

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.







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

Cordilleran Cor	npliance Services	ACZ Sample ID:	L59449-01
Project ID:	ED04243	Date Sampled:	10/16/06 09:40
Sample ID:	CW-W902	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	В		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 CaCC	03		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	В		mg/L	0.5	3	10/26/06 16:29	nps
Fluoride	SM4500F-C	0.3	В	*	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	В		mg/L	0.03	0.15	11/28/06 0:00	calc
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	0.03	В	*	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

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

Inorganic Analytical **Results**

Cordilleran Compliance Services

Cordilleran Com	oliance Services	ACZ Sample ID:	L59449-02
Project ID:	ED04243	Date Sampled:	10/16/06 14:40
Sample ID:	EG-SP902	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	В		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	В		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 CaCO	3		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	В	*	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	В		mg/L	0.03	0.15	11/28/06 0:00	calc
Phosphorus, ortho dissolved	M365.1 - Automated Ascorbic Acid	0.01	В	*	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



Inorganic Reference

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.

A

ACZ Qualifie	ers (Qual)
В	Analyte concentration detected at a value between MDL and PQL.
н	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.
т	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.
х	Quality control sample is out of control.
Z	Poor spike recovery is accepted because sample concentration is four times greater than spike concentration.
Method Refe	erences
(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	
(4)	

- (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.



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:ED04243Sample 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:ED04243Sample 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:ED04243Sample 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:ED04243Sample 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



Organic Reference

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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 fluctuat	ons.				
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)					
<i>RPD</i> 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 LEM Laboratory Fortified Matrix					
INTS Internal Standard LEMD Laboratory Fortified Matrix	Duplicate				
DUP Sample Duplicate / RB Laboratory Reagent Blank					
I CSS Laboratory Control Sample - Soil MS/MSD Matrix Spike/Matrix Spike F	uplicate				
Losw Laboratory Control Sample - Water PRS Prep Blank - Soil	aphoato				
I EB Laboratory Fortified Blank PBW Prep Blank - Water					
OC Sample Type Explanations					
Blanks Verifies that there is no or minimal contamination in the pren method procedu	re				
Control Samples Verifies the accuracy of the method, including the prep procedure	0.				
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.					
Analyte concentration detected at a value between MDL and PQL					
 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 th	e MDI				
Analyte was analyzed for but not detected at the indicated MDI					
V High blank data accepted because sample concentration is 10 times higher than blank concentration					
W Poor recovery for Silver quality control is accented because Silver often precipitates with Chloride					
X Quality control sample is out of control					
 Poor snike recovery is accented because sample concentration is four times greater than snike concert 	tration				
P Analyte concentration differs from second detector by more than 40%					
F Analyte concentration is estimated due to result exceeding calibration range					
M Analyte concentration is estimated due to result exceeding calibration range.					
Mathad References					
(1) EPA 600//-83-020 Methods for Chemical Analysis of Water and Wastes March 1983					
 (1) ETA 000/4-00-020. Methods for the Determination of Organic Compounds in Drinking Water (I) July 1 (2) EPA 600/4-00/020. Methods for the Determination of Organic Compounds in Drinking Water (I) July 1 					
(2) En A 600/ H 50/020. Methods for the Determination of Organic Compounds in Drinking Water (I), July 1 (2) EDA 600/ H 60/400. Methods for the Determination of Organic Compounds in Drinking Water (I), July 1	990				
(3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July 1990.					
 (3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July (5) EPA SW-846. Test Methods for Evaluating Solid Waste. Third Edition with Lodoto III. Decomber, 1000 	990. 1990.				
 (3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July (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 	990. 1990. 3.				
 (3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July (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. 	990. 1990. 3.				
 (3) EPA 600/R-92/129. Methods for the Determination of Organic Compounds in Drinking Water (II), July (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) OC results calculated from raw data. Results may yory slightly if the rounded values are used in the set. 	990. 1990.).				

REPIN03.11.00.01



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:

RadioChemistry **Analytical Results**

Prep Method:

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

Ũ							•
Parameter	Measure Date	Prep Date	Result Error(+/-) LLD	Units	XQ	Analyst
Gamma Emitting Nuclides			see attach- ments				n/a
Tritium in water						Pre	p Method:
Parameter	Measure Date	Prep Date	Result Error(+/-	LLD	Units	XQ	Analvst

Gamma Emitting Nuclides

Tritium in water

Result Error(+/-) n/a see attach-

ments



Cordilleran Compliance Services

Project ID:ED04243Sample ID:EG-SP902Locator:EG-SP902

Gamma Emitting Nuclides

RadioChemistry Analytical Results

Prep Method:

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

Parameter Measure Date Prep Date Result Error(+/-) LLD Units XQ Analyst Gamma Emitting Nuclides see attachments see attachments n/a Tritium in water Prep Method: Parameter Measure Date Prep Date Result Error(+/-) LLD Units XQ Analyst

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



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

1 7	•		
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 Explanation	S
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)

Н	Analysis exceeded method hold time.
R	Poor spike recovery accepted because the other spike in the set fell within the given limits.
т	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
Х	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

М	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.



(800) 334-5493

ACZ Project ID: L59449

Cordilleran Compliance Services

ACZ ID	WORKNUM P	ARAMETER	METHOD	QUAL DESCRIPTION

No extended qualifiers associated with this analysis



Cordilleran Compliance Services

ACZ Project ID: L59449

Gas	Chromatography	
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he 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 certif	ication or are not covered by NELAC certificate #ACZ.			
Lab Filtration	SM 3030 B			
Sulfide as S	376.2 - Methylene Blue			

ACZ F

Sample Recei<u>pt</u>

Cordilleran Compliance Services ED04243		ACZ Project ID: Date Received:		L59449 10/17/2006	
	Receiv	ved By:			
		Date Printed:		10/18/2006	
Receipt Verification					
		YES	NO	NA	
1) Does this project require special handling procedures such as CLP protocol?				Х	
2) Are the custody seals on the cooler intact?		Х			
3) Are the custody seals on the sample containers intact?				Х	
4) Is there a Chain of Custody or other directive shipping papers present?		Х			
5) Is the Chain of Custody complete?		Х			
6) Is the Chain of Custody in agreement with the samples received?		Х			
7) Is there enough sample for all requested analyses?		Х			
8) Are all samples within holding times for requested analyses?		Х			
9) Were all sample containers received intact?		Х			
10) Are the temperature blanks present?				Х	
11) Are the trip blanks (VOA and/or Cyanide) present?				Х	
12) Are samples requiring no headspace, headspace free?		Х			
13) Do the samples that require a Foreign Soils Permit have one?				Х	

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

Cordilleran Compliance Services ED04243

Sample Receipt

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

Sample Container Preservation

SAMPLE	CLIENT ID	R < 2	G < 2	BK < 2	Y< 2	YG< 2	B< 2	0 < 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									Х		
Sample C	ontainer Preservation Lege	nd										
Abbreviati	on Description	Contai	ner Typ	e Pre	servat	ive/Lim	its					
R	Raw/Nitric	RED		pН	must be	< 2						
В	Filtered/Sulfuric	BLUE		pН	must be	< 2						
BK	Filtered/Nitric	BLACK		pН	must be	< 2						
G	Filtered/Nitric	GREEN		pН	pH must be < 2							
0	Raw/Sulfuric	ORANG	θE	pН	must be	< 2						
Р	Raw/NaOH	PURPLE	Ξ	pН	must be	> 12 *						
Т	Raw/NaOH Zinc Acetate	TAN		pН	must be	> 12						
Υ	Raw/Sulfuric	YELLO	W	pН	must be	< 2						
YG	Raw/Sulfuric	YELLO	W GLAS	S pH	must be	< 2						
N/A	No preservative needed	Not app	olicable									
RAD	Gamma/Beta dose rate	Not app	olicable	mus	st be < 2	250 µR/h	r					

* pH check performed by analyst prior to sample preparation

Sample IDs Reviewed By:

	pratories, Inc.	-5493					CH	AIN	of Cl	JST	ODY
Report to:	Juligs, CO 00407 (000) 004	-0480									
lame: James Hix			Addre	ess: 5	550	Mar	sha	11 St	-		
Company: Cordilleran	Compliance	1	Ar	vado	a,	CO	800	02			
-mail: Jameshix@C	ordcomp. Com		Telep	hone:	303	23	720	659	Fax	<	
Conv of Report to:											
lomo:			F-ma	il.			· · ·				
Company:	<u> </u>	-	Teleo	none:	303	237	20	72			
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Name: James Hax	Condiance	-				Cn	<u>nuit</u> RN	$\frac{\partial \Gamma}{\partial a}$			
mail: School (Compriance			bone.	2/13	23	<u>200</u> 20	77			
f sample(s) received past holdin	a time (HT), or if Insufficier	그 at HT rema	ains to	comple	te				YES		
nalysis before expiration, shall	ACZ proceed with requeste	d short H	T analy	/ses?					NO]
"NO" then ACZ will contact clie	int for further instruction. I	If neither '	'YES" Lie ev:	nor "NO pired ar	" nd dete	will be a	ualifie	d.			
ROJECT INFORMATION	th the requested analyses,	evennnn	AN	ALYSES	S REQU	ESTED	(attach	list or i	use quo	ite num	ber)
)unte #: PRESCA-BTL	MNT-MESA	<u> </u>		-	-	6					
Project/PO # FD04243	3		lers	No No	\$ S	S.			33	S	Μş
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Reporting state for compliance testing.			Lo C	EQ	75/	S, SC 02/20	13.4		E L'A		E LA
re any samples NRC licensab	le material?		‡ of	EX 021	おそ	60	4 gr	8	٩ ٩	H3	it.
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Matrix SM (Surface Motor) - GM	/ (Ground Water) - MM/ (Waste M	 /ater) → DW (Drinking	Water) ·	SL (Slud	(<u>) SO (</u>	Soil) · Ol	(0ii) 0	ther (Sne	cifu)	
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Company: Cordilleran (ompliance	-	AT	Fax	$\mathbf{\nabla}$	$\frac{0}{2}$	<u>8000</u>	50	٣,		
E-mail: jameshix@Corc	Comp. Com		Telep	Hone	· 30	<u>3 di</u>	5/20	07	taz	۲	
Copy of Report to:									_		
Name: JWH		-	E-ma	il:							
Company:			Telep	hone:	<u> 303 </u>	237	- 20	72			
Invoice to:											
Name: James Hix			Addre	ess: 5	550	Mal	sha	ll 5	7		
Company: Cordilleran (Compliance	Arvada, (0 8002									
E-mail: jameshix@Co	rdcomp. Com		Telep	hone: 🕻	303	<i>2</i> 37	-20	72		,	/
If sample(s) received past holding	time (HT), or if insufficient	t HT rem	ains to	comple	te				YES	V	
analysis before expiration, shall A	CZ proceed with requested	d short H	IT analy	yses?	11				NO		
is indicated. ACZ will proceed with	the requested analyses, e	even if H	T is exp	pired, ar	, nđ data	will be	qualifie	d.			
PROJECT INFORMATION			AN	ALYSES	S REQU	ESTED	(attach	list or	use quo	te num	ber)
Quote #: PRESCO - BTLM	UT-MESA					É.	> 。				~ C
Project/PO#: ED04243		1	lers	10		S.	1		NZ Q	ς Υ	いま
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2773 Downhill Drive Steamboat Sp Report to: Name: ブルハヒミ HiX Company: Cosci Iler M	mmas CO 80487 (800)334-5	- 400					СН	AIN	of C	USTO	DDY
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E-mail: Jameshix@	Cord comp. com		Teleb	hone:	505		5/	<u> </u>	<u> </u>	<u>ax</u>	_
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nvoice to:											
Name: James Hix	(Addre	SS:							
Company: Cordillera	n N				_						
E-mail: Jameshix@	Cord Lomp, Com		Telep	hone:	302	32	37	207	<u>72</u>		/
f sample(s) received past holding	I time (HT), or if insufficient	HT rema	nins to	comple	te				YES		
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s indicated, ACZ will proceed wit	h the requested analyses. e	ven if H	lis exr	pired, an	d data	wili be	qualifie	əd.			
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Matrix SW (Surface Water) · GW ((Ground Water) · WW (Waste Wat	er) · DW (Drinking	Water) ·	SL (Slud	lge) · SO	(Soil) · C)L (Oil) ·	Other (Sp	ecify)	
REMARKS											

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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

1

A Division Of DataChem Laboratories, Inc.

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

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	atories, inc.							CU	STO	DY	
2773 Downhill Drive Steamboat Sp	rings, CO 80487 (800) 33	84-5493	-					00	010		
Report to:						-		_			
Name: Tony Antalek			Addre	ss:	2773	DOWN			90497		
Company: ACZ LABS, INC.		-			STEA (070)		00	5, 00	00407		
E-mail: TAntalek@acz.com			Telepi	none:	(970)	079-03	90				
Copy of Report to:									_		
Name: N/A			E-maii	:							
Company:		_	Telepl	none:					,	-	
Invoice to:											
Name: YVONNE BAKER			Addre	SS:	2773	DOWN	HILL D	R			
Company: ACZ LAS, INC.					STEA	MBOA	T SPG	s, co	80487		
E-mail: yb@acz.com			Telepi	none:	(970)	870-65	90	-			
If sample(s) received past holdin	g time (HT), or if insufficie	 ent HT re	emains t	o comp	lete			_	YES		
analysis before expiration, shall	ACZ proceed with reques	ted shor	t HT ana	alyses?					NO [
If "NO" then ACZ will contact clie	ent for further instruction.	. If neith	er "YES	" nor "N	10" and da	التبريم	o qual	ified			
is indicated, ACZ will proceed wi	th the requested analyses	s, even n	ANA	LYSES	and da REOU	ESTED	le quai (attach	list or	use aud	te num	ber)
PROJECT INFORMATION											
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Tracking #:		-	Ö	S A							
Reporting state for compliance	testing:	-	# of	ΜM							
Are any samples NRC licensat	DATE:TIME	Matrix		BA	۳						
SAMPLE IDENTIFICATION	10/16/2006 00:40		2								
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Matrix SW (Surface Water) · GW	(Ground Water) · WW (Waste	Water) · L	JW (Drink	ing wate	r) SL (:	sluage) ·	50 (501)) · UL (U	n) · Otner	(Specily	,
REMARKS											
SUBCONTRACTED - Par	agon Analytical, Attn:	: Lance	Steer	e, 225	Com	merce	Drive	e, Ft. (Collins	, CO	
80524 (970) 490-1511 - P	LEASE SHIP UPS G	ROUN	D SER	VICE							
SEND ONE EACH RRAD	& TWO EACH VLUF	PER	SAMPI	E							
RELINQUISHED BY	DATE:	TIME		REC	EIVE) BY:		D	AT <u>E:TI</u>	VIE	Pag
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CONDITION OF SAMPLE UPO	N RECEIPT FORM	Parag	gon Analy	tics
Client: ACZ	Workorder No: 0610	164		
Project Manager: LS	Initials: SL	Date:	10.20.00	0
Does this project require any special handling in addition to standard	Paragon procedures?	- 1	YES	NO
Are sustedy seals on shipping containers intact?		NONE	(YES)	NO
Are custody seals on sample containers intact?		NONE	YES	NO
Le there a COC (Chain of Custody) present or other represent	tative documents?		(YES)	NO
Any the COC and bettle labels complete and legible?			(YES)	NO
 Are me COC and bottle models complete and registered. Is the COC in agreement with samples received? (IDs, dates, the second structure matrix requested analyses, etc.) 	imes, no. of samples, no.		YES	NO
of containers, matrix, requested and or, and/or removable	?	DROP OFF	(YES)	NO
Were airbitis / simpling documents present and or romovate	v? (excluding volatiles)	N/A	(YES)	NO
Are all aqueous samples requiring preservation preserved correct	J. (0.000000 B. 000000)	(N/A)	YES	NO
Are all aqueous non-preserved samples pH 4-9?			(YES)	NO
10. Is there sufficient sample for the requested analyses?	ested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requi			(YES)	NO
12. Are all samples within holding times for the requested analyse	ling etc.)		(VES)	NO
13. Were all sample containers received intact? (not broken or lea				
14. Are all samples requiring no headspace (VOC, GRO, Rx CN/S Size of bubble:< green pea> green pea	, radon), headspace free?	N/A	YES	NO
15. Were samples checked for and free from the presence of resid (Applicable when PM has indicated samples are from a chlorinated water source; not	ual chlorine? e if field preservation with sodium	N/A	YES	NO
thosultate was not observed.)			YES	NO
17. We conclust temperatures measured at 0.1-6.0°C? IB (run used*: (#2) #4	RAD	YES	NO
Cooler #	<u>,</u>			
	· • •			
Temperature (C). <u>27</u>				
No. of custody seals on cooler:				
Survey/ External µR/hr reading: <u>12</u>				
Information Background µR/hr reading: 12		DAG		
Were external μ R/hr readings \leq two times background and within DOT acceptance c	riteria? (YES/ NO / NA (If no, s	See rorm 008	A NID #17	
Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPON	SE TO ANY QUESTION ABOVE,	EXCEPT #1	AND #16. \land	an - 7
-> Sample #1 (L 59449-01) recieved	donly 2 40 ml	Vial	5 100-	<u> </u>
-or H3 - (if these Via	Is are for H3,	they-	are a	<u>ccovd</u>
to the label, Preserved with	Het Liter	poly pu	<u>es.w.</u>	HNUS
Sample #2 (L 59449-01) recieve	d only 1 40m	I_Via	1 -for	<u></u> (
0	¥		<u>H3</u>	7
	es with HCL	1 0		
40, ml Vials for H3 Not preserv	ed. Limited V	ol · · ła	r H3	
Drunked Der. Matrat. Enouth, Surt A				
If applicable was the client contacted? YES / NO/ NA Contact:	11	Date/	Гіте:	
	1/10/20106			
Project Manager Signature / Date:				

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

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0610164



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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.

/alter

Radiochemistry Instrument Technician

Radiochemistry Final Data Review

<u>11/16/06</u> Date



PARAGON ANALYTICS, INC. Radiochemistry Data Package

Section 1

SAMPLE RESULTS SUMMARY

1

Tritium Analysis By Liquid Scintillation Sample Results Summary

Client Name: ACZ Laboratories, Inc.

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Laboratory Name: Paragon Analytics PAI Work Order: 0610164

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

> Client Project Name: Client Project Number: L59449

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

Comments:

Data Package ID: H30610164-1	
Qualifiers/Flags:	Abbreviations:
U - Result is less than the sample specific MDC.	TPU - Total Propagated Uncertainty (see PAI SOP 743)
LT - Result is less than Requested MDC, greater than sample specific MDC.	MDC - Minimum Detectable Concentration (see PAI SOP 709)
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.	
Y2 - Chemical Yield outside default limits.	BDL - Below Detection Limit
M - The requested MDC was not met.	
M3 - They equested MDC was not met, but the reported activity is greater than the reported MDC.	
Date Finted: Tuesday, November 14, 2006	Paragon Analytics Page 1 of 1
)(LIMS Version: 5.446A

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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	Н-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

Date Printed: Tuesday, November 14, 2006

Paragon Analytics LIMS Version: 5.446A Page 1 of 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.

Data Package ID: H30610164-1

Date Printed: Tuesday, November 14, 2006

Paragon Analytics LIMS Version: 5.446A

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

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PARAGON ANALYTICS, INC. Radiochemistry Data Package



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

Date Printed: Tuesday, November 14, 2006

Paragon Analytics LIMS Version: 5.446A



Page 1 of 2
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

Date Printed: Tuesday, November 14, 2006

Paragon Analytics LIMS Version: 5.446A





PARAGON ANALYTICS, INC. Radiochemistry Data Package



Section 4

RAW DATA

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Laboratory Name: Paragon Analytics

Prep SOP: PAI 700 Analytical SOP: PAI 704

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

PAI Work C	r der: 0610	164				-	Analytical	SOP: P	AI 704					~	:02:49 H	5		
Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	Ingrowth Date /Time	Quench Factor %Lum	Matrix %Moist.	Samp Aiq Analy Alq	Inst fD Det ID	AnRunID File Name	Count Date/Time	GrossCPM BkgCPM	BaseEff ProgEff	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER PD	6Spk. Recov Flags
0610164-1 SMP	H-3 Trg. Analyte	10/16/06 9:40:00 AM	3H061106-1 3H061106-1-1	Y Y	138.4 0.11	WATER 100	43 mi 10 mi	LS6000 27-05	3H061106-1A Manual Entry	11/12/06 12:54 PM	7.720 8.080	23.86% NA	60 NA	-70 190	330 NA	pCi/I Unfiltered	A A	∍
0610164-2 SMP	H-3 Trg. Analyte-	10/16/06 2:40:00 PM	3H061106-1 3H061106-1-1	AN NA	138.9 0.11	WATER 100	43 m 10 m	LS6000 27-06	3H061106-1A Manual Entry	11/12/06 1:56 PM	7.550	23.86% NA	8 8 8	-100 190	330 NA	pCM Unfiltered	A N N	, >
3H061106-1 MB	H-3 Trg. Analyte	11/6/06 10:29:27 AM	3H061106-1 3H061106-1-1	AN NA	138.9 0.14	WATER	50 ≡ 10 ≡	L\$6000 27-07	3H061106-1A Manual Entry	11/13/06 11:14 AM	8.230 8.080	23.86% NA	60 NA	30	330 NA	pCi/l Unfiltered	A N N	n
3H061106-1 LCS	H-3 Trg. Analyte	11/6/06 10:29:27 AM	3H061106-1 3H061106-1-1	AN AN	138.2 0.07	WATER	50 H	LS6000 27-08	3H061106-1A Manual Entry	11/13/06 12:15 PM	61.700 8.080	23.86% NA	60 NA	10200 1600	300 NA	pCi/l Unfiltered	A N N	95.3 P

Comments:

Data Package ID: H30610164-1

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- U Result is less than the sample specific MDC.
- Y1 Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

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

M - Requested MDC not met.

- Y2 Chemical Yield outside default limits.
- W DER is greater than Warning Limit of 1.42
- D DER is greater than Control Limit of 2.13
 - Duplicate RPD not within limits.
- LT Result is less than Request MDC, greater than sample specific MDC
- - Actual Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # Actual Basis is "Dry Weight' while the Report Basis is 'As Received'.

