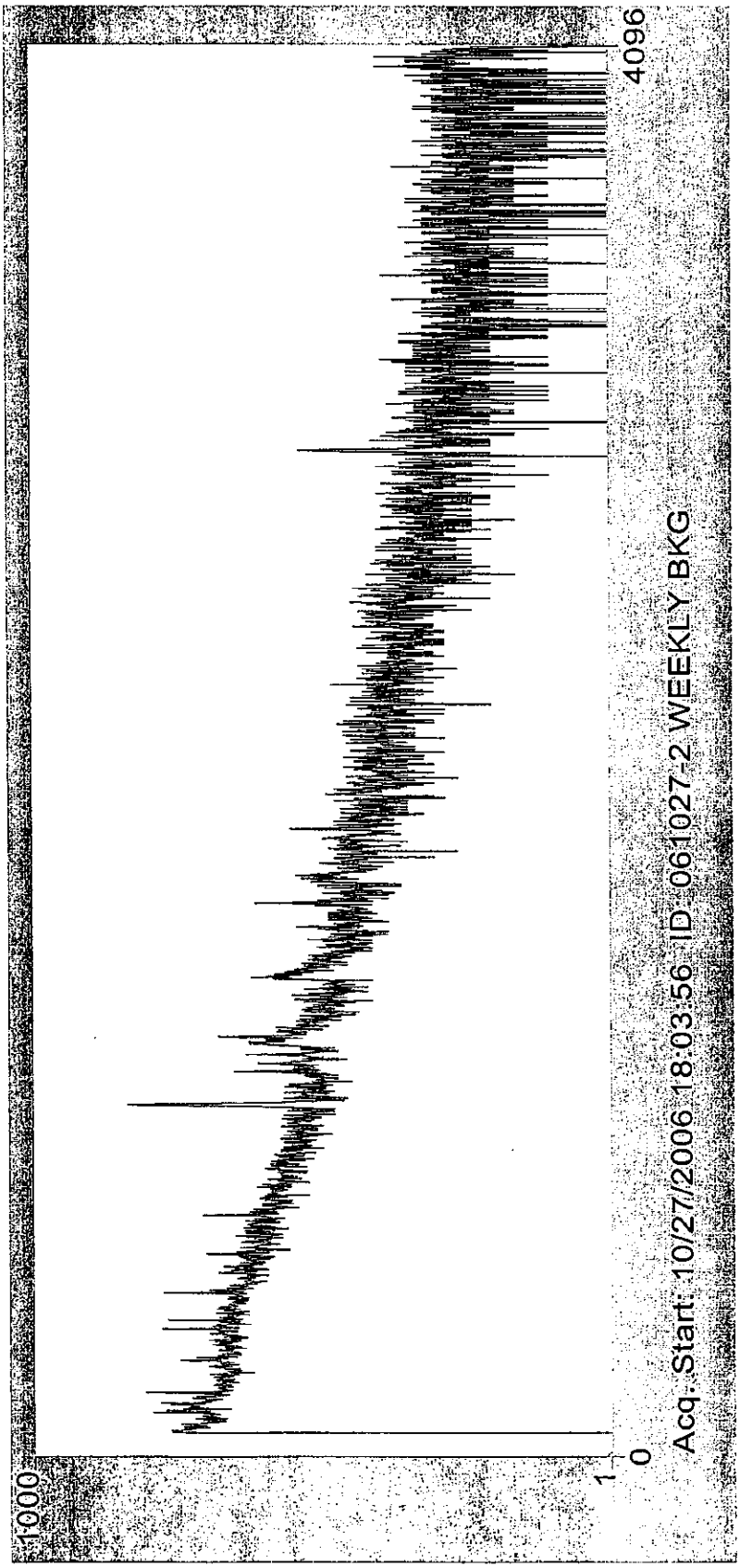
ID: 061027-2 WEEKLY BKG

Detector # 2 Background Q.C. Analysis for 10/27/2006 18:03:56

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
10	50-> 150 keV Bkg	23.881	N.A.	Pass	N.A.
11	150-> 250 keV Bkg	19.662	N.A.	Pass	N.A.
12	250-> 500 keV Bkg	29.145	N.A.	Pass	N.A.
13	500->1000 keV Bkg	30.364	N.A.	Pass	N.A.
14	1000->2000 keV Bkg	16.949	N.A.	Pass	N.A.
15	40-> 50 keV Bkg	2.939	N.A.	Pass	N.A.

Q.C. Results Saved.


1000
1
0
4096
Acq. Start: 10/27/2006 18:03:56 ID: 061027-2 WEEKLY BKG

062598D06.SPC Analyzed by

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

Weekly Background Check

Sample ID: 061027-6 WEEKLY BKG

Sampling Start: 10/27/2006 18:04:33	Counting Start: 10/27/2006 18:04:33
Sampling Stop: 10/27/2006 18:04:33	Decay Time. . . . . 0.00E+000 Hrs
Buildup Time. . . . . 0.00E+000 Hrs	Live Time . . . . . 60000 Sec
Sample Size . . . . . 1.00E+000 L	Real Time . . . . . 60022 Sec
Collection Efficiency 1.0000	Spc. File 062598D06.SPC

Detector #: 6 (Detector 6)

Energy(keV)= -0.65 + 0.501*Ch +-2.40E-08*Ch^2 + 0.00E+00*Ch^3 10/27/2006
FWHM(keV) = 1.19 + -0.002*En + 7.29E-04*En^2 + 0.00E+00*En^3 07/24/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)		FLAG
1	53.57	108.25	65	71	57	739	0.80	a	
2	66.40	133.87	126	73	58	754	0.80	a	
3	74.79	150.61	57	63	50	615	0.69	a	
4	92.58	186.13	178	74	57	680	1.00	a	
5	139.80	280.39	149	73	57	677	0.98	a	
6	185.86	372.34	98	56	43	450	0.72	a	
7	198.30	397.18	182	74	57	677	1.03	a	
8	238.68	477.79	107	68	53	594	0.97	a	
9	295.28	590.78	51	45	35	301	0.69	a	
10	352.13	704.29	136	62	47	444	1.17	a	
11	511.08	1021.62	1240	112	71	752	2.38	a	Wide Pk
12	558.53	1116.34	127	48	35	268	1.07	a	
13	570.37	1139.98	48	42	32	242	1.06	a	
14	583.17	1165.54	70	40	30	203	1.05	a	
15	596.82	1192.80	77	58	45	396	1.40	a	
16	598.88	1196.90	65	57	45	396	1.50	b	
17	609.28	1217.67	121	61	46	419	1.53	a	
18	803.10	1604.64	114	40	28	161	1.24	a	
19	911.46	1821.00	55	44	34	192	2.00	a	
20	962.06	1922.01	38	29	22	112	0.92	a	
21	1460.97	2918.22	326	45	22	88	1.91	a	
22	1765.12	3525.56	49	32	23	84	2.73	a	

062598D06.SPC Analyzed by

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SEEKER B A C K G R O U N D Q. C. A N A L Y S I S Version 2.2.2

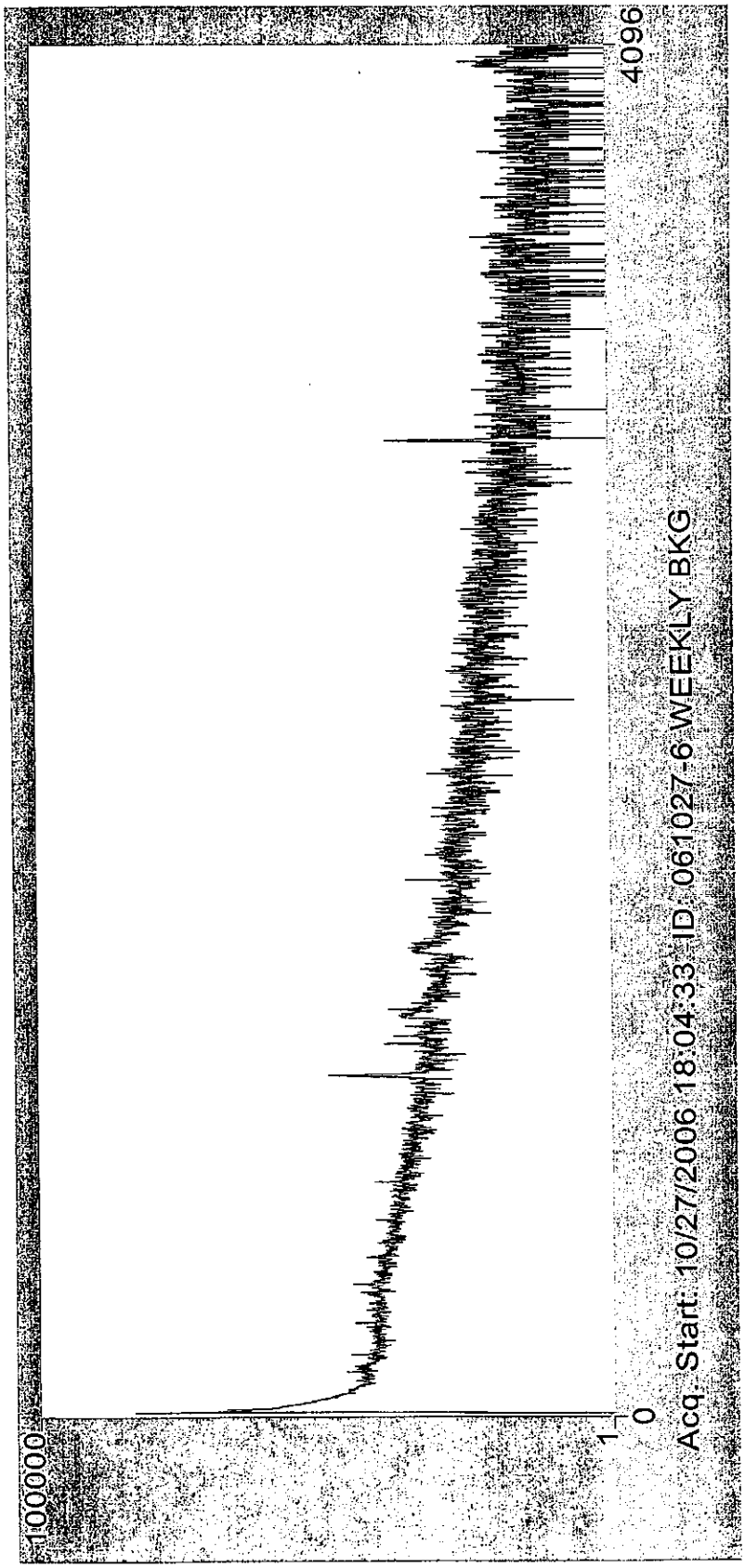
****

ID: 061027-6 WEEKLY BKG

Detector # 6 Background Q.C. Analysis for 10/27/2006 18:04:33

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
10	50-> 150 keV Bkg	25.076	N.A.	Pass	N.A.
11	150-> 250 keV Bkg	21.437	N.A.	Pass	N.A.
12	250-> 500 keV Bkg	31.223	N.A.	Pass	N.A.
13	500->1000 keV Bkg	30.163	N.A.	Pass	N.A.
14	1000->2000 keV Bkg	16.574	N.A.	Pass	N.A.
15	40-> 50 keV Bkg	3.502	N.A.	Pass	N.A.