Date Frinted: Tuesday, November 14, 2006

Paragon Analytics

Notes:

The Tracer results are not yield corrected (i.e. activity measured not activity added).
 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)

Circle Care Datio

DER - Duplicate Error Ratio BDL - Below Detection Limit

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

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

P - LCS, Matrix Spike Recovery within control limits.
 N - Matrix Spike Recovery outside control limits

L - LCS Recovery below lower control #mit. H - LCS Recovery above upper control limit.

Page 1 of 1

) e ci			11 NOV	2006	20:37
USER: 8		COMMENT:LS	36000				
PRESET TIME :	60.00						
DATA CALC :	CPM	州排 : 人E包	SAMPLE REPEATS:	1 6	PRINTER		: STD
COUNT BLANK :	N0	IC# : NO	REPLICATES :	<u>1</u> F	38232		: OFF
TWO PHASE :	NO	AQC : NO	CYCLE REPEATS ;	1.			
SCINTILLATOR:	LIGUID	LUMEX: NO	LOW SAMPLE REJ:	0			
LOW LEVEL :	YES	HALF LIFE	CORRECTION DATE:	r	none		
CHAN: 50.0 -	250.0 %ER	ROR: 1.75	FACTOR: 1.000000	BKG.	SUB:	O	
CHAN: 450.0 -	900.0 %ER	ROR:20.00	FACTOR: 1.000000	BKG.	SUB:	Q	

ALPHA-BETA DISCRIMINATION: NO

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2	37-2	60.00	139.1	8.37	8.93	29.68	4.74	0.14	122.15
	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
	37-5	60.00	139.2	7.68	9.31	28.33	4.85	0.13	305.54
	37-6	60.00	139.3	8.18	9.03	29,78	4,73	0.12	366.67
~7	37-7	40.00	138.8	7.70	9.30	29.27	4.77	0.11	427.77
ģ	37-8	A0.00	138.5	7.73	9.28	30.20	4,70	O.11	488.86
Ģ	37-9	A0.00	139.5	8.80	8.70	30.23	4.70	0.11	550.01
10	37-10	40.00	139.5	8.08	9.08	29,82	4.73	0.11	611.13
14	37-14:40	60.00	138.7	7.53	9.41	29.82	4.73	0.11	872-24 *
17	37-12	60.00	139.4	8.25	8.99	28.62	4.83	0.11	733.39
1 1	27-1	40.00	139.6	8.48	8.86	28,73	4.82	0.12	794.63
1 /1	27-2	40.00	i38.8	8.18	9.03	29,52	4.75	0.11	855.71
15	27-3	40.00	138.9	7,38	9.50	28.72	4,82	0.11	916,81
1.6	27-4	40.00	138.6	8,43	8.89	28.72	4.82	0.11	977.91
17	27-5	A0.00	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
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PAGE: 1

IC:sH:	<u>.</u>		seo					13 NOV	2006	11	:14
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SCINTILLATOR	£ \$	LIQUID	LUMEX	: NO	LOW SAM	PLE REJ:	0				
LOW LEVEL	n tr	YES	HALF	LIFE	CORRECTI	DN DATE:		none			
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9	27-9	- 60,00	137.6	8,03	9.11	29.68	4 . 74	0,16	162*∛6°÷

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O Reviewed by / Date

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Paragon Analytics

297984	Logbook/Page	No.	SOP	700 Rev 2	Form 1306r1.doc	(3/30/2003)
)ate	Workorder/ Sample Number	Column ID	Fiask ID	Run No.	Comments	Technician's Initials
1.166 06	10133-4	E	602)	Batch 3 Ho4/106-1	OBC
	1 -5	F	TZ	V	(
04.	10133-6	A	T12	2		
	-7	B	75			
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	-2	E	T8			
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C	5910164 - 1	$\left \right $	602			
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PARAGON ANALYTICS, INC. Radiochemistry Data Package

Section 5

QUALITY ASSURANCE SUMMARY REPORTS

QUALITY ASSURANCE SUMMARY SHEET

<u>م</u>	
PAI W.O. # / BATCH-	OR ALL REDUCED
TEST_	Vorume
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.
TECHNICIAN/ANALYST
DEPARTMENT MANAGER JUL
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FORM 302r6.doc (4/22/04)00017

PARAGON ANALYTICS, INC. Radiochemistry Data Package

Section 6

LABORATORY BENCH SHEETS

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Para	igon Anal)	ytics					Radi	ochen	nistry	/ Instr	umeni	Work	sheet			Prep Batch: 3H061106-1	
Prep	Procedure:		13		2	کر بر								An	alytical (JASS I NCR? Y (N) NA	
Prep Num	o LabiD	ac tr Type	nit Alq	in Alq	Units	Cnt 1 File/Inst	Cnt 1 Rack- Pos	Cnt 1 Pos Chk By	Cnt 2 File/Ins	Cnt 2 Ra t Pos	ick- Cnt 2 P Chk B	os Cnt 3 y File/Ins	Cnt 3 R ^z st Pos	ack- Cnt 3 Chk	Pos By	Notes	
<u> </u>	0610133-1	SMP	20	9	- E	21000	2-22	MC									
	0610133-2	SMP	20	10	Ē	-	m -										
-	0610133-3	SMP	50	10	Ē		4	+									
~	0610133-3	DUP	53	10	Ē		110										
 ←	0610133-4	SMP	ß	10	Ē		9										
	0610133-5	SMP	2	9	Ē		4	 .									1
-	0610133-6	SMP	50	9	Ē		20										
-	0610133-7	SMP	8	9	Ē		6										
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-	1 0610164-1	SMP	43	10	Ē		41	-				41					
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Paragon Analytics

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Prep Prc	xedure:	H3								Reviewed By: DBC	11/7/2006
Non-Routi	ine Pre-Trea	tment? }	Ś	Batch:	NIII		e-Prep? Y 🖉	N Batch:	MIH	Prep DASS / NCR? @ I N 71%/3	
Prep Si	OP: PAI 700	Rev : 9			Prep A	nalyst: Derek B	. Caduff		Balance: Bolonce:	Cocktail: UG LLT Cocktail Pinet: T-002	
Matrix Cla	iss: liquid				Prep	Dept: RS	9		Datalice.	Aliquot Pipet: RS-007	
Samp Prep Num Num	LabiD	ac Di Type N	lo. m	Alq Fin Alq i ml	Prep Basis	Water Added(ml)	Moisture(%)	Analysis Vol.(ml)	Standards	Prep Notes	
- -	0610133-1	SMP		10	Unfiltered	0	100	10			
2 4	0610133-2	SMP	10	6 6	Unfiltered Unfiltered	0	100	10			
- -	0610133-3	DUP	2	10	Unfiltered	0	100	10			
- -	0610133-4	SMP		10	Unfiltered	Ð	100	10			
9	0610133-5	SMP	5	0 10	Unfiltered	0	100	10			
7 1	0610133-6	SMP	Ω.	0 10	Unfiltered	D	100	9	4		
8	0610133-7	SMP		10	Unfiltered	0	100	6 4	00/100		
6 f	0610133-8	SMP	200	0 9 9	Unfiltered	-	100	10			
- -	0610141-1				Unifitered	-	100	2 12	~	M. C.	
- - -	0610141-2	SMP		10	Unfiltered		100	10		00/01	
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16	0610164-2	SMP	۹ '	5 5	Unfiltered	0	100	10			
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Page 1 of 2	H3 Bé	anch Shee	۲.				Parago	n Analytics		Supersedes: 11.1.198	
Date Printe	d: 11/7/2	2006	8:22				LIMS Ve	stsion: 5,441A		1(1 C 10a 10-1)	

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Paragon Analytics			œ	adioche	emistry	Prep /	Norksh	eet		Prep B.	atchi 3H061106-1	
Prep Procedure: H3								-	Reviewed By: DB	C DAC	Review Date: 1	1/7/2006
Non-Routine Pre-Treatment? Y /	D Batc		NH		Re-Prep? Y	/ 🔊 Ba	tch: ///	14	Prepar	SI NCR? @ 1	N 313613	
Prep SOP: PAI 700 Rev: 9 Prep SOP: NONE Matrix Class: liquid			Prep Ar Prep Prep	nalyst: Derek E Date: 11/6/20 Dept: RS	3. Caduff 106		Balan Balan	:e:	Cocktail Aliquo	Cocktail: Pipet: T-002 t Pipet: RS-007	NG ITL	
												ſ
Samp Prep LabID QC Dish Num Num Type No.	Init Alq F ml	in Alq mí	Prep Basis	Water Added(mf) Moisture(%) Analysis /	'ol.(ml) Stan	dards		Prep 1	Actes	
Spiked By: Derek B. Caduff	Date	:: 11/6/20	96									
Witnessed By: Jeff Kujawa	Date	: 11/6/20	90									
								pike Solution	Information			
					Soln #	Nuclide	SolnID	Prep Conc	Units Prep Dat	te Aliquot Units	Pipet ID	
					S1	Н-3	486.3020.23	2,383.682	DPM/ml 11/06/0	6 0.5 ml	ST-002	

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nts LOT #97-060701	H3 Bench Sheet	: 11/7/2006 8
CD0023	Page 2 of 2	Date Printed

Paragon Analytics

Parago	n Analy∣	tics			Ľ	adioche	mistry Pı	rep Wor	ksheet	Prep Batch: 3H061106-1
Prep Pr	ocedure:	H3	•			rep Bat	ch Not	: Valid	ated!!!	Reviewed By:
Non-Rou	tine Pre-Tre	atment?	<u>۲ ا © ا</u>	Batch:	WH	Ľ.	-Prep? Y / &	Batch:	11/14	Prep (0458 / NCR? (2) N 3/34/3
Prep 5	30P: PAI 700) Rev: {	5		Prep Ar	aliyst: Derek B.	Caduff DX		Balance:	Cocktail: UG 1LT
Prep (Matrix CI	SOP: NONE lass: liquid				Prep Prep	Date: 11/6/200 Dept: RS	ß		Balance:	Cocktail Pipet: T-002 Aliquot Pipet: RS-007
Samp Pre Num Nu	Lab(D	QC TVDe	Dish Init Al No.	lq Fin Alq	Prep Basis	Water Added(ml)	Moisture(%) A	Analysis Vol.(ml)	Standards	Prep Notes
	0610133-1	dws	samp 50	le sample ; 10	Unfiltered		100	10		
- ~	0610133-2	SMP	20	1	Unfiltered	0	100	10		
۳ ۳	0610133-3	SMP	20	10	Unfiltered	0	100	10		
4	0610133-3	400	20	¢	Unfiltered	0	100	₽ F		
- •	0610133-4	SWP SWP	8 8	6 6	Unfiltered	0	100	10		
	0610133-6	SMP	20	: ₽	Unfiltered	0	100	10		
- ∞	0610133-7	r SMP	20	10	Unfiltered	0	100	10		
6	1 0610133-5	3 SMP	50	무	Unfiltered	0	100	10		
10	1 0610141-1	1 SMP	50	10	Unfiltered	0	100	10		
11	1 0610141-2	2 SMP	50	10	Unfiltered	0	100	10		
12	1 0610141-3	3 SMP	50	10	Unfiltered	0	100	10		
13	1 0610141⊶	4 SMP	50	9	Unfiltered	0	100	2		
14	1 0610141-	5 SMP		9	Unfiltered	0	100	₽₽		
12	1 0610164-	AMS	B 2 2		Unintered		5	1		
9 1 1 1 1 1	1 0611014-	2 SMP	2 7 7 7 7	₽ ₽	Unfiltered		100	10		
8	1 0611014-:	2 DUP	50	9	Unfiltered	P	100	4		
19	1 0611014~	4 SMP	50	₽	Unfiltered	0	100	10		
20	1 0611014-	4 MS	50	066006.6	Unfiltered	0	100	10	S1	
21	1 3H061106-1	CB1 MB	ŝ	10	Unfiltered	0	100	9		
22	1 3H061106-1	CB2 MB	20	¢	Unfiltered	•	001	2 5		
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H3 Bench Sheet 11/6/2006 10:51 Page 1 of 2 Date Printed:

Paragon Analytics LIMS Version: 5.441A

Prep Batch: 3H061106-1	Reviewed By:	Prep(DASS / NCR? (0) N 3136/3	Cocktail Pipet: T-002 Aliquot Pipet: RS-007	Prep Notes		olution Information 2 Conc Units Prep Date Aliquot Units Prep Date Aliquot Units Prep Date Aliquot Units Prep Date Oct 83.682 DPMMm 11/06/06 0.5 ml ST-002							Supersedes://///
Radiochemistry Prep Worksheet	Prep Batch Not Validated!	Re-Prep? Y / D Batch: W/H	rep Analyst: Derek B. Caduff & Balance: Prep Date: 11/6/2006 Prep Dept: RS	3asis Water Added(ml) Moisture(%) Analysis Vol.(ml) Standards		Soln # Nuclide SolnID Pret Soln # Nuclide SolnID Pret S1 H-3 486, 3020 23 2.3	Ett.						Paragon Analytics
aragon Analytics	Prep Procedure: H3	Non-Routine Pre-Treatment? Y $I(0)$ Batch: M/H	Prep SOP: PAI 700 Rev: 9 Prep SOP: NONE Matrix Class: liquid	Samp Prep LabiD QC Dish Init Alq Fin Alq Prep B Num Num Type No. sample sample	Spiked By: Derek B. Caduff MC Date: 11 / 46/6/ Witnessed By: M' 4 Date: 11 / 6/6/					0(ეეს	လိုင်္ခံmments မြန်မို့L T LOT #97-060701	Page 2 of 2 H3 Bench Sheet

ABC	SAINI			
ANALYSIS DATE:	11/61	66	١	WETHOD: 3H
WORK	GAMPLE		<u>(</u>	SAMPLE CONDITION
ORDER	ID	pН	Color	Remarks
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PARAGON ANALYTICS, INC. Radiochemistry Data Package

Section 7

STANDARDS TRACEABILITY DOCUMENTS



311 Notabook No. 3020 22 ROJECT 4863020.23 Continued From Page AT n 2500 dpm 486.1284.85 07 WORKING DILUTION PREDARC A p.sl.loc 486.1284.85 GrASS BOTTLE AMBER 70 TRA LBFER Vzq utid Ro 259.20 1 10 ROTI MASS oF 261 .25 STD MAISSION 2 0.5 Q ∇ 732 Q31.100 SEE P DETERMINATION) 500 ml FOC REIDU E£ $\mathbb{D}($ 100 174 ZK DILLE TO BALZA 760 04 C MASS OF BOTTL Ē 259.20 • MASSIOF BIOTL MASS OF DILUTEDSTD: 500.80 WATER Di q ERMINE 68 えし DET Baliz 564421 100 m O ASC VOLOMETRIC FL M V 156.1980 29 TLA 5 35 5 99 .75594 Ц Ć άC 55 9975 B/n 59 P= Ol 417 NONTH CA 1 cell TUIT B31102 Pei 2.22 dpm 29 Zely 0.9976 9/ml 287 2.05+ Ģį in ଟ୍ଦିବ 36-4177/06 Stnd ID: 486.3020.23 Description: H-3 Reverification Log Analysis Date Initials Expiration Date 4/15/07 Expiration: dpm/mL 3871.30 Activity: dpm/mL . 193.57 2s Uncertainty: 3/23/98 Ref. Date: Ref Time: N/A AF Prep by: 3/24/06 Prep Date: DI H20 Matrix/Comp. 1.24E+01 Half Life (y): RG 4/17/06 Continued on Page Read and Understood By 4/12/06 Aner Hollegos 3124 Date -----Signod 000028

UUI284 Notebook No. . 85 Tritium Spile Salution 486 1224.85 Continued From Page aln I 486 1284 84 deluted to from a Sola 2 9 aprox Strid ID: 486.1284.85 follows 100000 cpm/ml Description: 3H Expiration: 8/11/06 Activity: 948004.38 dpm/mL 2s Uncertainty: 47400.22 dpm/mL DOA Harr 27 97115 Ref. Date: 3/23/98 Ref Time: NIA Prep Date: 5/3/00 rep by: RTS Matrix/Comp. DI Water UDK + HS (486. 1281.84 42.60113 Half Life (y): 1.23E+01 RE916 105 Final (dille/Dilko) 62,7170 Stnd ID: 486.1284.85 dil factor Description: H-3 Activity: 948004.38 dpm/ml 2s Uncertainty: 4740.02 dpm/ml 42.6011 Ref. Date: 3/23/98 Ref Time: na S 27.974 Prep Date: 5/3/00 Prep by: RTS 3125103 3/25/04 Expiration: 14.63 c รก่ง Matrix/Comp. DI H2O 5728/03x 014184.6 Half Life (y): 1.23E+01 14837521 MAY REQUIRE NCR FOR ICPT WORK. A130 2-27.9711 04 486.1284.85 Stnd ID: 484.1284.85 Description: Tritium in Water Stock Solution Description: 3H 427029 pCi/g or mL Activity: Expiration: 7/30/05 Activity: 948004.38 dpm/mL Uncertainty: pCi/g or mL -3/30/98 3/23/98 1-2-02 Ref. Date: Ref Time: 10:00 AM 3/30/98 CP4 18/4/62. Prep Date 3/30/98 Prep by: RTS 2s Uncertainty: 4740.02 dpm/mL Ref. Date: 3/23/98 Ref Time: N/A -3/29/03 3/23/18 Expiration 10/4/CZ Matrix/Comp. DI Water 3/29/03 Course Prep Date: 7/29/04 Prep by: JLK Matrix/Comp. DI H20 Short Lived - Decay Correct with each use Half Life (y): 1.23E+01 RG 8/17/04 RE 3/20103 10-11 130 Continued on Page P 2x00 Read and Understood By 1053 1.2010

101204 Notebook No. _ Tritium Stock Solution 486- 1284 84 Continued From Page ц ROJECT 405 1284.87 Analytics 5iR3 while YA! 50 unt ź 9. 40 mil 70ft Trial red มรริง P30th most available Will obtain an! 3Ki)97 сsМ ትርቅ 51 ່າស 7803 · 5.j. ÷ Stnd ID: 486.1284.84 RG-8113709 Stnd ID: 486.1284.84 Description: H-3 Activity: 1014184.00 pCilg or ml Description: 3H 'n 50709.00 pCi/g or ml 2s Uncertainty: 7/30/05 Expiration: Activity: 1014184.00 pCi/g or ml 3/23/98 Ref. Date: 0.417 Ref Time: Prep by: RTS 3/30/98 6 2s Uncertainty: pCi/g or ml Æ, Prep Date: 50709.00 7/3/04 Expiration: 3/23/98 Ref. Date: Di Water Matrix/Comp. Ref Time: N/A Prep by: JLK 1.24E+01 7/29/04 Half Life (y): Prep Date: D| Water Matrix/Comp. 1.23E+01 Half Life (y): RG 8/131 Stnd ID: - 1284.84 Description: Tritium in Water Stock Solution 7/30 \mathcal{O} Activity: 1014184 pCi/g or mL pCi/g or mL Uncertainty: -3/23/98 3/23/98 7-7-02 Ref. Date: 10:00 Ref Time: Prep by: RTS 3/30/98 Prep Date 3/29/03 Expiration Matrix/Comp. DI Water Short Lived -- Decay Correct with each use Ď \mathcal{O} Continued on Page Read and Understood By 5/5/D Date Slaned Date Signed

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ANALYTICS

1 380 Seaboard Industrial Blvd. Atlanta, Georgia 30318 · U.S.A.

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

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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 PREPARED BY: Currie, Radiochemist . M. ħ. 3 Q A APPROVED:

PARAGON ANALYTICS, INC. Radiochemistry Data Package

Section 8

CHAIN OF GUSTODY

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

QCC2 Laboratories, Inc. 3 Downhill Drive Steamboat Springs, CO 80487 (800) 334-5493 port to:	dress: ephone: nail: lephone: lephone: ins to cor f analyse: YES" nor is expire ANAL YSF ANAL YSF ANAL YSF	2773 C STEAN (970) 8 2773 I STEA :: (970) mplete :s? r "NO" ed, and da c STEA : STEA : : (970) mplete :s? r "NO" ed, and da c STEA : : : : : : : : : : : : : : : : : : :	DOWNHII MBOAT S 879-6590 DOWNHI MBOAT 870-6590 ata will b ESTED (a	LL DR SPGS, C D ILL DR SPGS, C D ILL DR SPGS, C D	CHAIN CUSTO CO 80487 CO 80487 YES NO ed. st or use q	J of DDY	τ
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						Other (Speci	ــلـــ ifv)
Matrix SW (Surface Water) · GW (Ground Water) · WW (Waste Water) · DW	/ (Drinking)	Water) SL	(Sludge)) · OE (Oii) ·		
REMARKS							,
SUBCONTRACTED - Paragon Analytical, Attn: Lance S	Steere,	225 Co	mmerce	e Drive	∍, Ft. Col	lins, CO	
80524 (970) 490-1511 - PLEASE SHIP UPS GROUND	SERVI	ICE					
AGNE CACH READ & TWO FACH VILLE PER S	AMPLE	<u>:</u>					
SEND ONE EACH RRAD & TWO EACH VEST FERCE							
		RECEIV	ED BY		DAT	E:TIME	
			2001				
T. ANTALEK	Ale	John			10.20-0	<u>06 110</u>	

FRMQA021.12.03.06

CONDITION OF SAMPLE UPON RE	ECEIPT FORM	Parag	on Analyt	ics
We State We	orkorder No: 061	0164		
Client: <u>AC12</u>	Initials: SL	Date: _	0.20.01	,
Project Manager: LS	agon procedures?	;	YES	NO
Does this project require any special handling in addition to standard rate	igon procession	NONE	(YES)	NO
Are custody seals on shipping containers intact?		(NONE)	YES I	NO
Are Custody seals on sample containers intact?	ve documents?		YES	NO
Is there a COC (Chain-of-Custody) present or other representative			(YES)	NO
Are the COC and bottle labels complete and legible?	of samples no		AVEC	NO
Is the COC in agreement with samples received? (IDs, dates, time	s, no. of samples, no.		(TES)	
of containers, matrix, requested analyses, etc.)		DROP OFF	(YES)	NO
Were airbills / shipping documents present and/or removable?	the second second	N/A	(YES)	NO
Are all aqueous samples requiring preservation preserved correctly?	(excluding volatiles)	NIA)	YES	NO
Are all aqueous non-preserved samples pH 4-9?	·····		(VES)	NO -
a Is there sufficient sample for the requested analyses?			TRAIL	NO
Ware all samples placed in the proper containers for the request	ed analyses?		- Crea	 NO
were an samples placed in the requested analyses?			(TEO)	NO
2. Are all samples within horizing	ng, etc.)		<u> </u>	
13. Were all sample containers received	adon), headspace free	? N/A	(YES)	NO
14. Are all samples requiring no neadspace (100), seen pea				
Size of Bubble green presence of residua	l chlorine?	_ N/A	YES	NO
15. Were samples checked for and need a chlorinated water source; note if (Applicable when PM has indicated samples are from a chlorinated water source; note if	field preservation with sould			
thiosulfate was not observed.)			(YES)	NO
16. Were the samples shipped on ice?	uead*: (#2) #4	RAD	(YES)	NO
17. Were cooler temperatures measured at 0.1-6.0 C?	luseu .			
Cooler #:				
Temperature (°C): <u>2.9</u>				_
No. of custody seals on cooler:				
External µR/hr reading: [2				~
Acceptance Acceptance Internation Background uR/hr reading: 2	\bigcirc		20)	
Ducing s === function of the standard and within DOT acceptance crit	eria? (YES/ NO / NA (If	f no, see Form U	08.)	
Were external profit readings - PROVIDE DETAILS BELOW FOR A NO RESPONSE	TO ANY QUESTION ABC	VE, EXCEPT #		<i>(</i> ())
Additional Information. (1 50449-D1) recieved	only 2 40	ml Via	Is tor	- 600
-> Sample +1	s are for H	$\frac{3}{1}$	ave a	LAND'
- the that Descreted with	Het + Lite	er poly 1	ves. w	HNU
+2 (, $-69449-01$) recieved	d only 1 4	oml Vi	al -100	<u> </u>
Sample #2 (2 STITIES)	¥′		<u>H3</u>	
Pro	s with HCL			
	d Limited	Vol	for H3	5
40, ml Viels tor H3 Not preserve				
FILTSCUPPED per. Matrit Enough, att	11	- Dat	e/Time:	
If applicable, was the client contacted? YES / NO/ NA Contact:	f J. La	<i> j</i> u		
Project Manager Signature / Date:	<u>(012106</u>			
	372220101-0002			
*IR Gun #2: Oakton, SN 29922500201-0066 *IR Gun #4: Oakton, SN 2	3/2220101-0002			
			Page	∋ 1 of <u> </u>

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

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PARAGON ANALYTICS Radiochemistry Data Package

Section 9

ADDITIONAL SUPPORTING DOCUMENTATION

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Liquid Scintillation Counter

Instrument Calibration

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Initial Efficiency Calibration Standards Traceability

ackground Determination
ritium Ba
0-mL geometry T
S6000 1

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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 from the initial unquenched calibration blank data. Once enough historical data is acquired, new historical limits are set as follows: interim control limits are established from the initial calibration for the geometry of interest. Limits are +/- 3 standard deviations Count Rate (CPM) is within the established control limits.