Q.C. Results Saved.


100000
1
0
4096
Acq. Start: 10/27/2006 18:04:33 ID: 061027-6 WEEKLY BKG

Paragon Analytics

Gamma Spectrometer Calibration Log

Date: 11/3/06

Reviewed By/Date: JP 11/3/06

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP									
2.		JP	JP	JP	JP					
3.	JP									
4.	JP									
5.	JP									
6.		JP	JP	JP	JP					
7.	JP									
8.		JP	JP	JP		1332 Centroid	JP			
9.		JP	JP	JP	JP	662 FWHM	JP			
10.	JP									
11.										
12.										

** Corrective Action:

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Form 754r11a.doc (6/13/2005)

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000118

062549D02.SPC Analyzed by JP

****

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

****

Weekly Background Check

Sample ID: 061103-2 WEEKLY BKG

Sampling Start:	11/03/2006 17:00:00	Counting Start:	11/03/2006 17:03:10
Sampling Stop:	11/03/2006 17:00:00	Decay Time.	5.28E-002 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	60000 Sec
Sample Size	1.00E+000 L	Real Time	60021 Sec
Collection Efficiency	1.0000	Spc. File	.062549D02.SPC

Detector #: 2 (Detector 2)

Energy(keV)= -0.77 + 0.500*Ch + 4.01E-08*Ch^2 + 0.00E+00*Ch^3 11/03/2006
FWHM(keV) = 0.69 + 0.006*En + 1.18E-03*En^2 + 0.00E+00*En^3 05/16/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)		FLAG
1	46.26	94.00	97	83	66	810	0.95	a	
2	53.55	108.58	47	69	56	632	0.75	a	NET< CL
3	56.27	114.00	13	37	30	253	0.40	b	NET< CL
4	63.05	127.56	197	126	101	1331	1.77	a	Wide Pk
5	66.31	134.08	295	84	63	726	1.00	b	
6	69.73	140.92	107	70	55	605	0.89	c	
7	74.14	149.73	358	164	131	1815	2.48	d	
8	77.08	155.59	184	72	55	605	0.85	e	
9	87.07	175.57	31	49	39	384	0.43	a	NET< CL
10	92.55	186.53	427	85	61	688	0.94	a	
11	129.13	259.63	37	45	35	310	0.46	a	
12	139.06	279.48	56	46	35	310	0.46	a	
13	140.02	281.39	115	48	35	310	0.47	b	
14	167.60	336.51	69	79	64	694	1.17	a	
15	171.69	344.69	27	61	50	496	0.79	b	NET< CL
16	185.66	372.62	339	101	77	879	1.44	a	
17	192.81	386.91	53	62	50	497	0.82	a	
18	198.36	397.99	199	83	64	695	1.09	b	
19	238.56	478.34	269	87	66	691	1.26	a	
20	241.80	484.82	99	83	66	691	1.31	b	
21	295.02	591.17	113	49	36	285	0.73	a	
22	338.46	677.99	41	56	45	419	0.97	a	NET< CL
23	351.63	704.32	214	64	47	427	1.16	a	
24	510.88	1022.58	1667	123	75	698	2.69	a	Wide Pk

062549D02.SPC Analyzed by

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
25	558.24	1117.22	173	54	39	278	1.29	a
26	569.33	1139.36	76	52	41	339	1.27	a
27	582.97	1166.63	141	58	43	349	1.62	a
28	609.28	1219.21	176	65	49	460	1.40	a
29	692.70	1385.91	90	60	47	389	1.82	a
30	695.09	1390.67	112	68	54	460	2.21	b
31	802.84	1605.99	132	48	35	225	1.64	a
32	897.97	1796.08	73	47	36	234	2.07	a
33	911.51	1823.14	83	39	29	167	1.63	a
34	961.63	1923.29	44	32	24	134	1.11	a
35	1014.29	2028.51	40	47	37	236	2.29	a
36	1120.28	2240.28	42	29	21	104	1.11	a
37	1460.68	2920.35	178	41	25	105	2.43	a
38	1764.85	3528.00	37	26	19	65	2.02	a

062550D02.SPC Analyzed by

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SEEKER C A L I B R A T I O N R E S U L T S Version 2.0.4

****

Sample ID: DAILY CHECK
Stds. Match Tolerance: 2.00 keV

Detector Number: 02 Calibration Date. . . 11/04/2006 09:49:55

Energy(keV) = -0.76 + 0.500*Ch + 4.70e-08*Ch^2 + 0.00e+00*Ch^3

Pk. #	Measured Centroid	Calculated Energy	Energy (keV)	% Difference
1	120.43	59.51	59.50	0.01
2	1323.37	661.62	661.64	-0.00
3	2345.36	1173.26	1173.21	0.00
4	2663.28	1332.45	1332.48	-0.00

Calibration Results Saved.

062549D02.SPC Analyzed by

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SEEKER B A C K G R O U N D Q. C. A N A L Y S I S Version 2.2.2

****

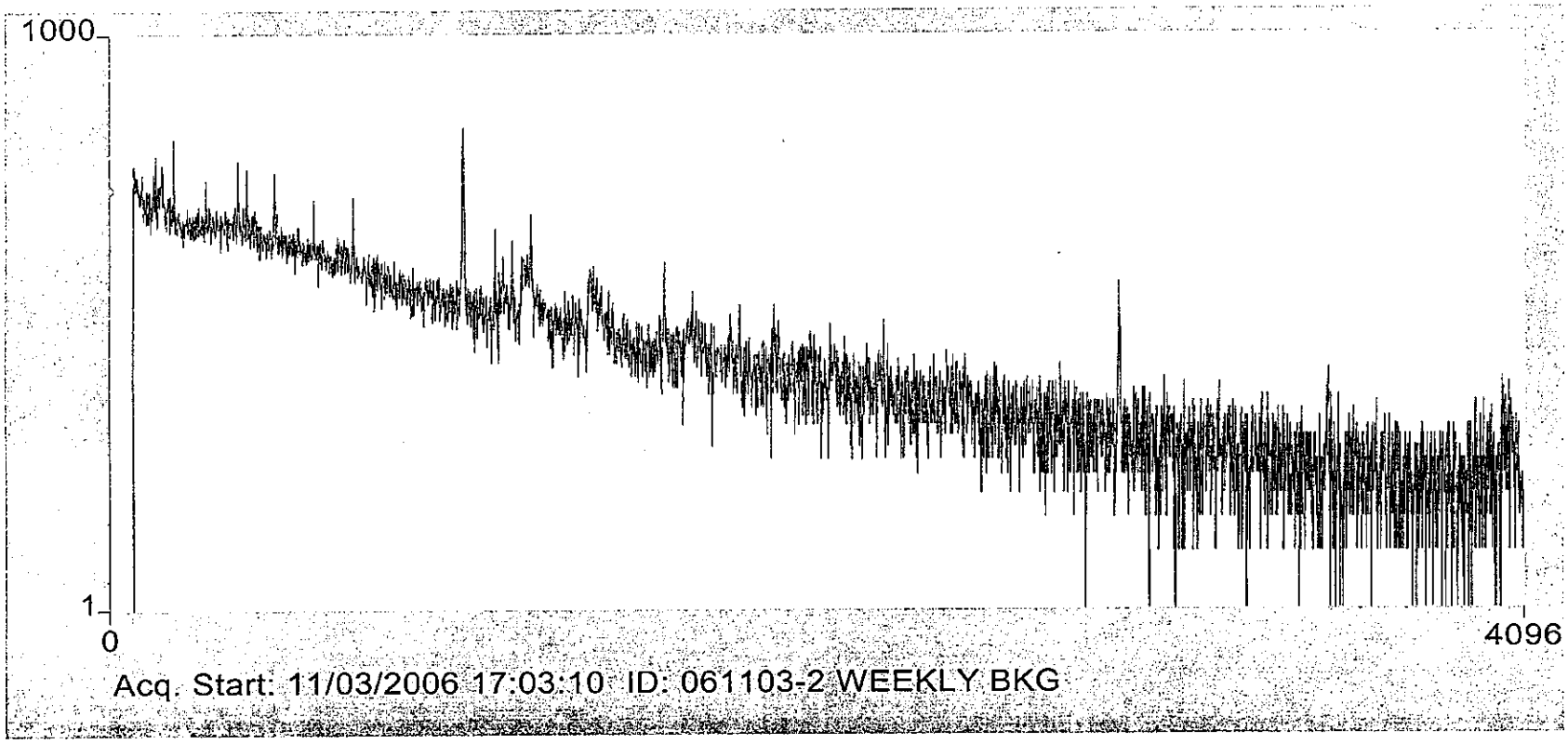
ID: 061103-2 WEEKLY BKG

Detector # 2 Background Q.C. Analysis for 11/03/2006 17:03:10

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
10	50-> 150 keV Bkg	24.032	N.A.	Pass	N.A.
11	150-> 250 keV Bkg	20.055	N.A.	Pass	N.A.
12	250-> 500 keV Bkg	29.655	N.A.	Pass	N.A.
13	500->1000 keV Bkg	30.929	N.A.	Pass	N.A.
14	1000->2000 keV Bkg	17.392	N.A.	Pass	N.A.
15	40-> 50 keV Bkg	3.030	N.A.	Pass	N.A.

Q.C. Results Saved.

RE-CALC QC HEADER for Overwritten Results.



063142D08.SPC Analyzed by JP

****

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

****

Weekly Background Check

Sample ID: 061103-8 WEEKLY BKG

Sampling Start:	11/03/2006 17:00:00	Counting Start:	11/03/2006 17:03:53
Sampling Stop:	11/03/2006 17:00:00	Decay Time.	6.47E-002 Hrs
Buildup Time.	0.00E+000 Hrs	Live Time	60000 Sec
Sample Size	1.00E+000 L	Real Time	60109 Sec
Collection Efficiency	1.0000	Spc. File	.063142D08.SPC

Detector #: 8 (Detector 8)