	"			Pass ?			PASS
	ent Blanks						03
	of Reag			ĭ			Ę
	Average o			LCL			4.81
	Blanks			Pass ?	PASS	PASS	PASS
	Reagent			NCL	11.03	11.03	11.03
	Individual			LOL	4.81	4.81	4.81
				Mean			8.08
TSI	006. MBC			Total Cts.	520.20	451.80	481.80
CAL LIMI	n 9/25/2(Count	Rate	(CPM)	8.67	7.53	8.03
R HISTORIG	Updated o	Count	Duration	Ê	60	60	60
CURRENTLY UNDER				Sample ID	3H061106-1CB1	3H061106-1CB2	3H061106-1CB3
-				#	7	ω	6
				CT DATE	11/11/06	11/12/06	11/13/06

6 R:INSTLSC/LS6000/CB'S_BKGD_WIN2_SPDSHT/RB_H3_10mL_XIS (BKGD DETERMINATION)

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

t

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.

	PASS/	FAIL			PASS
	Upper	Control Limit			0C.1S
	Lower	Control Limit			21.31
	Batch Average	Reagent Blank			29.48
2006 MBC	Count	Rate (CPM)	28.93	29.82	29.68
UPDATED 9/26/	Average count	Duration (min.)			60
	Count	Duration (min.)	60	60	60
		Sample ID	3H061106-1CB1	3H061106-1CB2	3H061106-1CB3
		CT DATE	11/11/06	11/12/06	11/13/06

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
• • • • •		WITNING

Sam <u>ple ID</u>	WIND1 cpm	WIND2 cpm	%LUMEX	SOP(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	WIND2 cpm	%LUMEX	SQP(E)	
/known dpm=	11685.24	31.65	5.00	155.72	UCL
•		27.44	0.00	125.72	LCL
efficiency=	0.2386	See Tech. Mgr.	See Tech. Mgr.	Std. Addition	Corrective Action

Instrument Technician: Signature & Date

<u>9/20/06</u> ?/25/06 Supervisory Review: Signature & Date

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

³H Efficiency Calibration Verification / Method Blank Verification 09/18/06

9/18/2006 ³H 12.23 Calibration Source Check LS 6000 9/18/200 Analysis Date: 9/18/200 Nuclide: 12.23

Call

rce:	486,3020.23	3/23/1998	3871.30	0.5	50.0	10.82
libration Check Sou	Spike Standard:	Reference Date :	Spiked DPM/mL :	Spike Volume :	Spiked into :	Current Spk. Act. :

Calibration Check Source Count

Pass/Fail	PASS	PASS	PASS	
LCS Recovery:	94.2%	91.2%	92.1%	
Chem. Yield	%001	X001	100%	-
Units	pCi/mL	DCI/mL	DCi/mL	
Activity	10.20	9.87	9.97	
Efficiency	0.2386	0.2386	0.2386	
BkgCPM	8.17	8.17	8 17	i
GISCPM	61 430	59 720	60.750	
Ansl. Vol.	0 90000	0 0000	0 00000	
Cat. Dur.	Ş	5	3 5	3
Pren Date	9000/10/8	9000108	90001078	1000777710
Position	7-74	47.8		
Samule ID	WOI-COVC90	5/101 CCUUCYU	71.01-7700700	04 77-7700700

															1 a IU 0 225	1 a PU	
Mathed Diants Chaole &	Jana C														00070	100.0	
Method Diams Check	f Deels	Pred Date	Cat Dur	Anal Vot	GreCPM	BkeCPM	Efficiency (Chem. Yieldl	k (denom.)	activity	MDC	Pass/Fail	Units	2s CU	IJ	PU	2s TPU
Cantana an	I INALA	1127 7211													01010	001/60	101 0
0620022-ICB4	47-10	8/21/2006	60	10	7.32	8.17	0.2386	100%	5.275	-0.1618	0.32	PASS	pcvm	641.0	-0.01612	0.010.0-	U.I34
	Ţ		5	5	7.6	8 17	0.7386	100%	5.275	-0.1087	0.32	PASS	pCi/mL	0.194	-0.01217	-0.01109	0.195
CG11-7700700	4/-11	0007777200	3	2	Ş										00000	0.01405	101.0
0620022-1086	47-17	8/21/2006	60	10	7,4	8.17	0.2386	100%	5.275	-0.1466	0.32	PASS	pCum	0.195	7+010'0-	66410.0-	0,154
				_			-	-	9								

R:VINSTILSCILS6000/CALIBRATIONS/SINGLE POINT CALIBRATIONS/091806_EFF_H3-10mL.XLS (ICV-ICB VERIF)

and a substance with

ID:3H.LO-FL	cheu.			18 SEP	2006	21:13
USER: 4	COMMENT:L	S6000				
PRESET TIME : 60.0	00					
DATA CALC : CF	PM H# :YES	SAMPLE REPEATS;	1.	PRINTER		a std
COUNT BLANK :	NO IC# : NO	REPLICATES :	1.	R9232		: OFF
TWO PHASE : 1	NO AQC : NO	CYCLE REPEATS :	1			
SCINTILLATOR: LIQUI	D LUMEX: NO	LOW SAMPLE REJ:	О.			
LOW LEVEL : YE	S HALF LIFE	CORRECTION DATE:		none		
CHAN: 50.0 - 250.0	KERROR: 1.75	FACTOR: 1.000000	вка.	SUB:	0	
CHAN: 450.0 - 900.0	LERROR: 20.00	FACTOR: 1.000000	BKG "	SUB:	0	

ALPHA-BETA DISCRIMINATION: NO

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SAM	POS	TIME	₩ ₩	1,011,11 <u>1</u> 1 ¹ 14,		ha I in		LUMEX	ELAPSED
NO		MIN		CFM	ZERROR	CPM	%ERROR	1/1	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
З	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
Ģ	47-9	60.00	138.0	60.25	3.33	28.00	4.88	0.07	382.71
tŌ	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

M C 9/19/06

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	Comments	H3-10ML CLCRV CH	1 h-226 570 WE.							H3-10NL EQUIB.																FORM 762r4.XLS (12/24/2002	·	
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6000	Batch ID	1-								\ \																		
LS LS	User #		-5	¥.						-77								-+										
·	Test	MOL-EL	4	N 220	+-					V Jz.M.T.				+	+-	+-			+			1-1	0		-			
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Paragon Analytics

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ep Procedure: H	13 SINGLE-POINT OF	MC NOLTAGALIA	HONE Analytic	sai QASS / NCR? Y / N
trep LabiD QC In tum Type	nit Alq Fin Alq Units Cnt 1 Cnt 1 Rach	k- Cnt 1 Pos Cnt 2 Cnt 2 Rack- Chk By File/Inst Pos	Cnt 2 Pos Cnt 3 Cnt 3 Rack- Cnt 3 Pos Chk By File/Inst Pos Chk By	Notes
1 0619009-B1 MB				
1 0518009-82 MB	50 5 mmC all DO			-
1 0619009-B3 MB	au 191			
1 0619009-B4 MB	1-th 0009-57 III 01 05	4 MC		
1 0619009-B5 MB	50 10 ml			
1 0619009-B6 MB		6		
t 0519009-S1 LCS	50 4.901961 ml			
1 0619009-S2 LCS	50 4.901961 Null 1.2121			
1 0619009-53 1003	50 4.901951 ml 01/4/06			
1 0619009-S4 LCS	-20 9.803922 III 15-6000 47+	U M		
1 0619009-55 LCS	50 9.803922 ml	2		
1 0619009-S6 LCS	50 9.803922 ml	2		
ample Barcodes		Soln # Nuclide S1 H-3	Scinit Prep Conc Units Prep D 50/12 - Prep Conc Units Prep D 699.2613.19 60,437.998 DPM/ml 07/12	2005 1 ml RS-2006
619009-S6LCS		0619009-S5LCS		
0619009-S4LCS		0619009-S3LCS		
0619009-S2LCS		0619009-S1LCS		
0619009-B6MB		0619009-B5MB		
0619009-B4MB		0619009-B3MB		
0619009-B2MB		0619009-B1MB		
1 of 1 H3 Instrume	ent Sheet	Paragon Analyti	ics	Supersedes:

Ptep Baten: 3H06071256 ***	Reviewed By: JRK/Ru Review Date: 7/13/2006	Prep QASS / NCR? Y 10 U.A	Cooktail Binet: T-002	Aliquot Pipet:	Prep Notes					41014								ALE ALA MARKA M no. Units Pred Date Alquot Units Pipet ID.			· · ·				Supersedes: 714/0V ();70
ry Prep Worksheet		Y 100 Batch: W	Balance:	Dalance:		2	5		10	₽ 	а С С С С С	а С	10 31					addiant and a second and a second a s	S1 H-3 699.2613.19 60,437.9	·					ragon Analytics IMS Version: 5.397A
Radiochemist		AM- Re-Prep7	Prep Analyst: Jeff Kujawa	Prep Dept: RS	rep Basis Water Added(ml) Moistur	Jnfiltered 0 100	Unfiltered 0 100	Untilitered 0 100 100 100	Unfiltered 0 100	Unlitered 0 100	Untillered 0 400	Unditered 0 100	Untilitered 0 100	Unfiltered 0 100	Unfiltered 0 100					 	 	 			
on Analytics	Procedure: H3	outine Pre-Treatment? Y / @ Batch:	p SOP: PAI 700 Rev: 9 SOP: NONF	Class: liquid	Prep LebiD QC Dish Init Alq Fin Alq Num Type No. mi	1 0619009-B1 MB 50 5	1 0619009-BZ MB 50 5	1 0619009-83 MB 50 5 1 0619009-84 MB 50 10	1 0619009-B5 MB 🔨 50 10	1 0619009-B6 MB + 6 50 10	1 0619009-S1 LCS 50 4.901961	1 0619009-S3 LCS 50 4.901961	1 0619009-S4 LCS 50 9.803922	1 0619009-S5 LCS 50 9.803922	1 0619009-56 LCS 50 9.803922	liked By: Jeff Kujawa Date: 7/12/200	ssad By: Kimberly Arnett Date: 7/12/200							mments	r 1 H.3 Bench Sheet hted: 7/13/2006 10:06

Para	A nopi	nalyti	S			-	Radioche	mistry P ₁	rep Worl	(sheet	Rrap Baten 3H060712#5*	
Pre	o Proce	dure:	H3				rep Ba	tch Not	t Valida	ated!!!	Reviewed By:	Γ
Non	Routine	Pre-Treat	ment?	N / J	Batch:			te-Prep? Y / N	Batch:		Prep QASS / NCR? Y / N	
<u>п</u> Г	rep SOP:	PAI 700	Rev: 9			Prep	Analyst: Jeff Kuj	awa JAk		Balance: Ralance:	Cocktail Pipet: T-002 Cocktail Pipet: T-002	
Mat	rep sur: rix Class:	liquid				лч лч	ep Uate: //12/20 sp Dept: RS	9			Aliquot Pipet:	
Sar	p Prep	LabiD	CC D Type	ish Init A 4o. ml	la Fin Ala mi	Prep Basis	Water Addeu(ml)) Moisture(%) /	Analysis Vol.(ml)	Standards	Prep Notes	[]
<u> </u>	- 	1619009-B1	- BE	20	<u>ی</u>	Unfiltered	0	100	5			ľ
N	-	1619009-B2	MB	50	ۍ ا	Untilitered		100	با م			1
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۹	-	0619009-B6	MB	20	10	Unfiltered	0	100	9			1
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6	-	0619009-53	LCS	8	4.901961	Unfiltered		100	- P	5 15		
≠ ₹	- .	0619009-54	LCS	202	9.603922	Unfiltered		100	10	31]
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Paragon Analytics

Date	Workorder/ Sample Number	Column ID	Fiask ID	Run No.	Comments	Technician's Initials
1/1/06	0607032 -824	B	74	1	Batch 311010711-1	1603
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	-lums	F	<u> 606</u>	\forall		
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7/12/06	0619009-51,54	A	103	<u> </u>	batch 3H060712. 5.	1hc
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(chrwah)06082123755	3 X / N	Notes												Pipet ID ST-002			• • •						NA
Preb Ba	ICN'S (SML (IDML) Analytical QASS INCR.	2 Cnt 2 Rack- Cnt 2 Pos Cnt 3 Cnt 3 Rack- Cnt 3 Pos ist Pos Chk By File/Inst Pos Chk By												Non-State Splite Splite Splite Splite Splite Ioln # Nuclide SolniD Prep Conc Units Prep Data Aliquot S1 H-3 486.3020.23 2,412.044 DPMmi 08/21/06 0.5 mi									agon Analytics As version: 5.415A
S	H3 SINGLE POINT IGB'S/	Init Alg Fin Atg Units Cnt 1 Cnt 1 Rack Cnt 1 Pos Cnt 2 File/Inst Pos Chk By File/Ins	an s mildeb		20 10 ml · · · · · · · · · · · · · · · · · ·	20 10 m 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	50 10 ml	69 430435 ml	50 4420(2013- 19/1-)		50 8.800390 ml 156006 47-7 MC	50 8.800990 mi	20 8.900890 ml V V Q V										nent Sheet Para 15:50 LM
Paragon Analytics	Prep Procedure:	Prep LabiD QC Num Type	1 0620022-ICB1 MB	1 0620022-ICB2 MB	1 0620022-ICB4 MB	1 0620022-JCB5 MB	1 0620022-ICB6 MB	1 0620022-ICV1 1.CS	1 0620022-ICV2 LCS	CA 11-7720700	1 0620022-ICV4 LCS	1 0620022-ICV5 LCS	1 0620022-ICV6 LCS		Sample Barcodes	0620022-ICV6LCS	0620022-ICV4LCS	0620022-ICV2LCS	0620022-ICB6MB	0620022-ICB4MB	0620022-ICB2MB	00	2016 1 0f 1 H3 Instrum

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p Procedure: H3 -Routine Pre-Treatment? Y / @								
-Routine Pre-Treatment? Y / 🕖							Reviewed By: JRK	Review Date: 8/21/200
	Batch:	1.v4	L.	-Prep? Y /	D Batch:	LA-	Prep QASS / NCR? Y 10	Lut-
rep SOP: PAI / JUU KEV: 9 rep SOP: NONE tx Class: liquid		Prep An Prep	alyst: Jeff Kuja Date: 8/21/200 Dept: RS	ма С		Balance: Balance:	Cocktail: UG Cocktail Pipet: T-002 Aliquot Pipet:	·LLT
n Num LabiD QC Dish Inti 7 Num Type No. r	Alq Fin Alq I	Prep Basis	Water Added(mi)	Moisture(%)	Analysis Vol.(ml)	Standards	Prap Notes	
1 0620022-ICB1 MB 5	10	Untilitered	0	- <u>1</u> 00	us u			
1 0520022-ICB2 MB 1 5	2 2	Unfiltered	-	00 100	о но -	N. A. C.		
1 0620022-ICB4 MB	0 10	Unfiltered	0	100	10	Yalı Xalı		
1 0620022-ICBS MB 2022	<u>60</u> 10	Unfiltered	0	100	9			
1 0620022-ICB6 MB	10	Unfiltered	0	9	2	Ū	A LO	
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) 1 0620022-ICV4 LCS	000000000000000000000000000000000000000	Unfiltered	0	100	10	S1		
1 0620022-ICV6 LCS	0660056 09	Unfiltered	0	100	10	S1		
1 0620022-ICV6 LCS	066006-6 09	Unfiltered	0	100	9	5		
Splked By: Jeff Kujawa	Date: 8/21/2	006						
messed By: Derek B. Caduff	Date: 8/21/2	. 900				•		
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	* <u>-</u>	•					India Pren Date Aliquid India Ploe	et ID
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UG LLT LOT# 97-060101								
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Paragon /	Analytic	ŷ			<u>ц</u>	Radioche	mistry F	^o rep Wor	ksheet	Rep Batch 3H	060821:3
Prep Proce	dure:	H3			C	rep Ba	tch No	ot Valid	ated!!!	Reviewed By:	sview Date:
Non-Routine	Pre-Treatm	ent? Y /	N Bal	tch:		Ŕ	e-Prep? Y /	N Batch:		Prep QASS / NCR? Y / N	
Prep SOP:	PAI 700 F	tev: 9			Prep A	nalyst: Jeff Kuja	wa / the	• • •	Balance:	Cocktail: UG LLT	
Prep SOP: Matrix Class:	NONE liquid				Pre Pre	p Date: 8/21/200 5 Dept: RS	96 /		Balance:	Cocktail Pipet: T-002 Aliquot Pipet:	
Samp Prep Num Num	LabID	JC Dish ype No.	Init Alq ml	Fin Alq ml	Prep Basis	Water Added(mt)	Moisture(%)	Analysis Vot.(ml)	Standards	Prep Notes	
1	620022-ICB1	MB	50	10	Unfiltered	0	100	ß			
2	620022-ICB2	MB	8	מו	Unfittered	0	100	ם בו י			
4 1 00	620022-ICB3 520022-ICB4	MB	8	s ¢	Unfiltered	0 0		40 40			
3	820022-ICB5	MB	8	e e	Unfiltered	, a	100	10			
6 1 0	620022-ICB6	MB	8	10	Unfiltered	0	100	10			
	620022-ICV1 L	S	20	4.950495	Unfiltered	0	100	ع	6		
2 F	620022-ICV2 1	CS CS	8 6	4.950495 4 950495	Untiltered		100	0 10	5		
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	620022-ICV5 L	CS	3 B	9:900990	Unfiltered	, D	100	10	5 15		
12 1 01	620022-ICV6 1	CS	50	9.900990	Unfiltered	0	100	10	S1		
Spiked By	:	EU.	Da	te: 6/	12/100						
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							Soln #	Nuclide Sc	InID Prep Col	nc Units Prep Date Aliquot Units Pipet ID	
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Notebook No. 2613 4S 3 H 7/4 Jontinued From Page PROJECT 699. 2413.19 Prepare a working dilution at approx, diluting Stal 699.2613.18 with DEM/AL 59000 RG9 16 105 Stnd ID: 699.2613.19 Description: 3H . Expiration: 8/11/06 dpm/mL Activity: 94000.71 dpm/mL 109 here 26 3 2s Uncertainty: 676.81 Ref. Date: 9/3/98. Ref. Date: 9/3/98 Ref Time: N/A 3/21 ef ŝ page 18 See Densit rep by: JLK Prep Date: 7/29/04 Matrix/Comp. DI Water & 2100 Half Life (y): 1.23E+01 Requires NCR for ICPT work. - RC-9/6/15 125 al Hube glass Gottle 699.26/3.18 + 6 SHJ. Transfer Ba1 4) 94.73890 Mass of bottle Massiof battle 10785 939 11 KI) + mess Nottoin DI ار المنك Lache DI pg a hala B』1#1> 94 7389 4 abare Reverification Log 19 Analysis Date Initials Expiration Date Masi 192 4076 -9 24/06 RG- 19 24/07 42 bott Mas5 iæof stal + DT w 7.662879 -mask RG9/27/06 culator Ga inal Activity 4 60, DEM/30 X 1000 30/ K34 X D. 9958 5/mL 1.9396 4.8151a 634.7 KBa/a 97.66879 = 9+1,000 711 DPM/mL SD 7/31/02 Stnd ID: 699.2613.19 W NCR For Stnd ID: 699.2613.19 \$ 5 Description: ³H Description: 3H 7/28/04 Expiration: Expiration: 7/30/05 Activity: 94000.71 dpm/mL Activity: 94000.71 dpm/mL dpm/mL 676.81 dpm/mL 2s Uncertainty: 2s Uncertainty: 676.81 9/3/98 Ref. Date: Ref. Date: 9/3/98 50 Bl Ref Time: N/A Real 24/06 Ref Time: NIA Prep Date: 7129104-7/28 Prep by: JLK JRK 7/28/03 Prep by: Prep Date: Matrix/Comp. DI Water Matrix/Comp. DI Water 8/1/ 03 Half Life (y): 1.23E+01 Half Life (y): 1.23E+01 5128/1/03 Signed 000053 Sianed





National Institute of Standards & Technology Certificate PAFIO DE S-09-03

Standard Reference Material 4927 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

Gaithersburg, Maryland 20899 June 1999 Half-life and text revised October 2000 Nancy M. Trahey, Chief Standard Reference Materials Program

SRM 4927F, page 1 of 6

*Notes and references are on pages 5 and 6.

Recommended Procedure for Opening the SRM Ampoule

- 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.
- 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.
- 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.
- Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.
- 9) Scal any unused SRM solution in a flame-scaled glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.

SRM 4927F, page 2 of 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:	r		
Source description	Liquid in flame-seale	d NIST borosilicate-gl	ass ampoule
Ampoule specifications	Body outside diameter Wall Thickness Barium content Lead-oxide content Other heavy element	er (16.5 ± 0.5) (0.60 ± 0.0) Less than Less than rs Trace quart) mm 14) mm 2.5% 0.02% ntities
Solution mass	Approximately 5.0 g		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration $(mol \cdot L^{-1})$	Mass Fraction $(g \cdot g^{-1})$
	H₂O 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 compensated interna intercomparison of scintillation counting	SRM 4927E using the al gas proportional cou SRMs 4927E/4927F us g systems [h]	NIST length inters and sing two 4π8 liquid-

SRM 4927F, page 3 of 6

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*Notes and references are on pages 5 and 6.

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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, $u(x_i)k_i$, (%) [i]	Relative Sensitivity Factor, $ \partial y/\partial x_i \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 Stands	ard Uncertainty of the Output Quan	tity, u _c (y)/y, (%))	0.36
Coverage Factor, k				<u>x 2</u>
Relative Expanded Uncer	tainty of the Output Quantity, U/y, ((%)		0.72

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

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, $u_{o}(y)$, 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 $300 \text{ Bq} \cdot \text{g}^{-1}$.
- [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_t .

SRM 4927F, page 5 of 6

- [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 $u_i(y)/y = |\partial y/\partial x_i| \cdot (u(x_i)/y) = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. 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.
- $[n] \quad |\partial y/\partial x_i| \cdot (x_i/y) = |\lambda \cdot t|$
- [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. $u(x_i)/x_i = 100\%$. $|\partial y/\partial x_i| \cdot (x_i/y) = \{(\text{response per Bq of impurity})/(\text{response per Bq of H-3})\} \cdot \{(\text{Bq of impurity})/(\text{Bq of H-3})\}$. 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

- 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 SO 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).

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SRM 4927F, page 6 of 6







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	A みまんま スクロード 1380 Seaboard industrial Bivd.
	ATVALLITION ADDAT TO USA ADDATA
	1/7 + +2 -7 45 Phone (404) 302-007
	CEPTIFICATE OF CALIBRATION
	Standard Radionuclide Source
	55543-307
	H-3 in Water 50 mL in Flame Sealed Vial
·	a sing an aliquot
	This standard individually from a master radionuclide solution measured gravimetrically from a master radionuclide solution standard was 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 hostitude 1993
•	
	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.
	PONUMBER 21143, Item 1
	MA Lune
•	PREPARED BY:
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	Q A APPROVED: $(C)^{M}$ $(M')^{3}/_{2}/_{9}/_{9}/_{9}$
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	DAILY INST	FRUMENT PE	RFORMAN	ICE CHECKS	- LS6000 (LI	OFF, LUMEX	OFF)		
Daily IPCs co	onsist of the follo	wing standards;							
-	Efficiency Chec	k -							
	Beckman Tritium Standard		B	Beckman C-14 Standard		PAI Reagent Blank			
	Lot HNZ0202	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 fac	lor is meası	ired on the	
						Reagent Blank			
Interim Cor	ntrol Limits	as of 9/20/06 N	ABC						
	De	cay Corrected Tr	itium	Carbon-14		<u>Reagent Blank</u>		Quench Fact	<u>or</u>
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	
	·				<u> </u>			· · · · · · · · · · · · · · · · · · ·	
		Decay Correcte	d			Reagent		Quench	
Date	<u>H-3 CPM</u>	H-CPM	PASS?	<u>C-14 CPM</u>	PASS?	<u>H-3 Bkg CPM</u>	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	ОК	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

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Liquid Scintillation Counter

Quality Control Data

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Daily Instrument Performance Checks

	DAILY INST	FRUMENT PE	RFORM	ANCE CHECKS	- LS6000 (L	L OFF, LUMEX	OFF)		
Daily IPCs co	onsist of the follo	wing standards;				118-1			
	Efficiency Chec	k -							
	Beckman Trit	ium Standard		Beckman C-14 Sta	ndard	PAI Reagen	t Blank		
	Lot HNZ0202			Lot CNZ3112	2	RB 5/7/03 L	LT # 97-3	021	
	101900.00	dpm		98500.0	dpm				
	2/17/05	RÉF		2/17/05	REF				
1	2/17/10	EXP		2/17/10	EXP				
						The quench fac	tor is meas	ured on the	
						Reagent Blank			
Historical C	Control Limits	as of 11/16/06	MBC						
	De	cay Corrected Tr	<u>itium</u>	Carbon-14		Reagent Blank		Quench Fact	or
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 Correcte	d			Reagent		Quench	
Date	<u>H-3 CPM</u>	H-CPM	PASS?	<u>C-14 CPM</u>	PASS?	H-3 Bkg CPM	PASS?	<u>H#</u>	PASS?
11/10/06	62523.30	68927 35	ОК	77231 4	ОК	31.8	OK	112.7	OK

77020.0

77132.1

76985.7

76963.7

77096.3

OK

ΟК

OK

OK

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35.4

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OK

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OK

ΟK

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OK

11/11/06

11/11/06

11/13/06

11/13/06

11/14/06

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62353.50

62382.10

62170.30

62332.40

62204.80

68750.79

68782.32

68569.98

68748.77

68618.64

OK

OK

OK

OK

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				
	<u>blank</u>		<u>spike</u>				
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			

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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.
- Paragon Analytics has found there to be a significant low bias to ²¹⁴Pb and ²¹⁴Bi results when 4. using a mixed nuclide gamma source for efficiency calibrations. The magnitude of this bias has been determined to be approximately 32% for ²¹⁴Bi, and 23% for ²¹⁴Pb. 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

chemistry Final Data Review

11/20100 Date

Paragon Analytics A Division of DataChem Laboratories. Inc.



PARAGON ANALYTICS Radiochemistry Data Package

Section 1

SAMPLE RESULTS SUMMARY

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

Please refer to the individual sample results in Section 3.

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PARAGON ANALYTICS

Radiochemistry Data Package

Section 2

QC RESULTS SUMMARY

1

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	AI-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	

Comments:

Qualifiers/Flags:

 \mathbf{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.

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- 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: GSW0610164-1

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

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	υ
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'N
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.

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

Data Package ID: GSW0610164-1



TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Page 2 of 3



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

Abbreviations:

BDL - Below Detection Limit

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

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	TI-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	υ

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.

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

Data Package ID: GSW0610164-1

Paragon Analytics LIMS Version: 5.450A

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	Р
10198-40-0	Co-60	41800 +/- 4900	100	42000	99.5	85 - 115	Р
10045-97-3	Cs-137	38200 +/- 4500	200	37000	103	85 - 115	P, M3

Comments:

Abbreviations Qualifiers/Flags: U - Result is less than the sample specific MDC or less than the associated TPU TPU - Total Propagated Uncertainty (see PAI SOP 743) MDC - Minimum Detectable Concentration (see PAI SOP 709) 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. SQ - Spectral quality prevents accurate quantitation. L - LCS Recovery below lower control limit. SI - Nuclide identification and/or quantitation is tentative H - LCS Recovery above upper control limit. TI - Nuclide identification is tentative P - LCS Recovery within control limits. R - Nuclide has exceeded 8 halflives. M - The requested MDC was not met. M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC. Data Package ID: GSW0610164-1

Paragon Analytics LIMS Version: 5.450A



PARAGON ANALYTICS Radiochemistry Data Package

B

Section 3

INDIVIDUAL SAMPLE 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

SQ - Spectral quality prevents accurate quantitation.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

SI - Nuclide identification and/or quantitation is tentative.

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

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	AI-26	-0.2 +/- 5.5	9.9	U
14596-10-2	Am-241	0.5 +/- 5.2	8.9	υ
13966-02-4	Be-7	26 +/- 40	66	U
14913-49-6	Bi-212	26 +/- 84	142	υ
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	υ
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.

Abbreviations:

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

BD1 - Below Detection Limit

Data Package ID: GSW0610164-1

Date Printed: Monday, November 20, 2006

Paragon Analytics LIMS Version: 5.450A

PAI 713 Rev 9 Sample Results

Lab Name: Paragon Analytics

Work Order Number: 0610164 Client Name: ACZ Laboratories, Inc.

ClientProject ID: L59449

Prep Batch: GS061025-4 Final Aliquot: 975 ml Sample Matrix: WATER Field ID: L59449-01 QCBatchID: GS061025-4-2 Prep Basis: Unfiltered Prep SOP: PAI 739 Rev 8 Lab ID: 0610164-1 Moisture(%): NA Date Collected: 16-Oct-06 Run 1D: GS061025-4A Result Units: pCi/l Count Time: 300 minutes Library: FANP Date Prepared: 25-Oct-06 File Name: 063147d08 Report Basis: Unfiltered Date Analyzed: 05-Nov-06

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	υ
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	К-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	υ
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.

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 LIMS Version: 5.450A



SQ - Spectral quality prevents accurate quantitation.

- TI Nuclide identification is tentative.
- R Nuclide has exceeded 8 halflives.
- G Sample density differs by more than 15% of LCS density.

PAI 713 Rev 9 Sample Results

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

ID: L59449-01 ID: 0610164-1 Library: FANP	Sample Matr Prep SO Date Collecte Date Prepare Date Analyze	Sample Matrix: WATER Prep SOP: PAI 739 Rev 8 Date Collected: 16-Oct-06 Date Prepared: 25-Oct-06 Date Analyzed: 05-Nov-06		GS061025-4 GS061025-4-2 GS061025-4A 300 minutes 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	
CASNO 14683-10-4	Target Nuclide Sb-124	Result +/-	2 s TPU	MDC 8.9	Lab Qualifier	

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	TI-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 tess 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.

Abbreviations:

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

BD1 - Below Detection Limit

Data Package ID: GSW0610164-1

Date Printed: Monday, November 20, 2006

Paragon Analytics LIMS Version: 5.450A

SQ - Spectral quality prevents accurate quantitation.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

SI - Nuclide identification and/or quantitation is tentative.

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

Page 3 of 6
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	AI-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.

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

Date Printed: Monday, November 20, 2006

Paragon Analytics LIMS Version: 5.450A

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.

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

Final Aliquot: 990 ml Prep Batch: GS061025-4 Sample Matrix: WATER Field ID: L59449-02 Prep Basis: Unfiltered QCBatchID: GS061025-4-2 Prep SOP: PAI 739 Rev 8 Lab ID: 0610164-2 Moisture(%): NA Run ID: GS061025-4A Date Collected: 16-Oct-06 Count Time: 300 minutes Result Units: pCi/l Date Prepared: 25-Oct-06 Library: FANP File Name: 062554d02 Report Basis: Unfiltered Date Analyzed: 05-Nov-06

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	-131	0 +/- 22	38	U
13966-00-2	K-40	-9 +/- 85	147	U
13966-31-9		-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	Ph-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.

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

Date Printed: Monday, November 20, 2006

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.

Paragon Analytics LIMS Version: 5.450A

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

Final Aliquot: 990 ml Prep Batch: GS061025-4 Sample Matrix: WATER Field ID: L59449-02 QCBatchID: GS061025-4-2 Prep Basis: Unfiltered Prep SOP: PAI 739 Rev 8 Lab ID: 0610164-2 Moisture(%): NA Run ID: GS061025-4A Date Collected: 16-Oct-06 Result Units: pCi/l Count Time: 300 minutes Date Prepared: 25-Oct-06 Library: FANP File Name: 062554d02 Report Basis: Unfiltered Date Analyzed: 05-Nov-06

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	TI-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.

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

Date Printed: Monday, November 20, 2006

Paragon Analytics LIMS Version: 5.450A

SQ - Spectral quality prevents accurate quantitation.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halflives.

SI - Nuclide identification and/or quantitation is tentative.

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

PARAGON ANALYTICS Radiochemistry Data Package



Section 4

RAW DATA



				\bigcirc				
	00	53147D08.S	PC Analyze	d by A				
****	*****	*******	******	***********	********	*******	*******	********
SEEK	ER	GAMM	A ANA	LYSIS	RESUL	TS PS	S Version	n 1.8.4
		Dar	agon Analy	tics. Div.	of DataChe	m Lab		
		Far	agon mary	GammaScar	02 2000000 1			
****	******	*****	******	******	******	* * * * * * * * *	******	******
				Geo 1 / Wat	er			
~ 1		10104 1 00	061005 4					
Sampi	e ID: 06	10164-1 GS	061025-4					
								
Samp]	ling Star	t: 10/1	6/2006 12:	00:00 Cou	inting Star	t: 11,	/05/2006	09:27:20
Samp]	Ling Stop	: 10/1	6/2006 12:	00:00 Dec	cay Time		. 4.77	E+002 Hrs
Build	lup Time.		0.00E+00	0 Hrs Liv	ve Time		• •	18000 Sec
Samp]	le Size .		. 9.75E-	001 L Rea	al Time		• •	18036 Sec
Colle	ection Ef	ficiency .	1	.0000 Spa	c. File	• • • •	0631	47D08.SPC
	• • • 		Detecto	r # = 8 (De	etector 8)			
Fner	w(keV) =	-0.56 + 0	.500*Ch +	0.00E+00*C	$h^2 + 0.00E$	+00*Ch^3	11/05/2	006
FWHM	(keV) =	0.72 + 0	.007*En +	8.11E-04*E	n^2 + 0.00E	+00*En^3	08/17/2	006
	(1207)		Where E	n = Sqrt(E	nergy in ke	V)		
								
Searc	ch Sensit	ivity: 1.0	00 Sigma	Multiplier	: 2.00 Se	arch Sta	rt/End:	80/4000
====:				ישבבבבבבביי ע מסאסכע סו	=======================================	========		
				E SEARCH R				
PK.	ENERGY	ADDRESS	NET/MDA	UN -	C.L.	BKG	FWHM	
#	(keV)	CHANNEL	COUNTS C	ERTAINTY	COUNTS	COUNTS	(keV)	FLAG
1	46.45	93.96	138	56	42	322	0.90 a	NET OT.
2	53.48	108.00	13	26	43	120	0.41 a	NEIC CH
3	63.28	122.50	211	74	54	464	1.26 b	
4 5	74 27	149 55	209	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	142	0.81 a	
13	238.59	477.96	/5	30	25	43	0.72 a	NET CL
14	295.20	591.10 705 10	19	20	28	141	0.93 a	
15 16	552.24 511 A1	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	L
20	802.76	1605.47	41	24	17	64	1.18 a	ц. т.т.
21	911.04	1821.87	28	21	15	48	1.25 a	L '
22	927.70	1855.18	25	27	20	70	2.02 a	L
23	1460.05	2919.10	40	22	15	45	T'2/ 9	L

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000017

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

Bkg.File Detector #: 8

BACKGROUND SUBTRACT RESULTS

рк#	ENERGY (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN- CERTAINTY	NEW CR.LEVEL	FLAG
	46.45	138	56	42	7	72	59	NET <cl< td=""></cl<>
3	63,28	211	60	43	43	80	65	NET <cl< td=""></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< td=""></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< td=""></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< td=""></cl<>
23	1460.05	40	22	15	-12	33	28	NET < CL

	06314	17D0	08.SPC An	alyz	ed by		*****		*****	******
SEEKER	******	F 1	INAL	AC	TIV:	ΊΤ	Y R	EPORT	Version	2.2.1
BEREI C			Paragon	Anal	ytics, Gam	Div maSc	. of Da an	taChem Lab		
*****	*****	* * * *	******	* * * *	*****	* * * *	*****	* * * * * * * * * * *	*****	*****
					Geo 1	/ W	ater			
Sample I	D; 0610	164	-1 GS0610	25-4	L					
Sampling Sampling Buildup ' Sample S Collection Cr. Leve	Start: Stop: Time ize on Effic: 1 Confide	ience	10/16/200 10/16/200 0.0 9 cy e Interva)6 12)6 12)0e+0).75e	2:00:00 2:00:00 000 Hrs 2-001 L 1.0000 95 %	C D L R S	ounting ecay Ti ive Tim eal Tim pectrum et. Lim	Start: me me me File it Confider	11/05/2006 . 4.77e 1 1 06314 nce Interval	09:27:20 +002 Hrs 8000 Sec 8036 Sec 7D08.SPC : 95 %
Efficien Eff.=1/	cy File: [6.36E-0	(D 1*E)	De 08) (Sh01) n^-1.19E4	etect .EFE +00 +	cor #; F (Geo + 1.20E	8 (1 Ef 5+02*	Detecto f Cal) En^9.04	er 8) E-01] 09/1	1/2006	
Library	File: .		E	FANP.	LIB (FANP) (Fiss.	Act. and M	Nat. Product	s))
=====	=========	===	=========							
			MEA	ASURI	ED or M	IDA C	CONCENTR	ATIONS		
##£23 8 8#	=======	===				====				
	FNFRGY	N E	Concer	ntrat	ion			Critical	Halflife	
Nuclide	(keV)	T	(pCi/L	ICT (4))	MDA	Level	(hrs)	
					 -					
Th-234	92.50	N-	2.92E+01	+- !	5.68E+0)1 9	0.65E+01	4.73E+01	3.92E+13	
Sb-125	Average	:x	9.04E-01	+- 8	8.98E+C	0			2.43E+04	
	176.29		3.54E+01	+- 3	3.50E+0)1 5	5.71E+01	2.76E+01	2.43E+04	
	427.95	N	1.53E+00	+- !	9.30E+0	00 1	.63E+01	7.73E+00	2.43E+04	
Pb-212	238.63	N -	2.84E+00	+- '	7.23E+0	00 1	.24E+01	6.04E+00	1.676+04	
Pb-214	351.99	N	1.17E+00	+- :	1.16E+()1 1	.96E+01	9.53E+00	1.40E+07	
Bi-214	609.32	N	1.55E+00	+- :	1.38E+0	01 2	2.34E+01	1.13E+01	1.40E+07	
Ac-228	911.07	N	7.29E+00	+- 2	2.21E+()1 3	3.75E+01	1.79E+01	5.048+04	
K-40	1460.75	N -	2.94E+01	+ '	7.81E+(01 1	L.38E+02	2 6.58E+01	1.12E+13	
Am-241	59.54	Ν	5.34E-01	+- !	5.23E+(00 8	3.88E+00	B 4.28E+00	3.80E+06	
Eu-155	105.31	N-	2.80E+00	+- '	7.41E+(00 1	L.29E+01	L 6.21E+00	4.35E+04	
Co-57	122.07	N	1.31E+00	+- :	2.04E+(00 3	3.38E+00)b 1.62E+00	6.48E+03	
Ce-144	133.53	N -	3.46E+00	+- :	1.78E+(01 3	3.06E+01	1.48E+01	6.82E+03	
U-235	143.76	N	4.96E+00	+- :	1.74E+(01 2	2.93E+01	Lb 1.41E+01	6.17E+12	
Ce-139	165.85	N-	4.30E-01	+- :	2.83E+(00 4	1.86E+00) 2.35E+00	3.30E+03	
Th-227	236.00	N -	1.81E+00	+-	1.83E+(01 3	3.15E+03	LB 1.51E+01	1.90E+05	
Cr-51	320.07	N-	3.47E+01	+-	4.83E+(01 8	8.53E+01	L 4.11E+01	6.65 <u>E</u> +02	
I-131	364.48	Ν	4.77E+00	+-	1.92E+(01 3	3.26E+01	L 1.56E+01	1.93E+02	
Be-7	477.56	Ν	2.63E+01	+-	3.95E+0	01 6	5.56E+01	L 3.12E+01	1.28E+03	
T1-208	583.14	N	2.35E+00	+ -	6.41E+(00 1	1.08E+01	L 5.19E+00	1.67E+04	
Sb-124	602.71	. N-	1.82E+00	+-	5.02E+0	00 8	8.85E+00) 4.22E+00	1.44E+03	· · ·
Cs-134	604.66	N -	7.44E-01	+ -	4.10E+0	00 7	7.16E+0(DB 3.41E+00	1.81E+04	
Ru-106	621.84	N-	3.87E+00	+	4.19E+0	01 7	7.29E+01	1 3.47E+01	8.84E+03	
Ag-110M	657.75	N	6.53E-01	+ -	4.35E+0	00 5	7.47E+0(0 3.54E+00	6.00E+03	
Cs-137	661.62	N -	1.38E+00	+-	4.70E+0	00 8	B.29E+00	3.94E+00	2.64E+05	
	Pag	je C	03							000019

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063147D08.SPC Analyzed by

MEASURED OR MDA CONCENTRATIONS

					==========		==========		
Nuclide	ENERGY (keV)	N E T	Concer (pCi/L	ntra	ation)	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	Ν	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	Ν	1.53E+01	+-	2.63E+01	4.40E+01	2.06E+01	7.45E+04	
Fe-59	1099.22	Ν	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	Ν	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

РК. #	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.