Energy(keV)= -0.50 + 0.500*Ch + 2.17E-07*Ch^2 + 0.00E+00*Ch^3 11/03/2006
FWHM(keV) = 0.72 + 0.007*En + 8.11E-04*En^2 + 0.00E+00*En^3 08/17/2006
Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.41	93.78	437	76	53	611	0.71 a	
2	63.18	127.31	560	88	61	755	0.80 a	
3	66.15	133.25	244	91	70	906	1.06 b	
4	74.78	150.50	216	81	62	783	0.80 a	
5	77.05	155.03	219	81	62	783	0.81 b	
6	84.45	169.83	85	75	60	717	0.88 a	
7	87.26	175.43	80	54	42	430	0.43 b	
8	92.58	186.07	773	98	66	813	1.01 a	
9	139.71	280.28	184	61	45	453	0.68 a	
10	178.44	357.69	50	55	44	424	0.65 a	
11	185.72	372.24	360	80	58	624	0.97 a	
12	198.26	397.31	216	76	58	621	0.98 a	
13	202.53	405.83	51	72	58	621	0.90 b	NET< CL
14	205.80	412.36	51	54	43	414	0.68 c	
15	238.54	477.80	320	70	50	495	0.88 a	
16	241.93	484.57	42	44	35	297	0.52 b	
17	295.03	590.68	121	67	52	497	1.06 a	
18	351.93	704.37	224	72	54	497	1.11 a	
19	511.10	1022.35	1699	128	80	825	2.47 a	Wide Pk
20	537.58	1075.25	40	39	31	214	0.84 a	
21	558.51	1117.06	294	63	43	322	1.52 a	
22	569.89	1139.79	60	61	49	410	1.47 a	
23	583.40	1166.76	144	56	42	321	1.26 a	
24	609.27	1218.43	172	69	53	480	1.54 a	

063142D08.SPC Analyzed by

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
25	670.16	1340.03	39	41	32	219	0.96 a	
26	691.87	1383.38	35	34	26	168	0.73 a	Wide Pk
27	694.16	1387.96	145	88	70	630	2.45 b	
28	726.90	1453.34	36	42	33	218	1.12 a	
29	803.21	1605.70	156	53	38	270	1.65 a	
30	898.82	1796.57	47	38	29	178	1.35 a	
31	911.55	1821.98	58	42	33	207	1.54 a	
32	962.38	1923.43	39	53	42	296	2.02 a	NET< CL
33	1460.99	2918.19	175	41	26	128	1.76 a	
34	1765.56	3525.39	54	35	26	104	2.88 a	

063142D08.SPC Analyzed by

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SEEKER B A C K G R O U N D Q. C. A N A L Y S I S Version 2.2.2