	06	2554D02.S	PC Analyze	ed by	*****	******	******	******
*****	********	**************************************	*********	T. V G T G	RESI	ι Τ Β Ρ	S Versior	1 1.8.4
SEEK	ER	GAMMI	A ANA		R L D D			
		Par	agon Anal	ytics, Div	. of DataCl	nem Lab		
			-	GammaSc	an			
****	*******	******	******	* * * * * * * * * *	******	*******	*******	******
				~ ~ / ~				
				Geo I / W	later			
Gompl	ο TD, 061	10164-2 GS	061025-4					
Sampi	e 10. 00-	10104 2 00	001020					
Sampl	ing Start	z: 10/1	6/2006 12	:00:00 0	Counting Sta	art: 11,	/05/2006	09:27:05
Sampl	ing Stop	: 10/1	6/2006 12	:00:00 [Decay Time.	• • • • •	. 4.77)	3+002 Hrs
Build	lup Time.		0.00E+0	00 Hrs I	Live Time .		•••	18007 Sec
Samp]	e Size .	· · · · ·	. 9.90E		ceal lime . Enc File		0625	54D02.SPC
COTTE	CTION EI	ficiency .	· · ·					
			Detect	or #: 2	(Detector 2)		
Energ	v(keV) =	-0.77 + 0	.501*Ch +	2.77E-08	Ch ² + 0.0	0E+00*Ch^3	11/05/2	006
FWHM	(keV) =	0.69 + 0	.006*En +	1.18E-03	*En^2 + 0.0	0E+00*En^3	05/16/2	006
_			Where	En = Sqrt	(Energy in	keV)		
						Cta		80/4000
Searc	ch Sensit	ivity: 1.0	00 Sigma	Multiplie	er: 2.00	search sta		
							========	
====;	=======		 PR	AK SEARCH	RESULTS			
				=============				
PK.	ENERGY	ADDRESS	NET/MDA	UN-	C.L.	BKG	FWHM (leoN)	ET AC
#	(keV)	CHANNEL	COUNTS	CERTAINTY	COUNTS	COUNTS	(Kev)	
		134 10	 116	52	39	299	0.83 a	
1 2	74 81	151.00	13	32	26	165	0.42 a	NET< CL
2	84.80	170.96	30	42	34	228	0.75 a	NET< CL
ر ۲	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	l i
7	174.78	350.72	39	35	27	164	0.70 a	
8	185.72	372.59	84	33	22	123	0.50 a	L
9	198.23	397.58	140	52	38	247	1.09 a	L
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	L
12	278.67	558.28	27	33	26	132	0.76 a	Ļ
13	295.00	590.91	40	36	28	153	0.90 a	L
14	351.88	704.54	77	36	26	132	1.11 G	Wide Dk
15	511.00	1022.42	420	66	42	24U 1 0 3	2.2/ c 1 25 =	I HIUC ER
16	558.50	1117.31	106	55 דר	· ∠4 ⊃∧	100	1,07 8	- 1.
17	595.75	1191.72	36	15	. 24	132	1.61 a	1
18	609.51 002 02	1605 79	/4 10	21	23	95	1.80 a	1
7.A 7.A	003.03	1821 88		18	13	39	0.97 a	1
∠∪	+	2022.00	50	24	16	41	2.55 a	1

,

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
	66.36	 116	52	39	28	72	59	NET <cl< td=""></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< td=""></cl<>
13	295.00	40	36	28	7	46	38	NET <cl< td=""></cl<>
14	351.88	77	36	26	13	53	43	NET < CL
15	511.00	420	66	42	-81	99	82	NET <cl< td=""></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< td=""></cl<>

	062554I	02.SPC Ana	alyzed by	* * * * * * * * * * * * *	* * * * * * * * * *	******	******
*********	י******** ה	TNAL	ACTIVI	TY RE	PORT	Version	2.2.1
DEFUER	1	Paragon i	Analytics, D: Gamma	iv. of Data Scan	Chem Lab		
*******	*****	*****	*****	* * * * * * * * * * * *	*******	**********	*****
			Geo 1 /	Water			
Sample II	D: 061016	4-2 GS0610	25-4				
Sampling Sampling Buildup Sample S Collectio Cr. Leve	Start: Stop: Time ize on Efficie l Confiden	10/16/200 10/16/200 0.0 9 ncy ce Interva	6 12:00:00 6 12:00:00 0e+000 Hrs .90e-001 L . 1.0000 1: 95 %	Counting S Decay Time Live Time Real Time Spectrum F Det. Limit	tart:	11/05/2006 (. 4.77e- 18 18 062554 ce Interval)9:27:05 +002 Hrs 3000 Sec 3007 Sec 4D02.SPC : 95 %
Efficien Eff.=1/	cy File: ([3.02E-03*	De D02) (Sh01) En^-3.85E+	tector #: 2 .EFF (Geo 1 00 + 1.33E+0	(Detector Eff Cal) 2*En^7.85E-	2) 01] 05/10	8/2006	
Library	 File:		ANP.LIB (FA	NP (Fiss. A	ct. and Na	at. Product	3))
			CURED or MDA	CONCENTRAT	TONS		
		MEA	SORED OF MDA		=======================================	=======================================	
	======================================						
	ENERGY E	Concer	ntration		Critical	Halflife	
Nuclide	(keV) I	' (pCi/L)	MDA	Level	(hrs)	
			· · · · · · · · · · · · · · · · · · ·	1 64 F±02	8 04E+01	3.92E+13	
Th-234	92.50 N	1 47E+01	+- 1.66E+01	2.71E+01	1.29E+01	6.17E+12	
0-235 Sh-125	Average:X	5.27E+00	+- 1.07E+01			2.43E+04	
30-125	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	
T1-208	Average:	c-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	J-2.12E+00	+- 7.27E+00	1.25E+01	6.05E+00	1.67E+04	
Pb-214	351.99 N	J 3.10E+00	+- 1.26E+01	2.12E+01	1.03E+01	1.40E+07	
Bi-214	609.32 N	1 6.23E+00	+- 1.58E+01	2.65E+01	1.28E+01	1.40E+07	
Ac-228	911.07 N	J 5.92E-01	+- 2.18E+01	3.78E+01	1.79E+01	5.04E+04	
K-40	1460.75 N	N-8.57E+00	+- 8.47E+01	1.47E+02	7.01E+01	1.12E+13	
Am-241	59.54 N	N 1.64E+01	+- 2.97E+01	4.95E+01	2.38E+01	3.80E+06	
Eu-155	105.31 N	N 3.85E+00	+- 1.13E+01	1.91E+01	9.14E+00	4.35E+04	
Co-57	122.07 N	N-7.25E-01	+- 2.94E+00	5.06E+00	2.44E+00	6.48E+03	
Ce-144	133.53 1	N-6.40E+00	+- 2.17E+01	3.76E+01	1.81E+01	6.82E+03	
Ce-139	165.85 I	N-8.55E-01	+- 4.87E+00	8.25E+00	4.03E+00	3.30E+03	
Th-227	236.00 1	N-7.52E+00	+- 2.20E+01	3.82E+01B	1.84E+01	1.90E+05	
Cr-51	320.07 1	N-2.56E+01	+- 4.72E+01	8.37E+01	4.00E+01	6.65E+02	
I-131	364.48 1	N 0.00E+00	+- 2.21E+01	3.81E+01	1.82E+01	1.938+02	
Be-7	477.56 l	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 J	N-7.34E+00	+- 4.52E+01	7.91E+01	3.76E+01	8.84E+03	
	Page	003					

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062554D02.SPC Analyzed by

MEASURED OR MDA CONCENTRATIONS

		===		===					:======
Nuclide	ENERGY (keV)	N E T	Concer (pCi/L	itra	ation)	MDA	Critical Level	Halflife (hrs)	
Ag-110M Cs-137 Nb-94 Bi-212 Nb-95 Co-58 Mn-54 Sc-46 Pa-234m Eu-154 Fe-59 Zn-65 Co-56 Na-22 Co-60 Eu-152 Al-26	657.75 661.62 702.50 727.17 765.82 810.75 834.81 889.26 1001.03 1004.80 1099.22 1115.52 1238.28 1274.54 1332.51 1408.08 1808.65	N- N N- N N- N N N N N N N N N N N N	3.78E+00 4.28E+00 1.87E+00 5.83E+01 1.70E+00 2.94E+00 8.68E-01 4.33E-01 4.10E+02 1.16E+01 1.57E+00 1.00E+01 7.23E+00 5.08E-01 3.77E+00 3.43E+00	+- +- +- +- +- +- +- +- +- +- +- +- +- +	4.78E+00 5.02E+00 4.91E+00 6.19E+01 5.50E+00 5.85E+00 5.04E+00 5.41E+00 8.38E+02 2.66E+01 1.23E+01 1.04E+01 5.49E+00 5.70E+00 2.63E+01 5.61E+00	8.72E+00 8.23E+00 8.69E+00 1.01E+02 9.39E+00 1.05E+01 8.89E+00 9.43E+00 1.53E+03 4.51E+01 2.14E+01 2.02E+01 1.72E+01 1.07E+01 9.99E+00 4.72E+01 9.43E+00	$\begin{array}{c} 4.14E+00\\ 3.88E+00\\ 4.13E+00\\ 4.70E+01\\ 4.42E+00\\ 4.98E+00\\ 4.20E+00\\ 4.42E+00\\ 7.16E+02\\ 2.10E+01\\ 9.99E+00\\ 9.49E+00\\ 8.02E+00\\ 5.01E+00\\ 4.65E+00\\ 2.19E+01\\ 4.28E+00\\ \end{array}$	6.00E+03 2.64E+05 1.78E+08 1.67E+04 1.54E+03 1.70E+03 2.01E+03 3.92E+13 7.45E+04 1.08E+03 5.85E+03 1.86E+03 2.28E+04 4.62E+04 1.17E+05 6.31E+09	
MEASUE	ED TOTAL	. :	1.61E+02	+-	3.09E+02	pCi/L			

MEASURED TOTAL

UNKNOWN, SUM or ESCAPE PEAKS

РК. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
	 66 36	134 10	28	72	59	299	0.83	Deleted
2 T	00.00	151 00	- 94	103	87	165	0.42	Deleted
2	74.01	170.96	30	42	34	228	0.75	Deleted
э г	120 07	291 17	59	48	37	165	0.62	Unknown
5	139.97	201.17	-18	69	57	123	0.50	Deleted
8	100 22	372.53	- 10	72	57	247	1.09	Unknown
9	198.23	397.50	22	32	25	142	0.58	Deleted
10	233.03	407.10	7	46	38	153	0.90	Deleted
51	295.00	590.91	, 1	40	82	240	2.27	Deleted
15	511.00	1022.42	-01	10	38	103	1.25	Unknown
16	558.50	1117.31	54	40	30	100	1.25	Unimour
17	595.75	1191.72	36	31	24	122	1.07	UTIKITOWI
19	803.03	1605.79	2	42	35	95	1.80	Deleted

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

	06	2634D06.S	PC Analyz	ed by				
****	******	*****	******	*******	****	*******	******	*******
SEEK	ER	GAMM	A ANA	LYSIS	RESUI	TS PS	S Versio	n 1.8.4
		Par	agon Anal	ytics, Div.	of DataChe	m Lab		
*****	******	******	******	**********	********	*******	******	*******
				Geo 1 / Wa	ater			
Sampl	.e ID: GSC	061025-4MB	GS061025	-4				
Sampl Sampl Build Sampl Colle	ling Start ling Stop lup Time. le Size . ection Ef:	t: 11/0 : 11/0 ficiency .	2/2006 22 2/2006 22 0.00E+0 . 1.00E	:00:00 Co :00:00 Do 00 Hrs L: :+000 L Ro 1.0000 Sp	ounting Star ecay Time. lve Time eal Time oc. File	rt: 11,	/02/2006 . 6.09 0626	22:36:31 E-001 Hrs 24000 Sec 24010 Sec 34D06.SPC
Energ FWHM	gy (keV) = (keV) =	-0.65 + 0 1.19 + -0	Detect).501*Ch +).002*En + Where	or #: 6 (1 2.97E-08*(- 7.29E-04*) En = Sqrt()	Detector 6) Ch^2 + 0.001 En^2 + 0.001 Energy in ke	E+00*Ch^3 E+00*En^3 eV)	11/02/2 07/24/2	2006 2006
Sear	ch Sensit	 ivity: 1.0	00 Sigma	Multiplie	r: 2.00 S	earch Sta	rt/End:	80/4000
								=============
====;	=======	============	PI	EAK SEARCH	RESULTS			
====	=======	===========					=======	
РК. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
		100 01	162		47	471	0.94 a	a
T	120 80	290 55	113	55	42	364	0.95 a	a
2	139.89	200.55	29	41	32	256	0.64	a NET< CL
3	159.00	310.70	53	39	30	220	0.65 8	a
4	100.44	372.43	101	54	38	310	0.95	a
5	198.44	397.44	21	84	68	657	2.15	a NET< CL
6	237.62	4/5.04	31	04		- - ·		Wide Pk
-		704 09	90	44	32	207	1.09	a
	352.05	704.00	19	39	30	176	1.49	a
8	500.25	777,74 1001 00	49 570	76	48	320	2.77	a Wide Pk
9	511.23	1116 00	570	<i>30</i>	25	129	1.31	a
10	558.39	1101 02	100	22	22	112	0.91	a
11	596.05	1017 47	JJ 70	24	24	125	1.16	a
12	609.20	121/.4/	70	24	23		1.68	a
13	803.10	1004.59	40	21	16	46	2.02	a
14	1460.95	2210.12	142	14	11	25	1.66	a
15	1763.65	3522.60	Z 1	TO	± ±	20		

> 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
		162	63	47	112	86	69	
⊥ 2	139 89	113	55	42	53	80	65	NET <cl< td=""></cl<>
4	185.92	53	39	30	14	59	48	NET < CL
	198 44	191	54	38	118	80	63	
6	237 62	31	84	68	-12	100	82	NET <cl< td=""></cl<>
7	352.05	90	44	32	36	66	54	NET < CL
, 0	511 23	570	76	48	74	117	95	NET <cl< td=""></cl<>
10	558 39	155	39	25	105	55	42	
11	596.05		33	22	68	57	45	
12	609 20	78	34	24	30	59	48	NET <cl< td=""></cl<>
13	803 10	25	29	23	-21	44	37	NET < CL
14	1460 95	142	31	16	12	47	38	NET <cl< td=""></cl<>
15	1763.65	21	16	11	2	30	25	NET <cl< td=""></cl<>

	062634	D06.SPC An	alyzed by	****	******	****	****
SEEKER	I	INAL	ACTIVI	TY REI	PORT	Version	2.2.1
		Paragon	Analytics, D:	iv. of Data	Chem Lab		
*****	*******	******	Gatiliida	5Call *********	*****	*****	******
			Geo 1 /	Water			
Sample ID): GS0610	025-4MB GS0	061025-4				
Sampling Sampling Buildup T Sample Si Collectic Cr. Level	Start: Stop: Time ze on Efficio Confide:	11/02/200 11/02/200 0.0 1 ency nce Interva	06 22:00:00 06 22:00:00 00e+000 Hrs 1.00e+000 L 1.0000 al: 95 %	Counting S Decay Time Live Time Real Time Spectrum F Det. Limit	tart: 1	.1/02/2006 2 . 6.09e- . 24 . 24 062634 ce Interval:	2:36:31 001 Hrs 000 Sec 010 Sec D06.SPC 95 %
Efficienc Eff=10 [^] Eff.=10 [^]	cy File: [-2.87E+0 [-1.40E+0	De (D06) (Sh01) 1 +2.52E+0] 0 +1.00E+0(etector #: 6).EFF (Geo 1 L*L +-5.85E+0 D*L +-6.55E-0	(Detector Eff Cal) 0*L^2 +0.00 1*L^2 +7.72	6) E+00*L^3] E-02*L^3]	09/11/2006 Above 180).00 keV
Library 1	File:		FANP.LIB (FA	NP (Fiss. A	ct. and Na	at. Products	3))
=================	========	================	===============================				
		MEZ	ASURED or MDA	CONCENTRAT	'IONS ============		===========
=======================================	========						
	ENERGY	E Concei	ntration		Critical	Halflife	
Nuclide	(keV)	T (pCi/L)	MDA	Level	(hrs)	
Pb-214	351.99	N 7.06E+00	+- 1.31E+01	2.18E+01	1.066+01	1.40E+07	
Bi-214	609.32	N 7.51E+00	+- 1.50E+01	2.506+01	1.22E+V1	1 128-13	
K-40	1460.75	N 2.60E+01	+- 1.04E+02	1./6E+V2	0.50E+01	3 808+06	
Am-241	59.54	N-1.22E+01	+- 5.02E+01	8.55E+VI	4.105+01 0 105.01	3 928113	
Th-234	92.50	N-1.58E+01	+- 1.118+02	1.0/E+V2 2 E9F+01	1 25E±01	4.35E+04	
Eu-155	105.31	N 2.39E+01	+- 1.60E+01	Z.30ETVI	2 888+00	6.48E+03	
Co-57	122.07	N-1.75E+00	+- 3.44E+00	3.90E+00	2.00H+00	6.82E+03	
Ce-144	133.53	N-1.25E+01	+- 2.40E+VI	4.25E+01b	2.12E+01	6.17E+12	
U-235	143.76	N-1.49E+01	+- 2.535+01	5 14E+00	2.99E+00	3.30E+03	
Ce-139	165.85	N-4.07E-01	+- 2 51E+01	4.34E+01	2.11E+01	1.90E+05	
Th-227	236.00	N-1.98E+01	+- 7 30E+00	1.22E+01	5.94E+00	1.67E+04	
PD-212	238.63	N 2.IIE+00	+-3.18E+01	5 36E+01	2.59E+01	6.65E+02	
Cr-51	320.07	N 0.09E+00	+- 4 60E+00	7.89E+00	3.82E+00	1.93E+02	
1-131	364.40	N = 4 $34E = 01$	+ 1 20E+01	2.05E+01	9.87E+00	2.43E+04	
SD-125	427.33	N-5 40E+01	+- 3.59E+01	6.58E+01	3.17E+01	1.28E+03	
Be-/	4//.00 500 1/	N-3 88ET00	+-6.58E+00	1.14E+01	5.54E+00	1.67E+04	
TT-208	503,14 602 71	N-1 25E+00	+- 5.22E+00	9.79E+00B	4.74E+00	1.44E+03	
50-124 Ca 124	602.11 601 66	$N=3, 21E\pm00$	+-4.65E+00	8.23E+00B	3.96E+00	1.81E+04	
$C_{3} = \pm 34$ $B_{11} = 106$	621 84	N-7.28E+00	+-4.49E+01	7.77E+01	3.72E+01	8.84E+03	
Δα-110M	657.75	N 2 68E+00) +- 4.52E+00	7.53E+00	3.58E+00	6.00E+03	
Cg-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	
	Page	e 003					00(

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MEASURED OR MDA CONCENTRATIONS

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

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

UNKNOWN, SUM or ESCAPE PEAKS

РК. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
		133 81	112	86	69	471	0.94	Unknown
1 2	139 89	280 55	53	80	65	364	0.95	Deleted
2	159 00	318.70	29	41	32	256	0.64	Deleted
2	185 92	372.45	14	59	48	220	0.65	Deleted
	198 44	397.44	118	80	63	310	0.95	Unknown
5	237 67	475.64	-12	100	82	657	2.15	Deleted
9 9	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.

06	52727D	06.SP0	C Ar	aly	yzec	l by	•															
*****	*****	****	* * * 1	****	****	***	**1	* * * *	***	***	* * *	***	***	***	* * *	**	* * *	***	**	***	***	* * *
SEEKER		CAI	LІ	в	RA	ТΙ	0	N	R	ES	5 U	\mathbf{L}	т	S		V	ers	ion	•	2.0).4	
******	*****	****	****	****	****	***	**1	****	***	**1	***	**1	**1	***	***	**	***	* * *	**	***	***	***
Sample ID: DA1	LLY CH	ECK																				
Stds. Match To	oleran	ce:	2.0	20]	keV													_			-	
Detector Numbe	er: 06		Ca	ali	brat	ion	Da	ate.	•	•	11/	16,	/20	006	12	::5	9:2	6				
Energy(keV) =	-0.6	9 +	0.	501	*Ch	+-9	.1	5e-0)9*C	:h^:	2 +	0	. 0()e+	00*	Ch	^ 3					 -
	 סע	Meag	ure	4	Ca	l cu l	ati	ed	En	er	av			ક્ષ								
	#	Cent	roi	đ	Ene	ergy	7		(k	εv)]	Di:	Efe	rer	ice						
=======================================			==== 0 0	:	===:	====	===	====		:==:	=== 50			 0	0)						
	T	120	0.2	с Т		33. 561	21		6	.1	50 61			- 0		Ś						
	2	132	2.8	0	, 		04		115	72 -	0-1 0-1			c c		,)						
	3	234	4.5	8	1.	L/3.	22		11/	· • • ·	2 L					, ,						
	4	266	2.6	5	1:	332.	47		133	32.	48			- C	.00	,						

Calibration Results Saved.

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062543D02.SPC Analyzed by ***** PS Version 1.8.4 RESULTS GAMMA ANALYSIS SEEKER Paragon Analytics, Div. of DataChem Lab GammaScan Geo 1 / Water Sample ID: GS061025-4LCS GS061025-4 _____ 11/03/2006 07:00:00 | Counting Start: 11/03/2006 07:20:43 Sampling Start: 11/03/2006 07:00:00 | Decay Time. 3.45E-001 Hrs Sampling Stop: Buildup Time. 0.00E+000 Hrs | Live Time 1800 Sec Sample Size 1.00E+000 L | Real Time 1825 Sec Detector #: 2 (Detector 2) Energy(keV) = -0.77 + 0.500*Ch + 4.01E-08*Ch² + 0.00E+00*Ch³ 11/03/2006 FWHM(keV) = 0.69 + 0.006*En + 1.18E-03*En² + 0.00E+00*En³ 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 BKG FWHM C.L. NET/MDA UN-ENERGY ADDRESS PK. COUNTS (keV) FLAG COUNTS CERTAINTY COUNTS CHANNEL (keV) # _ _ _ _ _ _ _ _ _ 1.18 a 4320 159 196 210 50.98 103.45 1 1.91 a Wide Pk 6570 231 286 713 58.37 118.21 2 0.85 b 2329 108 268 59.55 120.56 13622 3 0.73 a 1453 81 100 96 142.26 4 70.410.87 a 91 1659 233 10504 5 87.98 177.38 0.44 a NET< CL 780 56 70 98.92 199.25 48 6 0.61 b NET< CL 1039 68 84 21 200.36 7 99.47 780 0.53 c 56 71 87 207.52 8 103.05 1343 0.86 a 82 138 2326 245.53 9 122.08 1827 1.17 a 103 131 346 274.58 136.61 10 1261 0.86 a 79 99 142 333.46 166.07 11 0.90 a NET< CL 96 1690 118 74 374.92 186.81 12 1099 0.93 a NET< CL 72 88 636.20 32 317.55 13 0.61 a NET< CL 670 52 65 40 707.68 353.32 14 0.69 a 49 583 81 62 953.46 476.30 15 1.58 a NET< CL 84 1170 104 61 511.10 1023.01 16 1.05 a NET< CL 481 46 57 41 630.53 1261.68 17 1.04 a 524 48 60 49 644.13 1288.86 18 1.63 a 852 68 312 661.74 1324.03 22572 19 2.33 a 501 54 280 1173.40 2346.41 18534 20 2.52 a HiResid 109 26 261 16729 1332.64 2664.55

****	06 ********	2543D02.SI	PC Analyzed	by *********	*****	* * * * * * * * * * * *	****
SEEKE	R E	заскди	ROUND	SUBTR	ACT R	ESULTS	5 Vers. 2.2.1
****	*****	Par:	agon Analyt:	ics, Div. GammaScan *********	of DataCh	em Lab	* * * * * * * * * * * * * * * * * * * *
Backg	round Fil	le:	DET021	027.BKG (061027-2	WEEKLY BKG)	
Bkg.F	Tile Detec	ctor #: 2 =========	======================================	======================================	======================================		
	=======================================						
PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN- CERTAINTY	NEW CR.LEVEL FLAG
 5 12	87.98 186.81	 10504 74	233 118	91 96	10504 67	233 118	91 96 NET <cl< td=""></cl<>
14 16	353.32 511.10	4 0 61	65 104	52 84	34 11	65 104	52 NET <cl 85 NET<cl< td=""></cl<></cl

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	06	2543D0)2.SPC Ar	alyz	ed by ********	* * * * * * * * * * *	*****	*****	****
***** SEEKEF	: * * * * * * * * 2	***** F]	INAL	A C	TIVI	TY RE	PORT	Versio	n 2.2.1
			Paragon	Anal	ytics, Di GammaS	v. of Data can	Chem Lab		
*****	******	*****	******	****	*******	******	******	*******	****
					Geo 1 /	Water			
					000 1 /	10000			
Sample	e ID: GS	506 1 02	5-4LCS GS	30610	25-4				
									
Sampl	ing Start	:	11/03/20	06 07	:00:00	Counting S	Start: 1	1/03/2000	507:20:43
Sampl	ing Stop		11/03/20	06 07	:00:00	Decay Time	** * * * * *		1800 Sec
Build	up Time.		0.	1.00e	+000 L	Real Time			1825 Sec
Colle	e Size . ction Efi	 Eicien	cy		1.0000	Spectrum 1	File	062	543D02.SPC
Cr. L	evel Con:	fidenc	e Interv	al:	95 %	Det. Limit	c Confidenc	e Interv	al: 95 %
					\cdots	(Detector	2)		
neri a	ionar Fi	let (D	ע (Sh01) (Sh01	ececu) FFI	Geo 1 H	Eff Cal)	2)		
Eff.	=1/[3.02]	E-03*E	n^-3.85E	+00 -	+ 1.33E+02	2*En^7.85E	-01] 05/18	3/2006	
Libra	ry File:		. ANALYT	ICAL	LIB (Ana	alytical) ==============		=========	
====		******	ME	ASUR	ED or MDA	CONCENTRA	TIONS		
	========	=		====					
		N	_				Critical	Halflife	
	ENE	RGY E	Conce	ntra	cion)	MDA	Level	(hrs)	
Nucli	.de (K	ev) 1	(pci/li						
Am-24	1 59	.54	9.74E+04	+-	1.91E+03	1.56E+03	7.69E+02	3.79E+06	
Cd-10	9 88	.02	2.38E+05	5 +-	5.27E+03	4.17E+03	2.06E+03	1.11E+04	
Co-57	122	.07	1.44E+03	3 +-	8.58E+01	1.03E+02 1.06E+02	5.08E+01 5.24E+01	3.30E+03	•
Ce-13	39 165 27 661	62	9.42E+04	L +- 1 +-	5.27E+02	2.34E+02	1.15E+02	2.64E+05	5
Co-60) Aver	age:x	4.18E+04	1 +-	4.54E+02			4.62E+04	L .
••••	1173	3.21	4.19E+04	4 +-	6.33E+02	2.51E+02	1.22E+02	4.62E+04	
	1332	2.48	4.18E+04	4 +-	6.51E+02	1.35E+02 1 71E+02	6.43E+01 8 40E+01	1.12E+03	3
Hg-20	03 275 10 201	9.18	MD/ MD/	A.		2.51E+02	1.24E+02	2.76E+03	3
Y-88	898	3.02	MD	A.		3.31E+02	1.63E+02	2.56E+03	3
ME.	ASURED TO	OTAL:	4.17E+0	5 +-	8.32E+03	pCi/L			
====		*====		===== UNKN(ESCAPE PI	EAKS		
====		======		=====		=======================================			
						A T	DVC	гинм	
ΡК.	ENERGY	ADDRE	ISS N	ET INTO	UN - CERTA TNT	COUNT:	S COUNTS	G (keV)	FLAG
#	(keV)	CHANN							
1	50.98	103.	45	210	190	6 15	9 4320) 1.18	Unknown
2	58.37	118.	21	713	28	6 23		J 1.91 2 0 72	Unknown
4	70.41	142.	26	96	10	U 8	L 145. 6 79/	0.44	Deleted
6	98.92	199.	25	48 21	8-	4 6	8 103	9 0.61	Deleted
1	37.4/	Page	003	2 4	·				000032
		-							

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062543D02.SPC Analyzed by

UNKNOWN, SUM or ESCAPE PEAKS

рк. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
	103 05	207.52	87	71	56	780	0.53	Unknown
10	126 61	274 58	346	131	104	1827	1.17	Unknown
10	196 91	374.90	67	118	96	1690	0.90	Deleted
12	100.01 217 EE	574.72	32	88	72	1099	0.93	Deleted
13	317.55	707 69	34	65	52	670	0.61	Deleted
14	353.34	707.00	81	62	49	583	0.69	Unknown
15	476.30	953.40	11	104	85	1170	1.58	Deleted
16	511.10	1023.01	11 41	57	46	481	1.05	Deleted
17	630.53	1261.68	41	57	40	524	1.04	Unknown
18	644.13	1288.86	49	60	40	724	1.01	0

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

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Paragon Analytics

Gamma Spectrometer Run Log

Date: 11 2 06

Reviewed By/Date: JP 11306

								1	
Sample ID	Ver ¹	Det. No.	Geo ²	Count Dur. (mín.) ³	Start Time	Analyst	File ID/Comments	Saved?	
0610189-1	JP	Z	13	30	8:11	JP	062535002.SPC	JP	
-Z	TP	9			\checkmark	V	061306D09.SPC	JT	
0610197-7	TP	6	13	V	8:33	JP	062627006SR		
0610189-3	JP	Z	13	30	9:07	JP	0625360025PC	JP	
-1D	JP	9					061307D09.5R	TP	
01-10197-3	T	10					062628006.SPC	TP	
N 12 011-8/799	ATP	<u>x</u>	18	30	9:24	9Ľ	063124008,SR	OP	
0110189-4	TD	2	13	30	9:45	JP	062537002.SP	¢JP	
0610101 1	170	9					061308009.SPC	JP	
65061027-LND	TP	6					X6Z629D068	2 JP	
(3506 102 1-1ML		x x		20	9:57	JP	063126008.SR	JP	
0610019-1	TP	9	13	30	10:35	TP	0.1309D09.5PC	TP	
0009720		2		30		1	067538DDZSPC	JUP	
65061021-2LL		1-1-	12	30	11:06	JP	01-2630D06.5K	1 P	
6506102FIL			+	320	11:09	TP	06131000954	OP	1
0604-1		7	+ + -	1			06253900259	UTP	
		17	╶┝╴╋┈	215	11.27	T	N-71-3701/SI	XIP	1
$\frac{\sqrt{-6}}{\sqrt{10}}$		18		200	12.2		0.317700859	NTP	
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$\sqrt{-10}$				220	1651	<u>\</u>	061211D19 SP	V (TP	1
0610119 - 1			·	200			N31780088	RTP	-
-4		+ p	<u> </u>	215	17:00		0.7.23 $N.9$	PITP	-
V - 7		18			77.21		$) \cap (1217)	PITP	1
0610179-3		<u>r</u> <u> </u>	<u> </u>	400	<u>22.57</u>		NO1214001,51	NTD	-
1650G025-4	MK U	16			<u> </u>	4	166631116.0		_ _

<u>KEY</u>:

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

sample was counted on a puck *

 \uparrow sample was counted with air flow arrow pointing up

 \downarrow sample was counted with air flow arrow pointing down

2 Calibration geometry.

3 Count duration.

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4.77、213

Paragon Analytics

Gamma Spectrometer Run Log

Date: 11 3 06

Reviewed By/Date: JP 114 06

Saved? Count Dur. File ID/Comments Start Time Analyst Verl Geo² Det. No. Sample ID (min.) 3 JP 062543102584 3 7:ZI GS061025-4L Л Ζ :Z8 8 9 :46 661315D09.580 A \mathcal{O} Ì Sĭ JP 2 10:23 Ж 062544Dozsk 60 SI 063134008.SPC <u> 7</u> SI (
hoJP 8 10:33 56 ✻ 10 3133D00.52 SV. \mathcal{L} 7* 12:09 ST 062545002.SR 2 0611025-9D a Г) 7* 7006.SP 12:11 52 6 0611025-26 8 135 D08.590 <u> 30</u> 12:11 0611025-27 \checkmark G 062547D02,SR 1322 SZ 2 0611025-28 262636006.5M 68 St 0611025 $\overline{v\varphi}$ 仍 3 063136000-SAC 50 0611020= 4:54 ¥ 58 -52 6 -262640D06.5PC 52 65061103-1 MB misla 7 ZŨ g 063141008.SPC r 68061103-1 LCS Si Æ 5113/06 79 ᠂ᡠᡅᡃᠣᠵᡏ \mathcal{D} 7* SI 262549D02.5R 2 60 1452 52 .29 a011025 * 006.3 1322 A 60) 30 6 V C .31 NA 704 7 NOD 061103 Q 10 Ž . 8 V N 9 .9 F 114106

KEY:

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

* sample was counted on a puck

↑ sample was counted with air flow arrow pointing up
 ↓ sample was counted with air flow arrow pointing down

2 Calibration geometry.

3 Count duration.

<u>318721</u> B

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Paragon Analytics

Gamma Spectrometer Run Log

Date: 11/5/06

Reviewed By/Date:

100

Sample ID	Verl	Det. No.	Geo ²	Count Dur. (min.) 3	Start Time	Analyst	File ID/Comments	Saved?]
0610164-1	MC	8		300	9.27	JP	06314700858	MC	
<u> </u>	k	2					0625541007.97		
GS061019-1MB	MC	Q		335	1 L		062648006.90	MC	
0610045-4	MC	9	*	3350	9:45	JP	061322009.57	MC	115/00
0608143-17	G)	6	_1	1000	16:07	MC	D62649206.58	- Q	
<u>r -18</u>	_	G		{			CX63148208.5PC	G	
65061024-INB		9	/				0613232091.5PU	G	
061301-2	<u> </u>	2	18	1000	V	MC	062555 DQ. SPC	- G	I
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Analyst will verify the position, detector, and geometry I when the sample is removed from the detector.

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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

Calibration geometry. 3 Count duration.

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OCT. TIME = 330

MIN . MC 115/06

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<u>Technical Comments Regarding Analysis using the FANP Gamma Spectroscopic</u> <u>Library</u>

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: ²²⁸Ac

Energy: various

Photon Abundance: various

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

Nuclide: ²¹²Bi, ²¹²Pb, ²⁰⁸Tl

Energy: various

Photon Abundance: various

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

Nuclide: ²¹⁴Bi, ²¹⁴Pb

Energy: various

Photon Abundance: various

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

Nuclide: 56Co

Energy: 1175.13 keV Photon Abundance: 0.0228

This emission for this nuclide suffers from possible resolution interference due to the ⁶⁰Co 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: ⁵⁷Co 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 ¹⁵²Eu gamma emission occurring at 121.78 keV (0.2050, abundance). Therefore, a possibility of a high bias to the ⁵⁷Co results may occur in the presence of elevated ¹⁵²Eu activity.

PARAGON ANALYTICS

Nuclide: ¹³⁴Cs

Energy: 604.66

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

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

Nuclide: ¹³⁷Cs

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 ¹³⁷Cs 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 ¹³⁷Ba and ^{137m}Ba.

Nuclide: ¹⁵⁵Eu

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 ²³⁵U gamma emission occurring at 105 keV (0.0210, abundance). Therefore, a possibility of a high bias to the ¹⁵⁵Eu results may occur in the presence of elevated ²³⁵U activity.

Nuclide: ⁴⁰K

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 ²²⁸Ac gamma emission occurring at 1459.2 keV (0.0104, abundance). Therefore, a possibility of a high bias to the ⁴⁰K results may occur in the presence of elevated ²²⁸Ac activity.

Nuclide: ⁵⁴Mn

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 ²²⁸Ac gamma emission occurring at 835.6 keV (0.0182, abundance). Therefore, a possibility of a high bias to the ⁵⁴Mn results may occur in the presence of elevated ²²⁸Ac activity.

Nuclide: ⁹⁵Nb

Energy: 765.82

- All activity values for ⁹⁵Nb are calculated using the half-life, t_{1/2}=64.02 days, of the ⁹⁵Zr parent. It is assumed that a transient equilibrium is achieved between the ⁹⁵Zr parent and the ⁹⁵Nb 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 ⁹⁵Nb 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 longlived ²³⁸U parent. It is assumed that secular equilibrium is achieved between the ²³⁸U parent and the ^{234m}Pa progeny.

Nuclide: ¹⁰⁶Ru

Energy: various

Photon Abundance: various

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

Nuclide: ¹²⁴Sb

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 ¹³⁴Cs gamma emission occurring at 604.66 keV (0.9762, abundance). Therefore, a possibility of a high bias to the ¹²⁴Sb results may occur in the presence of elevated ¹³⁴Cs activity.

Nuclide: ¹²⁵Sb

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 ¹²⁴Sb 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: ²²⁷Th

Energy: 236.00

Photon Abundance: 0.1230

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

Nuclide: ²³⁴Th

Energy: 92.50

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

Nuclide: ²³⁵U

Energy: 185.70

Photon Abundance: 0.5720

Quantifying ²³⁵U activity using the 185.70 keV photo-peak is vulnerable to a significant high bias due to interference from gamma emissions from ²²⁶Ra 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.

Date

Gamma Spectroscopist Radiochemistry Instrumentation Laboratory

Radiochemistry Manager

05

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

1

05B

	Pk.	Energy	Isotope	2ndary		Gamma			123 05
	#	(keV)	Name	Pk #	Туре	Fraction	Halflife		2
$\langle \cdot \rangle$									
	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	Aq-110M	43	NET	0.9314	2.4990E+02	dys	
	43	677.71	Aq-110M	46	QUANT	0.1054	2.4990E+02	dys	
	46	706.67	Aq-110M	49	QUANT	0.1646	2.4990E+02	dys	
	49	763.93	Aq-110M	59	OUANT	0.2198	2.4990E+02	dys	
	59	884.67	Aq-110M	62	OUANT	0.7163	2.4990E+02	dys	
	62	937.48	Ag-110M	84	OUANT	0.3375	2.4990E+02	dvs	
	84	1384.27	Ag-110M	87	OUANT	0.2394	2.4990E+02	dvs	
	87	1505.00	Ag-110M	41	OUANT	0.1289	2.4990E+02	dvs	, · 3
	90	1808 65	Al-26		NET	0.9973	7.2000E+05	vrs	
	7	59 54	Am-241	ñ	NET	0.3590	4.3310E+02	vra	
	30	477 56	Be-7	0	NET	0.1052	5.3440E+01	dvs	
	48	777 17	Bi - 212	0	NET	0.0658	1.9100E+00	vrs	
	20	609 32	$B_{1} - 214$	73	NET	0.4609	1.6000E+03	vra	
	30 73	1120 29	$D_1 - 214$	38	OUTANT	0 1510	1.6000E+03	vrs	
	75	165 95	B1 - 214	20	NET	0.8035	1 3766E±02	dva.	
	11	100.00	Ce - 139	44	NGT	0 1109	2 9414E+02	dva	
	1	133.53	Ce^{-144}	44	OUDNEL	0.1109	2.04140+02	dya	
	44	696.49		67	QUANT	0.0130	2.04146+02 7 72000401	dva	
	50	846.81	0-56	70	QUANT	0.9999	7.7300E+01	dya	
	67	1037.83	CO-56	70	QUAN I TD	0.1400	7.73000+01	dya	
)	76	1175.13	CO-56	77	LD	0.0228	7.73008+01	dys	
$\langle \rangle$	77	1238.28	0-56	81	NET	0.6760	7.73008+01	ays	
$\langle \rangle$	81	1360.22	0-56	89	QUANT	0.0429	7.73000+01	dys	
	89	1771.49	Co-56	56	<u>OUANT</u>	0.1570	7.7300E+01	ays	
	6	122.07	CO-57	. 8	NET	0,8560	2,70006+02	ays	
	8	136.43	Co-57	6	QUAN'I	0.1068	2.70006+02	ays	
	54	810.75	Co-58	0	NET	0.9945	7.0780E+01	ays	
	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	\mathbf{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	
\cup	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	
			Page 001						

	Pk.	Energy	Isotope	2ndary		Gamma	····	
	#	(keV)	Name	Pk #	Type ======	Fraction	Halflife	*****
	14	192.34	Fe-59	70	QUANT	0.0308	4.5100E+01 d	lys
~	70	1099.22	Fe-59	79	NET	0.5650	4.5100E+01 (iys
)	79	1291.56	Fe-59	14	QUANT	0.4320	4.5100E+01 (lys
	20	284.29	I-131	27	QUANT	0.0614	8,0405E+00 (дуя
	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	yra
	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	Ale.
7	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
	З	92.50	Th-234	2	NET	0.0553	4.4680E+09	yrs
	19	277.36	T1-208	33	QUANT	0.0631	1 .9100E+00	yrs
	33	583.14	T1-208	57	NET	0.8450	1.9100E+00	yrs
	57	860.47	T1-208	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

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PARAGON ANALYTICS Radiochemistry Data Package

Section 5

1

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



Pari	iA nope	nalytic	Ņ				Radioc	hemi	stry li	nstrui	nent /	Vorksl	heet		Prep Batch	: GS061025-4	
Pre	p Proced	ure:	GAM	MASC	AN			 					1	Analytics	I QASS / NCR? Y	() NA	
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I	1 061016 ⁻	1-1 SMP	1000	1000	Ē												1
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I	1 061017	9-1 SMF	1000	1000	Ē												1
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I	10/19/06 1 061017 40/19/06	13:45 9-2 SMF 13-35	1000	1000	5 5 5												
I	1 061017 10/19/06	9-3 SMF	970	0/6	<u></u>					:							
I	1 061017 10/19/06	9-4 SMF 14-05	1000	1000	£ 5												
I	1 GS06102 10/25/06	14:16	1000	1000	E 2												
I	1 GS06102 10/25/06	25-4B MB	1000	1000	ΈE												
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Prep	Procedure		GAN	IMAS	SCAN	_								Analytica	I QASS / NCR	1 X I W	L'A	
Prep Num	Lab ID Collection	D Type	Init Alq	I Fin Al	lq Unit Geo	s Cnt 1 File Cnt Dur	Cnt 1 Inst/Det	Count Date	Cnt 2 File Cnt Dur	Cnt 2 Inst/Det	Cnt 2 Count Date	Cnt 3 File Cnt Dur (min)	Cnt 3 Inst/Det C	Cnt 3 count Date		Note		
	Date																	
												Spike Solu	tion Inform	ation				
									Soln #	Nuclide	SolnIC	D Prep C	onc Units	Prep Date	Aliquot Units	Pipet ID		
									S1	AM-241	718	216.7	80 DPM/m	10/25/06	1000 ml	_		
									S.	CO-60	718	93.62	25 DPMm	1 10/25/06	1000 ml			
									ζ.	CS-137	718	82.28	35 DPM/m	I 10/25/06	1000 m			

82.285

718

CS-137

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Paragon Analytics LIMS Version: 5.450A

Prep Batch: GS061025-4

Radiochemistry Instrument Worksheet

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Paragon Analytics

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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		

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Paragon A	Analytic	ĹŇ			Radi	ochen	nistry	Instrume	ent Wo	rkshee	ţ	المحمد مل	Prep Ba	tch: GS06	1025-4	
Prep Proce	idure:	GAMMA	SCAN								A	nalytical Q	ASS / NCF	N / X 2		and a second
Prep Lab Num Collec Dat	lD QC ction Type te	Init Alq Fin	Alq Units Geo.	Cnt 1 File Cnt Dur (min)	Cnt 1 Inst/Det	Count Date	Cnt 2 File Cnt Dur (min)	Cnt 2 C Inst/Det Cou	nt 2 Cnt nt Date Cnt (n	3 File Cn t Dur Inst nin)	t3 Cn /Det Coun	t 3 t Date		Notes		
	-						Son # Son #	Nuclide 1	Solnib Solnib 798 798	Ike Solution Prep Conc 225.652 125.472	Information Units F DPM/mt DPM/mt	10/25/06 10/25/06	1000 ml	Pipet ID		
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Radiochemistry Instrument Worksheet