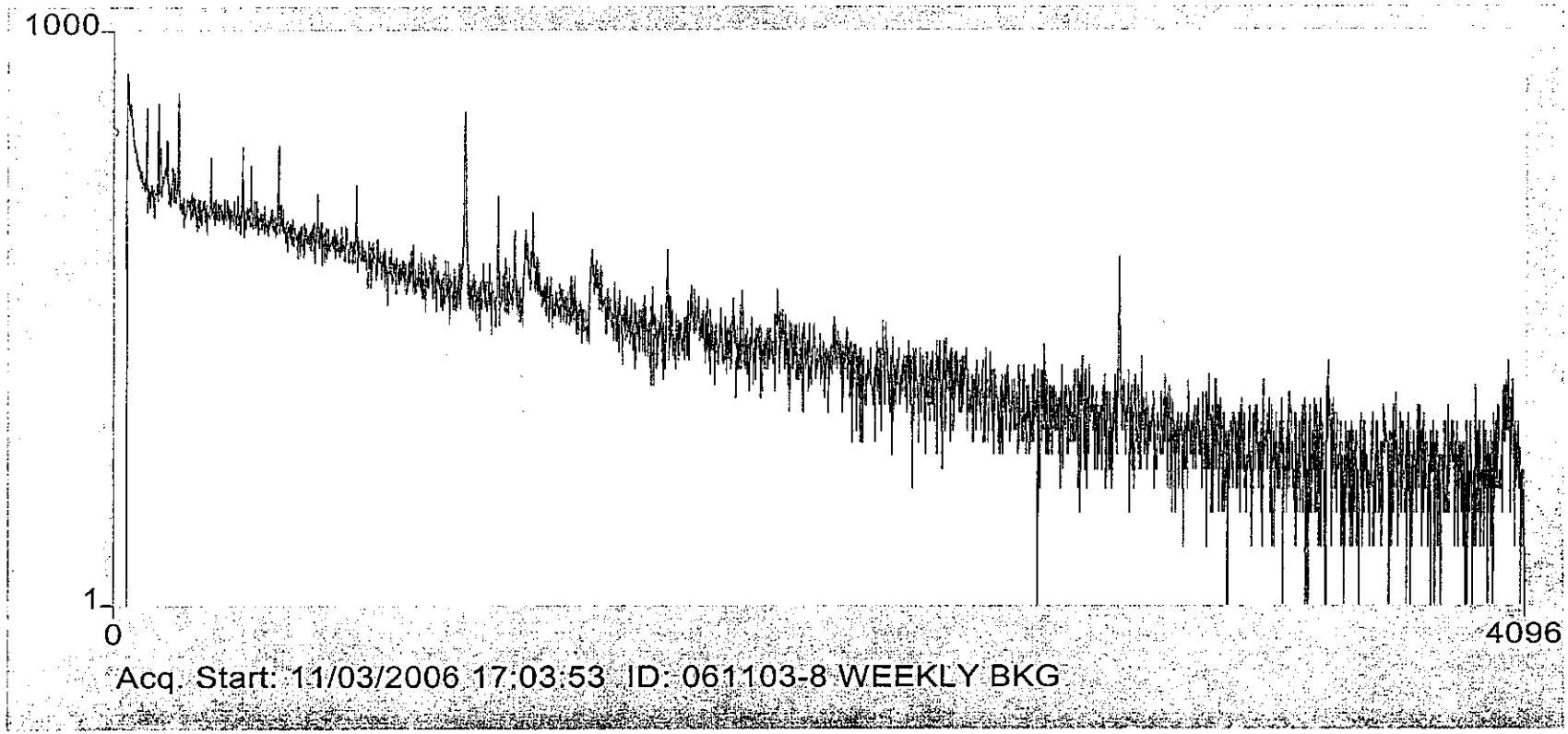
****

ID: 061103-8 WEEKLY BKG

Detector # 8 Background Q.C. Analysis for 11/03/2006 17:03:53

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
10	50-> 150 keV Bkg	28.284	N.A.	Pass	N.A.
11	150-> 250 keV Bkg	21.703	N.A.	Pass	N.A.
12	250-> 500 keV Bkg	32.931	N.A.	Pass	N.A.
13	500->1000 keV Bkg	35.848	N.A.	Pass	N.A.
14	1000->2000 keV Bkg	20.175	N.A.	Pass	N.A.
15	40-> 50 keV Bkg	3.705	N.A.	Pass	N.A.

Q.C. Results Saved.


1000
1
0
4096
Acq. Start: 11/03/2006 17:03:53 ID: 061103-8 WEEKLY BKG

Gamma Spectroscopy

Quality Control Data

Daily Instrument Performance Checks

ANALYTICS

ATD 0126

Analytics, Inc.
1380 Seaboard Industrial Boulevard
Atlanta, Georgia 30318
404 352-8677

recd 12-29-94

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

49500-307

50 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

Calibration date: October 1, 1994 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE		GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	y	1759	5.0
Cd-109	88	462.6	d	2622	4.5
Co-57	122	271.79	d	1472	4.2
Ce-139	166	137.64	d	2037	4.6
Hg-203	279	46.595	d	3978	4.5
Sn-113	392	115.09	d	2862	4.7
Cs-137	662	30.0	y	1735	4.7
Y-88	898	106.63	d	7290	4.4
Co-60	1173	5.2714	y	3347	4.3
Co-60	1332	5.2714	y	3355	4.8
Y-88	1836	106.63	d	7630	4.3

50.8520 grams solution 4M HCl.
P O NUMBER 45864, Item 1

SOURCE PREPARED BY: H. D. Currie
H. D. Currie, Radiochemist

Q A APPROVED: D. M. Martin 12-23-94

This standard will expire one year after the calibration date.

000129

ATI I0 0126

ANALYTICS

Analytics, Inc.
3388 Seaboard Industrial Boulevard
Atlanta, Georgia 30318
404 352-8677

ANALYSIS OF UNCERTAINTY

BATCH 78 MIXED GAMMA STANDARDS WITH Am-241
CALIBRATION DATE: October 1, 1994 12:00 EST

GAMMA RAY ENERGY (keV)	RANDOM ERROR % (99 % CL)	SYSTEMATIC ERROR %	TOTAL %
59.5	2.0	3.0	5.0
88	1.5	3.0	4.5
122	1.6	2.6	4.2
166	2.1	2.5	4.6
279	1.5	3.0	4.5
392	1.9	2.8	4.7
662	1.9	2.8	4.7
898	1.4	3.0	4.4
1173	1.5	2.8	4.3
1332	2.0	2.8	4.8
1836	1.2	3.1	4.3

The systematic error includes the error in calibration standards, weighing error, and estimated counting corrections. All uncertainties are stated at the 99% confidence level.

No interfering gamma emitting impurities were detected during calibration. Depending on the resolution and energy dispersion (kev/channel) of the measuring system, the following spectral conflicts may occur: (1) between the 88 keV gamma-ray and the X-rays emitted in the decay of Hg-203, (2) between the 1333 keV gamma-ray and the 1325 keV single escape peak from the 1836 keV gamma-ray.

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

Certificate of Participation

Analytics, Incorporated
Atlanta, Georgia

is a participant for the period January 1, 1994, through December 31, 1994, in a radioactivity measurements assurance program conducted by the National Institute of Standards and Technology, in cooperation with the U.S. Council for Energy Awareness. Continued participation is evidenced by dated Reports of Traceability issued for particular radionuclides, which indicate the deviation of the participant's reported value from that measured by the National Institute of Standards and Technology. The significance of these Reports is addressed on the back of this certificate.

For the Director,

J.M. Robin Hutchinson, Acting Group Leader
Radioactivity Group
Physics Laboratory

(over)

000131

PROJECT Stds 178 A thru L

(ATI ID 126)
Analytics Std. 49500-307 was diluted 12 ways to gamma spectrometer daily calibration standards. For each standard, 4 ml of 49500-307 was added to 100 ml in a 100 ml class A volumetric with DI water. The solution was agitated and transferred to a nominal 250 cc pre-cleaned right cylinder. Activity calculations (as of 10-1-94) are attached below. The remaining ~2 ml of standard was flushed down the drain.