Prep Batch: GS061025-4

Paragon Analytics

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		

Paragon Analytics LIMS Version: 5.439A

GAMMASCAN Instrument Sheet Date Printed: Page 3 of 3

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Para	√ noĝi	Analyti	S			LE.	Radioch	emistry	Prep Worksheet	Prep Batch: GS	3061025-4
Pre	o Proce	dure:	0 B	MMAS	SCAN					Reviewed By: atf	eview Date: 11/18/2006
Non-	Routine	Pre-Treat	ment?	N ×	Batch:	AN AN		Re-Prep? Y //	N Batch: 4	Prep DASS / NCR? () N	
<u>ā</u> ā	rep SOP:	: PAI 739 NONE	Rev: 8			Prep A	naiyst: Krysta	l A. Brown 2006	Balance:)	
Matr	ix Class:	liquid				Prep	Dept: GM	annz	Dalatice		
Sam	p Prep	LabiD	ц С	ish Init/	Alq Fin Alq	Prep Basis	Geometry	Standards		Prep Notes	
unn -		0610141-1	adyi	E E	m _ ml	Unfiltered		<u> </u>			
- ~	-	0610141-2	SMP	100	1000	Unfiltered	6	+			
m	-	0610141-3	SMP	100	1000	Unfiltered	9				
4	-	0610141-4	SMP	100	00 1000	Unfiltered	2				
чо ч		0610141-5	SMP	100	00 1000	Untiltered	5 5	+		P	
• r	-	0610161-1	Dup	100	1000	Filtered	6	+		Count dup due to insufficient volume	
∞	-	0610161-4	SMP	93(0 930	Unfiltered	5			Brought up to 1000 ml with Dl water	
σ	-	0610161-6	SMP	100	00 1000	Unfiltered	6			A set in the	
5 5	- -	0610161-9	SMP	102	00 1000 E a7E	Unfiltered	2 5			Brought up to 1000 ml with DI water	
= 2	- -	0610164-1 0610164-2	SMP	;	066 0	Unfiltered	5 6			Brought up to 1000 ml with Di water	
13	-	0610178-1	SMP	49 100	00 1000	Unfiltered	ы	2		(thuilteacto	
14	+	0610178-1	DUP	100 171	00 1000	Unfiltered	01	,,,		Count dup due to insufficient volume	
ا ا	- -	0610179-1	SMP	ĕ ŧ A)	1000	Filtered	2 2	2		Court Bup due to insufficient volume	
₽ ₽	- -	0610179-1	SMP		1000	Unfiltered	5			1. 00	
= \$	- -	0610179-3	SMP	26	0.70	Unfiltered	4			Brought up to 1000 ml with Dl water	
19	-	0610179-4	SMP	100	00 1000	Unfiltered	9				
8	-	3S061025-4A	ЯЮ	100	00 1000	Unfiltered	6				
ג ג ג ג	-	SS061025-4B	8W		00 1000	Unfiltered	5 5			Ar tou	
3 8	- -	GS061025-4		100	00 1000	Unfiltered	5 5			(P)	
24	-	GS061025-4	rcs) Å	00 1000	Unfiltered	9	S1			
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Page 1	of 2	GAMM	ASCAN	Bench St	heet			Parago	on Analytics	Supersedes: (D/27/G	56 9:30
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	Radiochen	nistry Prep Wo	orksheet	.	rep Batch: GS061025-4
Paragon Analytics					
Prep Procedure: GAMMASCAN			ц	eviewed By: atf	Review Date: 11/18/2006
	PA Re-	Prep? Y / Batch:	ž	Prep QASS / NCR	1 N
		•	·	2	
Prep SOP: PAI 739 Rev: 8	Prep Analyst: Krystal A.	Brown	Balance:	ł	
Prep SOP: NONE	Prep Date: 10/25/200	9	Balance:		
Matrix Class: liquid	Prep Dept: GM				
Samp Prep LabiD QC Dish Init Aid Fin Ald Num Num Type No	Prep Basis Geometry	Standards			
Spiked By: N/A Date: N/A					
Witnessed By: N/A Date: N/A					

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Initial Nuclide SolnID Prep Conc Units Prep Date S1 AM-241 718 216.780 DPM/min 10/25/06 S2 Conc 718 216.780 DPM/min 10/25/06	上海の			Spike Solution	Informat	ПŪ			
S1 AM-241 718 216.780 DPM/ml 10/25/06	# ulo:	Nuclide	SoluID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
21 22 20 21 21 21 22 22 22 20 20 20 20 20 20 20 20 20 20	5	AM-241	718	216.780	DP!M/ml	10/25/06	1000	Ē	
	, i	CO-60	718	93.625	DPM/ml	10/25/06	1000	Ē	

Witnessed By: N/A

		Paragon Analytics	LIMS VERSION: 5.4504
		GAMMASCAN Bench Sheet	11/18/2006 23:17
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Radiochemistry Prep Worksheet	3AMMASCAN Reviewed By: kab 100 Reviewed By: kab 100 Review Date: 11/20/2006	17 Y / (N) Batchi: N/A Re-Prep? Y / (N) Batch: N/A Prep QASS/ NCR7(Y) N 318815	/: B Prep Analyst: Krystal A. Brown Balance: Pren Data: 10/25/2006 Balance:	Prep Dept: GM	Dish Init Alq Fin Alq Prep Basis Geometry Standards Prep Notes Prep Notes No. mi mi	1000 1000 Unfiltered 01	1000 1000 Unfiltered 01	1000 1000 Unfiltered D1	1000 1000 Unfiltered 01	0 1000 1000 Unfiltered 01	1000 1000 Filtered 01	0 1000 1000 Flittered 01 Count dup due to insufficient volume	930 930 Unfiltered 01 Brought up to 1000 ml with DI water	000 1000 Unfiltered 01	1000 1000 Unfiltered 01	s 975 975 Unfiltered 01 Brought up to 1000 ml with DI water	b 990 990 Unfiltered 01	1000 1000 Unfiltered 01	1000 1000 Unfiltered 01 01 1000 Unfiltered 01 01 1000 Unfiltered 01	1000 1000 Untilitered 01 Country of Country Print of the following of the	1000 1000 Unfiltered 01	3 970 970 Unfiltered 01 Brought up to 1000 ml with Dl water	000 1000 Unfiltered 01	1000 1000 Unfiltered 01				
	ASCAN) Batch: N			iit Alq Fin Alq mi mi	1000 1000	1000 1000	1000 1000	1000 1000	1000 1000	1000 1000	1000 1000	930 930	1000 1000	1000 1000	975 975	066 066	1000 1000	1000 1000	1000 1000	1000 1000	970 970	1000 1000	1000 1000	1000 1000	1000 1000	1000 1000	1000 1000
tics	GAMM/	atment? Y / N	9 Rev: 8		C Dish Ir Type No.	SMP	SMP	SMP 1	- SMP	SMP	SMP	dup	I SMP	SMP	SMP	SMP	SMP	SMP	dUD	SMP	SMP	SMP	. dws t	4A MB	TE MB	tC MB	4 MB	
agon Analy	p Procedure:	-Routine Pre-Tre	rep SOP: PAI 739	ix Class: liquid	p Prep LabiD 1 Num	1 0610141-1	1 0610141-2	1 0610141-3	1 0610141-4	1 0610141-5	1 0610161-1	1 0610161-1	1 0610161-4	1 0610161-6	1 0610161-9	1 0610164-1	1 0610164-2	1 0610178-1	1 0610178-1	1 0610179-1 + 0610179-1	1 0610179-2	1 0610179-3	1 0610179-4	1 GS061025-4	1 GS061025-4	1 GS061025-4	1 GS061025-	
ប	1		ቆ ሻ	Matri	Samp Num	-	2	e	4	κn	۹	~	œ	en	\$	=	12	13	7	5 3	2 2	18	19	20	5	22	23	

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Page 1 of 2 GAMMASCAN Bench Sheet Date Printed: 11/20/2006 10:25

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Paragon Analytics LIMS Version: 5.450A

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-	Radiochemistry Prep	Worksheet	Prép Batch	n. GS061025-4
Paragon Analytics				11/2. 1.1
Prep Procedure: GAMMASCAN			Reviewed By: kab	Review Date: 11/20/2006
Non-Routine Pre-Treatment? Y (N) Batch:	Re-Prep? Y / M	3atch: MA	Prep QASS NCR Y N -	216815
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 Prep LabiD QC Dish Init Alq Fin Alt Num Num Type No. ml ml	Ig Prep Basis Geometry Standards		Prep Notes	
Spiked By: N/A Date: N/A	×			
Witnessed By: N/A Date: <u>N/A</u>	×			
		and Spike Solu	tion Information	
	Soln # Nuclide	SolulD Prep C	onc Units Prep Date Aliquot Units Pipe	tt ID
	S1 AM-241	1 718 216.7	80 DPM/mt 10/25/06 1000 ml	
	S1 CO-60	718 93.6	25 DPM/ml 10/25/06 1000 ml	
	S1 CS-137	7 718 82.24	35 DPM/mi 10/25/06 1000 mi	

		Paragon Analytics LIMS Version: 5.450A
		GAMMASCAN Bench Sheet 11/20/2006 10:25
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Paragon	(Analy	tics					tadioch	emistry	Prep Worksheet	Prep B	latch: GS061025-4
Prep Pro	cedure:	0	MM/	4SCA	Z					Reviewed By: kab KW	10/37/64 Review Date: 10/27/2006
Non-Routi	ne Pre-Trea	atment?	N N N) Batc	ch:	٩/A		Re-Prep? Y	M Batch: MA	Prep QASS / NCR? Y /	N/A
Prep SC)P: PAI 739 IP: NONF	Rev:	80			Prep Ar	nalyst: Krysta Doto: 10/05	ll A. Brown mone	Balance: Balance:		
Matrix Cla	ss: liquid				:	Prep	Dept: GM	0007			
								Standarde	-	Prep Notes	
Samp Prep Num Num	Labio	Type	No.	mit Alq	Fin Alq ml	Prep Basis	Geometry	oraridardo			
	0610141-1	SMP		1000	1000	Unfiltered	01			\langle	
7 7	0610141-2 0610141-3	SMP		1000	1000	Unfiltered	5 6				
4	0610141-4	SMP		1000	1000	Unfiltered	6			24	
5 1	0610141-5	SMP		1000	1000	Unfiltered	6			23	
6 1	0610161-1	SMP		1000	1000	Unfiltered	6		>		
7 1	0610161-1	DUP		1000	1000	Unfiltered	01			Count dup due to insumicient volum Brought un to 1000 ml with Di water	
eo 1	0610161-4	aws 1		930	930	Unfiltered	5	-	<		
9 10 1	0610161-6 0610161-9	SMP SMP		1001 1001	1000	Unfiltered	3 6				
; t	0610164-1	SMP		975	975	Unfiltered	01			Brought up to 1000 ml with Di water	
12 1	0610164-2	SMP		066	066	Unfiltered	01			Brought up to 1000 ml with Dl water	K44 10/22/W
13 1	0610178-1	SMP		1000	1000	Unfiltered	6				mlishian
14 1	0610178-1	and		1000	1000	Unfiltered	ᡖ			Count and due to insurticient volum	×++
15	0610179-1	SMP		1000	1000	Unfiltered	5			Count Dup due to insufficient volum	9
12 1	0610179-2	SMP		1000	1000	Unfiltered	5 5				KAR 10/22/04
18	0610179-3	SMP		970	970	Unfiltered	01			Brought up to 1000 ml with Dl wate	
19 1	0610179-4	1 SMP		1000	1000	Unfiltered	01				
20 1	GS061025-4	4A MB		1000	1000	Unfiltered	01				
21 1	GS061025-4	49 WB		1000	1000	Unfiltered	5 5				
22 23	GS061025-4 GS061025-	4 4 MB		1000	1000	Unfiltered	5 5				12
24 1	GS061025-	-4 LCS		1000	1000	Unfiltered	6	S.			
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heet Prep Batchi GS061025-4	Reviewed By: kab Review Date: 10/27/2006	Prep QASS / NCR? Y / N ince: ince:	Prep Notes	Spike Solution Information Spike Solution Information Prep Conc Units Prep Date Aliquot Units Prep ID 225.652 DPWini 10/25/06 1000 ml 125.472 DPWini 10/25/06 1000 ml 86.704 DPWini 10/25/06 1000 ml	
diochemistry Prep Worksl		Re-Prep? Y / N Batch: st: Krystal A. Brown Baia te: 10/25/2006 pt: GM	Geometry Standards	Soln # Nuclide Soln1D S1 AM-241 798 S1 CO-60 798 S1 CS-137 798	
Rac	GAMMASCAN	ment? Y / N Batch:Prep Analy: Rev: 8 Prep Dat	QC Dish Init Alq Fin Alq Prep Basis Type No. ml mł	Date: N/A Date: N/A	
Paragon Analytic	Prep Procedure:	Non-Routine Pre-Treatn Prep SOP: PAI 739 Prep SOP: NONE Matrix Class: liquid	Samp Prep LabID Num Num	Spiked By: WA Witnessed By: WA	000057

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GAMMASCAN Bench Sheet 10/27/2006 9:36 Date Printed: . Page 2 of 2

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Paragon Analytics LIMS Version: 5.439A

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Paragon	Analyti	S			Ŕ	adioch	emistry Prep Wo	orksheet	Prep Batch: GS061	025-4
. Prep Proc	edure:	GAMI	MASC	AN		ep Bá	atch Not Vali	dated!!!	Reviewed By:	Date:
Non-Routine	Pre-Treatn	nent? Y /	N Ba	atch:			Re-Prep? Y / N Batch:		Prep QASS / NCR? Y / N	
Prep SOF Pren SOP	: PAI 739 · NONF	Rev: 8			Prep An	lalyst: Krystal	A. Brown KPC	Balance: Balance:		
Matrix Class	: liquid				Prep	Dept: GM				
Samp Prep Num Num	LabiD	QC Dish Type No.	Init Alq m	Fin Alq ml	Prep Basis	Geometry	Standards		Prep Notes	
-	0610141-1	SMP	1000	1000	Unfiltered	6				
2 7 7	0610141-2	SMP	1000	1000	Unfiltered	5 5				
- +	0610141-3	SMP	1000	1000	Unfiltered	1. A 10 25 100				
5 1	0610141-5	SMP	1000	1000	(President)	KNOX 01				
е Т	0610161-1	SMP	1000	1000	Unfiltered C	1/2 ver 01			Count dup due to insufficient volume	
- +	0610161-4	SMP	1000	1000 4	V Unfiltered	145.69	* 920 ml + 70 ml DE Ha	0		
9	0610161-6	SMP	1000	1000	Unfiltered	6				
10 1	0610161-9	SMP	1000	1000	Unfiltered	5				
11 1	0610164-1	SMP	1000	1000	Unfiltered	5	1975 m 1+ 25 m DI H.	0		
12 1	0610164-2	SMP	1000	1000	Unfiltered	5	990 mi + 10 mi DEA	H20		
13 1	0610178-1	SMP	1000	1000	Unfiltered	10				
14 1	0610179-1	SMP	1000	1000	Hafikened	1 K-ce 101			Count Dup due to insufficient volume	
15 1 16 1	0610179-1 0610179-2	and	1000	1000	Unfiltered	01				
12	0610179-3	SMP	1000	1000	Unfiltered	7	970ml + 30 in DIH.	() c		
18 1	0610179-4	SMP	1000	1000	Unfiltered	01				
19 1	GS061025-4A	MB	1000	1000	Unfiltered	10				
20 1	GS061025-4B	MB	1000	1000	Unfiltered	6				
21 1	GS061025-4C	BM II	1000	1000	Unfiltered	6				
23 1	GS061025-4 GS061025-4	rcs r	1000	1000	Unfiltered	01	S1			
	C61017	B-1 Dup	ある	a/2¢/01 0	e					
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Page 1 of 2 Date Printed:	GAMM 10/25/2	ASCAN Be 006 14:	snch Shee 49	et			Paragon Analytics	s	Supersedes:/A	
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Paragon Analytic	S	Radioche	mistry I	Prep W	orkshe	et			rep Batch: GS06	1025-4
Prep Procedure:	GAMMASCAN	Prep Ba	tch No	ot Val	idatec	iii ^{se}	viewed By:		Reviev	v Date:
Non-Routine Pre-Treatm	ient? Y / N Batch:	R	e-Prep? Y /	N Batch	i i i		Prep QA	SS / NCF	NIY	
Prep SOP: PAI 739 Prep SOP: NONE Matrix Class: liquid	Rev: 8	Prep Analyst: Krystal / Prep Date: 10/25/20 Prep Dept: GM	A. Brown (A 1	æ	Balance Balance					
Samp Prep LabID Num Num	QC Dish Init Alq Fin Alq Type No. ml mt	Prep Basis Geometry	Standards				Pre	p Notes		
Spiked By: <u>N/A</u> Witnessed By:	Date: N/A Date:									
					Pill Spill	ce Solution I	nformation			
			Soln #	Nuclide	SolnID	Prep Conc	Units Prep D	ate Aliquo	Units Pipet ID	
			s s	AM-241 CO-60	798 798	225.652 125.472	DPM/ml 10/25/ DPM/ml 10/25/	06 1000 06 1000	ĒĒ	
			S1	CS-137	798	86.704	DPM/ml 10/25/	06 1000	Ē	
6000										
Somments										

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-	SAM		NDITION	I FORM (LIQUID)
ANALYST: KAB			· · · · · · · · · · · · · · · · · · ·	
ANALYSIS DATE:	10/25	-/04	N	IETHOD: Prep
WORK	SAMPLE		S	AMPLE CONDITION
ORDER	al	рН	Color	Remarks
0610161	1	12	Clear	Filtered
	4			Unfiltered
	6			
	.9			
0610164	1.		· · · · · · · · · · · · · · · · · · ·	·
	2	: :		
0610178	1			
0610179	1			Filteria
· · · · · · · · · · · · · · · · · · ·	2	·		Unfiltered
	3	· · ·		V
	4			
0610141	1			
	2			•
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	4			
	5		\checkmark	
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PARAGON ANALYTICS Radiochemistry Data Package

Section 7

STANDARDS TRACEABILITY DOCUMENTS





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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

66352-307

PAI ID 27/8 recol 8-205-03

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 gammaray 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-LI	FE	GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432	У	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	đ	3194	2.7
Sn-113	392	115.1	đ	1960	2.6
Cs-137	662	30.07	У	1260	3.0
Y-88	898	106.6	đ	5060	2.6
Co-60	1173	5.2714	У	2402	2.7
Co-60	1332	5.2714	У	2427	2.6
Y-88	1836	106.6	ā	5287	2.6

P O NUMBER EW060303, Item 🔑 SOURCE PREPARED BY: ochemist

81.03 Q A APPROVED:

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)	CALLIBRATION 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	4NLS	0.33	1.1	0	0.9	0.30	0.2	1.50	3.0
Am-241	59.5	4nls	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

¹Calibration Methods:

4IILS (4 pi Liquid Scintillation Counting) HPGe (High Purity Germanium Gamma Ray Spectrometer) IC (Gamma Ray Ionization Chamber)

²As 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.

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PARAGON ANALYTICS Radiochemistry Data Package

Section 8

CHAIN OF CUSTODY



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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:

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

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									1	061	010	<u> </u>	
								- 1		CH/	AIN d	of	
ACZ	🕻 Labora	tories, l	Inc.							cus	TOD	ŊΥ	
2773 Downhill Dr	ive Steamboat Sprin	ngs, CO 80487	(800) 334-54	493									
Report to:													
Name: Ton	y Antalek			L A	ddress	:	2773 D			CO 80	1487		
Company: AC2	Z LABS, INC.			-				70 650	<u></u>				
E-mail: TAr	ntalek@acz.com			ני	elepho	ne: (970) 8	19-009					
Copy of Repo	rt to:												
Name: N/A				Ε	E-mail:	<u>.</u>							
Company:				b	<u>relepho</u>	ne:							
Invoice to:													
	ONNE BAKER				Addres	5:	2773 C	OWNH	IILL DF	<u>۲</u>			
Name: 1V	ZLAS INC			Ē			STEAN	BOAT	SPGS	, CO 8	.0487		
Company: AC	@acz.com			ľ	Telepho	one:	(970) 8	70-659	30				
E-mail: you	ceived past holding	time (HT), or if	Insufficient	HT ren	nains to	compl	ete				YES	딕	
analysis before	e expiration, shall A	CZ proceed wit	th requested	l short	HT anal	yses?	0.				NO	ري	1
If "NO" then A	CZ will contact clier	nt for further in	struction. If	neithe wen if i	r "YES" HT is ex	nor N pired. 3	and dat	a wili k	e quali	fied.			
is indicated, A	CZ will proceed with	h the requested	analyses, c	A GIT II	ANAL	YSES	REQUE	STED	attach	list or u	ise quot	le numb	er)
PROJECT IN	FORMATION		1				-						
Quote #:					<u>ہ</u>								
Project/PO #:					uer.	Z			I				ļ
Shipping Co.:		·			ntai	SC/							1
Tracking #:					ပို	¥							
Reporting sta	te for compliance	testing:			*	MN							
Are any same	oles NRC licensati	DATE:	TIME	Matrix		e A D	H3		ļ				
SAMPLE	DENTIFICATION	10/16/2006 0	9.40	GW	3	~	~						
1.59449-01	······	10/16/2006 1/	4.40	GW	62	~	~						
- 159449-02		10/10/2000 /			12	30							
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		<u> </u>		Nator) - I	 DW (Drink	L	er) · SL (_l Sludge)	SO (So	il) OL (0	Dil) · Othe	r (Specify	n
Metrix S	W (Surface Water) · GV	w (Ground water)	1111 (118518 (\								
REMARKS							5 C on		o Driv	e Ft	Collins	s. CO	
SUBCON	TRACTED - Pa	ragon Analyt	D UPS G	ROUN	ID SEF		5.00				÷ -		
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SEND OF	NE EACH RRAD	& TWO EA	CH VLUP	PER	SAMP	LE							
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T. ANTALE	K		10/19/2006 1	600	An	nd	off			10.2	20 0 0	<u>111 D</u>	
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													<u> </u>
					w	hite - Ri	ətum wi	th samp	sle.	Yellow -	Retain f	for your	records

FRMQA021.12.03.06

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CONDITION OF SAMPLE UPON RECEIPT FORM	Parag	on Analyl	ics	
Workorder No: 0610	164			
Client: ACIZInitials: SL	Date:	0.20.06	2	
Project Manager:		YES	NO	
1. Does this project require any special handling in addition to stationary ranges pro-	NONE	(YES)	NO	
2 Are custody seals on shipping containers intact?	NONE)	YES	NO	
3. Are Custody seals on sample containers intact?		(YES)	NO	
4. Is there a COC (Chain-of-Custody) present or other representative documenter		(YES)	NO	
s Are the COC and bottle labels complete and legible?	<u>_</u>		NO	
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no.		(YES)		
of containers, matrix, requested many eee, ere y	DROP OFF	(YES)	NO	
7. Were airbills / shipping documents present and/or rentering (excluding volatiles)	N/A	YES	NO	
8. Are all aqueous samples requiring preservation preserve correctly and the second se	(N/A)	YES	NO	
9. Are all aqueous non-preserved samples pH 4-9?		YES		•
10. Is there sufficient sample for the requested analyses?		(YES)	NO	
11. Were all samples placed in the proper containers for the requested unargues		(YES)	NO	
12. Are all samples within holding times for the requested analyses:		(YES)	NO	
13. Were all sample containers received intact? (not broken of feaking, etc.)			NO	
14. Are all samples requiring no headspace (VOC, GRO, RX CN/S, radon), neauspace need	N/A	(YES)		
Size of bubble: < green pea > green pea	1-			
15. Were samples checked for and free from the presence of residual chorner.	N/A	YES	NO	
(Applicable when PM has indicated samples are from a chloring to the samples are from		(YES)	NO	
16. Were the samples shipped on ice?	RAD	TYES	NO	
17. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: (#2) #4	ONLY		<u></u>	
Cooler #:				
Temperature (°C): 2. 4				
No of supported y seals on cooler:				
No. of clistody sears on cooler				
Survey/ External LIN II Country.				
Information Background µR/hr reading:	o, see Form O)8.)		
Were external µR/hr readings ≤ two times background and within DOT acceptance of the QUESTION ABOV	E, EXCEPT #	1 AND #16.		
Additional Information: PROVIDE DETAILS BELOW FOR A NO RESI CHED TO THE C	nl Via	ls for	8260?	<u>(</u>
-> Sample #1 (L 59449-01) recieved only -	- they	ave	accord	ing
or H3 tit these viais are for the	- Poly F	ves. u	HN03)	8
to the label preserved with Her Lene		al for	- Yoc-	00-
Sample #2 (L 59449-01) recieved DMy 1 40		H3	7	
Pres_with files	1/01	Cor H	3	l
40, ml Vials for H3 Not preserved. Limited	<u> </u>			SL
SI Trunket per. Matrit Enouthe just				
If applicable was the client contacted? YES / NO/ NA Contact:	Dat	e/11me:		- C
1) approvadio, not in the (Data)				, a
Project Manager Signature / Date:				6
*IR Gun #2: Oakton, SN 29922500201-0066 *IR Gun #4: Oakton, SN 2372220101-0002				
Form 201r19.xls (1/13/06)		Page	e 1 of <u>1</u>	

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Paragon Analytics

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PARAGON ANALYTICS Radiochemistry Data Package

Section 9

ADDITIONAL SUPPORTING DOCUMENTATION

1



Gamma Spectroscopy

Initial Calibration Standards Traceability

ANALYTICS

RS0#817 Rocid 3/10/06

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

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

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 gammaray 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.