Expiration Date:
For primary calibration: 10-1-95
For instrument performance checks, daily calibration: 12-31-96

ANALYTICS
CAUTION
RADIOACTIVE MATERIAL

ATI Working Standards 178-A through L
ATI Inventory Number 126
Analytics Standard ID: 49500-307
Prepared 01/08/95

Isotope	Energy	GPS	Abn.	Original Vol. (ml)	Aliquot ml	Final ml	Final pCi/ml	Final pCi Total	Final pCi/l	Final GPS	Final DPS
Am-241	59.5	1759	0.359	50	4	100	105.9	10594	105940	140.7	392.0
Cd-109	88	2622	0.0372	50	4	100	1524.0	152398	1523976	209.8	5638.7
Co-57	122	1472	0.8551	50	4	100	37.2	3722	37220	117.8	137.7
Ce-139	166	2037	0.8035	50	4	100	54.8	5481	54814	163.0	202.8
Hg-203	279	3978	0.773	50	4	100	111.3	11127	111269	318.2	411.7
Sn-113	392	2862	0.649	50	4	100	95.3	9535	95348	229.0	352.8
Cs-137	662	1735	0.8512	50	4	100	44.1	4407	44071	138.8	163.1
Y-88	898	7290	0.934	50	4	100	168.8	16876	168760	583.2	624.4
Co-60	1173	3347	1	50	4	100	72.4	7237	72368	267.8	267.8
Co-60	1332	3355	1	50	4	100	72.5	7254	72541	268.4	268.4
Y-88	1836	7630	0.9938	50	4	100	166.0	16600	166002	610.4	614.2

Continued on Page

Read and Understood By

Signed 1/8/95 Date Signed 2/6/01 Date

Paragon Analytics

Gamma Spectrometer Calibration Log

Date: 11/2/06

Reviewed By/Date: JP 11/2/06

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP			/	/					
2.				JP	JP					
3.	JP			/	/					
4.	JP			/	/					
5.	JP			/	/					
6.				JP	/	60 Eff	JP			
7.	JP			/	/					
8.				JP	JP					
9.				JP	JP					
10.	JP			/	/					
11.										
12.										

** Corrective Action:

318719 A

Form 754r11a.doc (6/13/2005)

062625D06.SPC Analyzed by JP

****

SEEKER D E T E C T O R Q. C. A N A L Y S I S Version 2.2.2

****

ID: DAILY CHECK
Detector # 6 Detector Q.C. Analysis for 11/02/2006 07:46:05
Standards File #: 98 (Daily Performance Check 49500-307)

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.077	N.A.	Pass	N.A.
2	60 keV FWHM	7.683E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	5.507E-03	N.A.	<FAIL>	N.A.
4	662 keV Centroid	1322.177	N.A.	Pass	N.A.
5	662 keV FWHM	1.426	N.A.	Pass	N.A.
6	662 keV Efficiency	1.696E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2661.473	N.A.	Pass	N.A.
8	1332 keV FWHM	2.040	N.A.	Pass	N.A.
9	1332 keV Efficiency	8.894E-03	N.A.	Pass	N.A.

062626D06.SPC Analyzed by JP

****

SEEKER D E T E C T O R Q. C. A N A L Y S I S Version 2.2.2

****

ID: DAILY CHECK
Detector # 6 Detector Q.C. Analysis for 11/02/2006 08:07:21
Standards File #: 98 (Daily Performance Check 49500-307)

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.079	N.A.	Pass	N.A.
2	60 keV FWHM	8.741E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	5.961E-03	N.A.	Pass	N.A.
4	662 keV Centroid	1322.155	N.A.	Pass	N.A.
5	662 keV FWHM	1.388	N.A.	Pass	N.A.
6	662 keV Efficiency	1.625E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2661.584	N.A.	Pass	N.A.
8	1332 keV FWHM	1.901	N.A.	Pass	N.A.
9	1332 keV Efficiency	9.371E-03	N.A.	Pass	N.A.

Paragon Analytics

Gamma Spectrometer Calibration Log

Date: 11/3/06 Reviewed By/Date: JP 11/3/06

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP	/	/	/	/					
2.				JP	JP					
3.	JP	/	/	/	/					
4.	JP	/	/	/	/					
5.	JP	/	/	/	/					
6.				JP	JP					
7.	JP	/	/	/	/					
8.				JP	/	1332 Centroid	JP			
9.				JP	JP	662 FWHM	JP			
10.	JP	/	/	/	/					
11.										
12.										

.** Corrective Action:

318721 A

Form 754r11a.doc (6/13/2005)

000136

062542D02.SPC Analyzed by JP

****

SEEKER D E T E C T O R Q. C. A N A L Y S I S Version 2.2.2

****

ID: DAILY CHECK

Detector # 2 Detector Q.C. Analysis for 11/03/2006 06:54:58

Standards File #: 98 (Daily Performance Check 49500-307)

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.471	N.A.	Pass	N.A.
2	60 keV FWHM	8.471E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	1.297E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1323.814	N.A.	Pass	N.A.
5	662 keV FWHM	1.745	N.A.	Pass	N.A.
6	662 keV Efficiency	2.131E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2664.197	N.A.	Pass	N.A.
8	1332 keV FWHM	2.713	N.A.	Pass	N.A.
9	1332 keV Efficiency	1.067E-02	N.A.	Pass	N.A.

062635D06.SPC Analyzed by JP

****

SEEKER D E T E C T O R Q. C. A N A L Y S I S Version 2.2.2

****

ID: DAILY CHECK
Detector # 6 Detector Q.C. Analysis for 11/03/2006 06:55:13
Standards File #: 98 (Daily Performance Check 49500-307)

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.118	N.A.	Pass	N.A.
2	60 keV FWHM	8.148E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	6.477E-03	N.A.	Pass	N.A.
4	662 keV Centroid	1322.274	N.A.	Pass	N.A.
5	662 keV FWHM	1.422	N.A.	Pass	N.A.
6	662 keV Efficiency	1.678E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2661.734	N.A.	Pass	N.A.
8	1332 keV FWHM	1.869	N.A.	Pass	N.A.
9	1332 keV Efficiency	8.997E-03	N.A.	Pass	N.A.

000138

Paragon Analytics

Gamma Spectrometer Calibration Log

Date: 11/4/06

Reviewed By/Date: JP 11/4/06

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP			✓	✓					
2.				JP	JP					
3.	JP			✓	✓					
4.	JP			✓	✓					
5.	JP			✓	✓					
6.				JP	JP					
7.	JP			✓	✓					
8.				JP	JP					
9.				JP	JP					
10.	JP			✓	✓					
11.										
12.										

.** Corrective Action:

318722 A

Form 754r11a.doc (6/13/2005)

062550D02.SPC Analyzed by JP

****

SEEKER D E T E C T O R Q. C. A N A L Y S I S Version 2.2.2

****

ID: DAILY CHECK

Detector # 2 Detector Q.C. Analysis for 11/04/2006 09:49:55

Standards File #: 98 (Daily Performance Check 49500-307)

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.427	N.A.	Pass	N.A.
2	60 keV FWHM	7.985E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	1.355E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1323.373	N.A.	Pass	N.A.
5	662 keV FWHM	1.739	N.A.	Pass	N.A.
6	662 keV Efficiency	2.159E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2663.284	N.A.	Pass	N.A.
8	1332 keV FWHM	2.492	N.A.	Pass	N.A.
9	1332 keV Efficiency	1.050E-02	N.A.	Pass	N.A.

Paragon Analytics

Gamma Spectrometer Calibration Log

Date: 11/5/06

Reviewed By/Date: JP 11/5/06

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP			/	/					
2.				JP	JP					
3.	JP			/	/					
4.	JP			/	/					
5.	JP			/	/					
6.				JP	JP					
7.	JP			/	/					
8.				JP	JP					
9.				JP	/	662 FWHM	JP			
10.	JP			/	/					
11.										
12.										

** Corrective Action:

318723 A

Form 754r11a.doc (6/13/2005)

000141

062553D02.SPC Analyzed by JP

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SEEKER D E T E C T O R Q. C. A N A L Y S I S Version 2.2

****

ID: DAILY CHECK
Detector # 2 Detector Q.C. Analysis for 11/05/2006 09:01:31
Standards File #: 98 (Daily Performance Check 49500-307)

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.419	N.A.	Pass	N.A.
2	60 keV FWHM	8.361E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	1.334E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1323.295	N.A.	Pass	N.A.
5	662 keV FWHM	1.749	N.A.	Pass	N.A.
6	662 keV Efficiency	2.143E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2663.271	N.A.	Pass	N.A.
8	1332 keV FWHM	2.709	N.A.	Pass	N.A.
9	1332 keV Efficiency	1.083E-02	N.A.	Pass	N.A.

063146D08.SPC Analyzed by JP

****

SEEKER D E T E C T O R Q. C. A N A L Y S I S Version 2.2.2

****

ID: DAILY CHECK
Detector # 8 Detector Q.C. Analysis for 11/05/2006 08:55:13
Standards File #: 98 (Daily Performance Check 49500-307)

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.018	N.A.	Pass	N.A.
2	60 keV FWHM	8.282E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	7.248E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1323.965	N.A.	Pass	N.A.
5	662 keV FWHM	1.399	N.A.	Pass	N.A.
6	662 keV Efficiency	1.784E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2663.809	N.A.	Pass	N.A.
8	1332 keV FWHM	1.890	N.A.	Pass	N.A.
9	1332 keV Efficiency	9.478E-03	N.A.	Pass	N.A.

Paragon Analytics

Gamma Spectrometer Calibration Log

Date: 11/2/06 [illegible] 11/1/06

Reviewed By/Date: [illegible] 11/2/06

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	[illegible]									
2.				[illegible]	SI					
3.	[illegible]									
4.	[illegible]									
5.	[illegible]									
6.				[illegible]	SI					
7.	[illegible]									
8.				[illegible]	SI					
9.				[illegible]	SI					
10.	[illegible]									
11.										
12.										

** **Corrective Action:**

318724 A

Form 754r11a.doc (6/13/2005)

062556D02.SPC Analyzed by

****

SEEKER D E T E C T O R Q. C. A N A L Y S I S Version 2.2.2

****

ID: DAILY CHECK
Detector # 2 Detector Q.C. Analysis for 11/06/2006 09:16:57
Standards File #: 98 (Daily Performance Check 49500-307)

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.483	N.A.	Pass	N.A.
2	60 keV FWHM	8.519E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	1.365E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1323.462	N.A.	Pass	N.A.
5	662 keV FWHM	1.747	N.A.	Pass	N.A.
6	662 keV Efficiency	2.166E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2663.626	N.A.	Pass	N.A.
8	1332 keV FWHM	2.736	N.A.	Pass	N.A.
9	1332 keV Efficiency	1.117E-02	N.A.	Pass	N.A.

063149D08.SPC Analyzed by

****

SEEKER D E T E C T O R Q. C. A N A L Y S I S Version 2.2.2

****

ID: DAILY CHECK
Detector # 8 Detector Q.C. Analysis for 11/06/2006 09:17:24
Standards File #: 98 (Daily Performance Check 49500-307)

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	119.945	N.A.	Pass	N.A.
2	60 keV FWHM	8.311E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	7.270E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1323.320	N.A.	Pass	N.A.
5	662 keV FWHM	1.408	N.A.	Pass	N.A.
6	662 keV Efficiency	1.863E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2662.700	N.A.	Pass	N.A.
8	1332 keV FWHM	1.958	N.A.	Pass	N.A.
9	1332 keV Efficiency	9.710E-03	N.A.	Pass	N.A.