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
Ha-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

Calibration date: January 1, 2006 12:00 EST

500 grams/290 mL of customer supplied sand. P O NUMBER 71239, Rev., 2/3/06 REL., Item 3

SOURCE	PREPARED	BY:	UTagnaeve
		Μ.	Taskaeva, Radiochemist
		fa	
Q A AP	PROVED: 🧹	1011 -	03-07-2006

This standard will expire one year after the calibration date.

*****	0	61202D02.S *******	PC Analyze	d by MC	****	******	*******	****
SEEF	CER.	GAMM.	A ANA	LYSIS	RESUI	TS PS	S Version	1.8.4
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		Par	agon Analy	tics, Div.	of DataChe	m Lab		
			an	GammaScan			la alla alk alk alta alla alla alla a	
****	********	********	********	********	*********		******	*******
				Geo 13 / Sc	olid			
Samp]	le ID: 06	13003-2 FW	HM CAL (8:	L7)				
Sampl	ling Star	t: 01/0	1/2006 12	:00:00 Cou	nting Star	t: 05,	/16/2006	20:43:28
Samp.	ling Stop	: 01/0	1/2006 12		ay lime	• • • •	. 3.251	14003 Hrs
Build	hup Time.	• • • • •	0.00E+0		l Time	• • • •		2700 Sec
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		· · · · · · · · · · · · · · · · ·				· · · · · ·		
			Detecto	or #: 2 (De	etector 2)			
Ener	qy(keV) =	-0.77 + 0	.501*Ch +	3.48E-08*Ch	$1^2 + 0.001$	S+00*Ch^3	05/16/20	006
FWHM	(keV) =	0.65 + 0	.009*En +	1.05E-03*Er	1 ² + 0.001	G+00*En^3	03/27/2	006
	-		Where 1	En = Sqrt(Er	nergy in ke	eV)		
						······		
Sear	ch Sensit	ivity: 1.0	0 Sigma	Multiplier:	2.00 Se	earch Sta	rt/End:	80/4000
			PE	AK SEARCH RE	SULTS			
			· · · · · · •					
PK.	ENERGY	ADDRESS	NET/MDA	UN-	C.L.	BKG	FWHM	
#	(keV)	CHANNEL	COUNTS	CERTAINTY	COUNTS	COUNTS	(kev)	FTTAG
	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	661.72 010 CC	1523.19	33826	408	110	3805 3366	1 44 ~	Wipperid
15 17	013.03 001 66	1640.00	/v/ 222	197 197	166	2200	1,44 d 2,27 h	HiRpeid
10	041.00 990 10	1795 31	244	130	132	3001	2.27 D	HINCOLO
10	1173 24	1/30.01 2744 80	39719	414	104	1854	2.26 a	
20 T3	1305 10	4344.07 9647 99	1121	744	±∨± 106	1863	4,33 a	Wide Pk
20 21	1333 26	2047.24	35670	200	81	1075	2.50 h	. ,,
2⊥ 22	1836-13	3668-26	24519	319	48	326	3.10 a	HiResid
			الجنوب مير	. .	T T			

Page 001

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0(51201D0	02.SPC Ana	lyzed by			
******	*****	******	**********	*******	***********	*********
SEEKER		CALIE	RATION	RESU	LTS Ver	csion 2.0.4
****	*****	*******	*****	*******	****	******
Sample ID: DA Stds. Match To	ILY CHI olerand	ECK ce: 2.00	keV			
Detector Numb	er: 02	Cal	ibration Date	e 05/1	6/2006 20:14	: 57
Energy(keV) =	-0.7	7 + 0.50	1*Ch + 3.48e-	-08*Ch^2 +	0.00e+00*Ch [*]	3
	Pk.	Measured	Calculated	Energy	8	
	#	Centroid	Energy	(keV)	Difference	
	133535 1	==== === == 120.40		======================================	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.

	0612	02D02.SPC A	nalyzed b	ру			
******	******	********	*****	*******	******	******	******
SEEKER	2	CALI	BRAT	ION RE	SULT	S Version	2.0.4
******	******	********	******	******	******	*****	*****
Sample Stds. M	ID: 06130 Match Tole	03-2 FWHM C. rance: 2.	AL (817) 00 keV				
Detecto	or Number:	02 C	alibratio	on Date	05/16/2	006 20:43:28	
FWHM (ke	eV) = 0. (Where En	69 + 0.00 = SQR(Ener	6*En + 1 gy in kev	.18e-03*En^2 V))	+ 0.00e	+00*En^3	
Pk. #	Energy (kev)	Measured FWHM (keV)	% Diff.	Calculated FWHM(keV)	∛ Diff.	Prev.Calc. FWHM(kev)	
1	======================================	0.808	-0.03	0.808	-2.65	0.787	

-	52.50	0.000	0.05	0.000	2.00	0.707	
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.

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	06	51950D06.S	PC Analyze	a by M			, da da de da da de de s	
SEEK	*********	GAMM	A ANA	LYSIS	RESUL	TS PS	Versic	n 1.8.4
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•		Para	agon Analy	tics, Div.	of DataChe	m Lab		
				GammaScan		والمراجعة والمراجع والمراجع والمراجع		
****	****	******	********	*******	*******	*******	******	*******
				Geo 13 / Sc	lid			
Sampl	e ID: 061	L3003-6 FW	HM CAL (83	17)				
							Gy	· orb 1/25/
Sampl	ing Start	01/0	1/2006 12	:00:00 Cou	nting Star	t: 07/	/24/2006	5 15:42:28
Sampl	ing Stop	01/0	1/2006 12	:00:00 Dec	ay Time	••••	. 4.90)E+003 Hrs
Build	lup Time.		0.00E+0	00 Hrs Liv	re Time			3600 Sec
Sampl	le Size .		. 5.00E	+002 g Rea	l Time		• •	3727 Sec
Colle	ection Ef:	ficiency .		1.0000 Spc	. File	• • • •	0619	950D06.SPC
								
	4		Detecto	or #: 6 (De	etector 6)		00/01/	2005
Energ	y (keV) =	-0.68 + 0	.501*Ch +	-1.46E-08*Ch	$1^{2} + 0.001$	s+00*Ch~3	07/24/2	2006
FWHM	(keV) =	0.72 + 0	.012*En +	5.28E-04*En	1 2 + 0.001	s+uu≈≞n 3	09/15/:	2005
			where	En = Sqrt(Ei	lergy in Ke	=v)		
				Multiplier	2 00 1 54	earch Star	rt/End.	80/4000
searc	on Sensic	IVICY: I.0						
							#=====	===========
			PE	AK SEARCH RI	ESULTS			
====:				============				
PK.	ENERGY	ADDRESS	NET/MDA	UN-	C.L.	BKG	FWHM	ET NO
#	(keV)	CHANNEL	COUNTS	CERTAINTY	COUNTS	COUNTS	(kev)	
		120 17	10241	363	248	10458	1.21	a HiResid
- -	57.47 77 99	147 19	281	261	213	9168	0.82	a
2	82 47	166 05	1593	452	366	18532	1.56	a HiResid
5	02.47	100.05	1070					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
5	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
		Page 001						

061950D06.SPC Analyzed by

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			PE	EAK SEARCH	RESULTS			
РК. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
23 24	1570.93 1835.94	3138.57 3667.86	14 17334	55 267	45 37	492 221	1.02 2.42	a NET< CL a HiResid

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	0619	50D06.SPC An	nalyzed ł	ру			
******	*******	********	*******	**********	*******	*****	******
SEEKER		CALI	BRAT	ION RE	SULT	S Version	2.0.4
*******	*******	********	*******	**********	*******	******	*******
Sample I Stds. Ma	ID: 06130 atch Tole	03-6 FWHM CA rance: 2.(AL (817) 00 keV				
Detector	r Number:	06 Ca	alibratio	on Date	07/24/20	06 15:42:28	
FWHM (ke)	V) = 1. (Where En	19 + -0.002 = SQR(Energ	2*En + 7 gy in kev	.29e-04*En^2 V))	2 + 0.00e-	+00*En^3	
Pk. #	Energy (kev)	Measured FWHM (keV)	% Diff.	Calculated FWHM(keV)	۴ 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.

0K JS 7/25/06

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i.

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.5.4 Paragon Analytics, Div. of DataChem Lab GammaScan Geo 13 / Solid Geo 13 / Solid GammaScan Geo 13 / Solid Sampling Start: 01/01/2006 12:00:00 Decry Time 5:47E:4003 Hrs Sampling Start: 01/01/2006 12:00:00 Decry Time	****	0	62429D08.S	PC Analyze	d by W	*****	*****	*****	****
Paragon Analytics, Div. of DataChem Lab GammaScan Geo 13 / Solid Geo 13 / Solid Sample ID: 0613003-8 FWHM CAL (817) Collection Start: 08/17/2006 10:06:09 Sampling Start: 01/01/2006 12:00:00 Decay Time	SEEK	ER	GAMM	A ANA	LYSIS	RESUL	TS PS	S Version	1.8.4
Bample ID: 0613003-8 FWHM CAL (817) Sampling Start: 01/01/2006 12:00:00 Buildup Time. Counting Start: 08/17/2006 10:06:09 Decay Time. Sampling Stop: 01/01/2006 12:00:00 Buildup Time. Decay Time. 5.47E+003 Hrs Live Time Sample ID: 0.00E+000 Hrs Buildup Time. 1800 Sec Sample Stop: 0.101/2006 12:00:00 Buildup Time. Decay Time. 1800 Sec Collection Efficiency 1.0000 Spc. File 062423008.Spc Collection Efficiency 0.00E+00+ths Live Time 062423008.Spc FMHM(KeV) 0.03 + 0.500+ths 5.09E-04+En^2 + 0.00E+00+ths' 3 12/14/2005 Where Rh = Sqrt (Emergy in KeV) Search Sensitivity: 1.00 Sigma Multiplier: 2.00 Search Start/End: 80/4000 FMEK SEARCH RESULTS FEAK SEARCH RESULTS FMEK (keV) CHANNEL COUNTS CERTAINTY COUNTS COUNTS (keV) FLAG 1 49.65 100.03 2072 410 329 19577 1.52 a Wide Pk 2 59.55 19.83 5826 557 228 10450 0.83 a 3 66.21 134.36 3660 574 462 2252 2.414 b Hikesid	****	****	Par	agon Analy	tics, Div. GammaScan	of DataChe	m Lab ********	****	****
Geo 13 / Solid Sample ID: 0613003-8 FWHM CAL (817) Sampling Start: 01/01/2006 12:00:00 Decay Time									
Sample ID: 0613003-8 FWHM CAL (017) Sampling Start: 01/01/2006 12:00:00 Sampling Stop: 01/01/2006 12:00:00 Buildup Time 0.00E+000 Hrs Sample Size 0.00E+000 Hrs Sample Size					Geo 13 / So	lid			
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 Collection Efficiency 1.0000 Spc. File 1908 Sec Collection Efficiency 1.0000 Spc. File 062429D08.Spc Detector #: 8 (Detector 8) Energy (keV) = -0.37 + 0.500*Ch +4.29E-04*Ch^2 + 6.41E+11*Ch^3 08/17/2006 FWEM(keV) = 0.68 + 0.014*En + 5.09E-04*Ch^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 THEAK SEARCH RESULTS PEAK SEARCH RESULTS WHM # (keV) CHANNE COUNTS CERTAINTY COUNTS CERTAINTY COUNTS 158 2223 506 409 19520 2.14 b HiResid Wide Pk 4 72.39 145.50 2223 506 409 19520 2.14 b HiResid THEAK SEARCH RESULTS Wide Pk 1.100.3 2072 410 329 15977 1.52 a Wide Pk 1.158 1866 630 514 26576 2.64 a Wide Pk	Sampl	le ID: 06	13003-8 FW	THM CAL (81	.7)				
Where En = Sqrt(Energy in keV) Search Sensitivity: 1.00 Sigma Multiplier: 2.00 Search Start/End: 80/4000 FEAK SEARCH RESULTS FEAK SEARCH RESULTS FEAK SEARCH RESULTS THE COUNTS CERTAINTY COUNTS COUNTS (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 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	Samp] Samp] Build Samp] Colle Energ FWHM	Ling Star Ling Stop Lup Time. Le Size . ection Ef Gy(keV) = (keV) =	t: 01/0 : 01/0 ficiency . -0.37 + 0 0.68 + 0	01/2006 12: 01/2006 12: 0.00E+00 5.00E+ Detecto 0.500*Ch +- 0.014*En +	00:00 Cou 00:00 Dec 00 Hrs Liv 002 g Rea 1.0000 Spc 0r #: 8 (De -4.29E-08*Ch 5.09E-04*En	nting Star ay Time e Time l Time f. File tector 8) 2 + 6.41E 2 + 0.00E		/17/2006 . 5.47 	10:06:09 E+003 Hrs 1800 Sec 1908 Sec 29D08.SPC
Search Sensitivity: 1.00 Sigma Multiplier: 2.00 Search Start/End: 80/4000 PEAK SEARCH RESULTS PEAK SEARCH RESULTS PEAK SEARCH RESULTS 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 13 279.2 559.14 3487 184 115 2276 1.07 a 145 1023.40 302 125 99 1661 1.18 a 1467 1.45 a 13 31 274 784.07 11961 249 99 1661 1.18 a 16 511.45 1023.40 302 125 99 1669 1.55 a 17 661.78 1323.90 19881 303 92 1467 1.45 a 18 74.54 1429.33 56 93 76 1057 1.39				Where H	En = Sqrt(En	ergy in ke	eV)		
PK. ENERGY (keV) ADDRESS CHANNEL NET/MDA COUNTS UN- CERTAINTY C.L. COUNTS BKG COUNTS FWHM (keV) 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 Wide Pk 5 74.85 150.42 294 203 165 6006 60 c 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 3200	Searc	ch Sensit	ivity: 1.()0 Sigma	Multiplier:	2.00 Se	arch Star	rt/End:	80/4000
PK. ENERGY (keV) ADDRESS CHANNEL NET/MDA COUNTS UN- CERTAINTY C.L. 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 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 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	=====:			PE/	AK SEARCH RE	SULTS			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	РК. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS (UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
3 366.82 134.36 3680 574 462 22523 2.45 a Hikesid wide Pk4 72.39 145.50 2223 506 409 19520 2.14 b Hikesid5 74.85 150.42 294 203 165 6006 0.60 c Hikesid6 85.43 171.58 1866 630 514 26576 2.56 a Wide Pk7 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 1323.9	1 2	49.65 59.55	100.03 119.83	2072 58326	410 557 574	329 228 462	15977 10450	1.52 a 0.83 a	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 3965 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	د	66.82	134.30	3680	5/4	462	44543	2.49 d	Wide Pk
788.08176.876706956618770290.87 b8122.07244.842827537714139850.89 a9136.50273.70346521114438200.92 a10165.88332.441945932213332710.91 a11199.17399.0233717414033511.21 a12255.20511.055601269618730.87 a13279.25559.14348718411622761.07 a14310.01620.64571058614760.75 a NET< CL	4 5 6	72.39 74.85 85.43	145.50 150.42 171.58	2223 294 1866	506 203 630	409 165 514	19520 6006 26576	2.14 b 0.60 c 2.56 a	HiResid HiResid Wide Pk
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	7	88.08	176.87	67069	566	187	7029	0.87 b	i
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	8	136 50	244.84	28275	3// 211	141 144	3985	0.89 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	10	165.88	332.44	19459	322	133	3271	0.91 a	•
12255.20511.055601269618730.87 a13279.25559.14348718411622761.07 a14310.01620.64571058614760.75 a NET< CL	11	199.17	399.02	337	174	140	3351	1.21 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	12	255.20	511.05	560	126	96	1873	0.87 a	L
14 310.01 620.64 57 105 86 1476 0.75 a NET< CL	13	279.25	559.14	3487	184	116	2276	1.07 a	L
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	14	310.01	620.64	57	105	86	1476	0.75 a	NET< CL
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	15	391.74	784.07	11961	249	99	1661	1.18 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	16	511.45	1023.40	302	125	99	1690	1.55 a	L
18 714.54 1429.33 56 93 76 1057 1.39 a NET< CL	17	661.78	1323.90	19881	303	92	1467	1.45 8	
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	18	714.54	1429.33	56	93	76	1057	1.39 a	NET< CL
20 550.10 1750.12 12012 252 52 1557 1.02 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	19	814.UU	1706 10	10010	35 353	/4	1020 1557	1 40 A	
21 1173.41 2343.52 22012 307 64 697 1.92 6 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	∠∪ วา	ט⊥.טעס י∧ במור	1/30.12 22/E 02	77012 T70T7	202	74 C1	- T22/ 202	1 02 C	L
23 1332.70 2663.80 20223 289 40 286 2.07 b	⊿⊥ วว	1325 55	2343.92 7619 51	44014 110	507 84	04 61	191 191	3 54 =	Wide Dŀ
Baga 001	23	1332.70	2663.80	20223	289	40	286	2.07 k)

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062429D08.SPC Analyzed by

=====								20352382222
			PF	AK SEARCH	RESULTS			
====					: 김명무무무무무 감독님 ☆			
PK.	ENERGY	ADDRESS	NET/MDA	UN-	C.L.	BKG	FWHM	
	(] **)	CITANDAL	COLDING		COTRUNC	COLDING	(1	
#	(kev)	CHANNEL	COUNTS	CERTAINTY	COUNTS	COUNTS	(kev)	FLAG
24	1026 00	3668 79	7861	179	21	75	2 50	a
24	1020.20	3000.13	1001	1/2	2 1	15	2.50	a

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062429D08.SPC Analyzed by CALIBRATION RESULTS Version 2.0.4 SEEKER 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*En² + 0.00e+00*En³ (Where En = SQR(Energy in keV)) _____ * * Calculated Prev.Calc. Pk. Energy Measured FWHM(kev)(kev) FWHM(keV) Diff. FWHM(keV) Diff. # 59.50 0.834 -1.06 0.825 -0.66 0.820 1 -1.420.860 -0.28 0.857 2 88.04 0.872 0.894 0.55 0.899 -0.13 0.898 122.06 3 -0.18 3.44 0.947 0.945 165.85 0.914 4 279.00 1.073 -0.77 1.065 -0.88 1.055 5 1.183 -0.51 1.177 -1.89 1.155 391.68 6 1.453 -4.52 -1.16 1.436 1.3747 661.64 -6.69 2.00 1.657 1.553 81 898.02 1.624 -8.97

1.909

2.054 -10.16

2.505 -13.46

1.752

1.864

2.208

Calibration Results Saved.

1.922

2.069

2.496

-0.64

0.36

-0.75

1173.21

1332.48

1836.01

9

10

11



RSO # 798 Roid 8/5/05

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

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

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 gammaray 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.

TOTAL UNCERTAINTY GAMMA-RAYS GAMMA-RAY % PER SECOND HALF-LIFE ENERGY ISOTOPE 3.0 1353 432 Am-241 59.5 У 3.3 1912 462.6 d Cd-109 88 3.0 1048 d 271.79 Co-57 122 2.8 1426 d 137.6 166 Ce-139 2.7 đ 3260 46.61 279 Hq-203 2.6 2038 d 115.1 392 Sn-113 3.0 1268 30.07 У 662 Cs-137 2.6 5008 106.6 đ 898 Y-88 2.7 2475 5.2714 Y 1173 Co-60 2.6 2499 5.2714 У Co-60 1332 5224 2.6 d 106.6 Y-88 1836

Calibration date: July 1, 2005 12:00 EST

P O NUMBER 71239, Rel. 5/20/05, Item 1 Marxaeva SOURCE PREPARED BY: _

M. D. Currie, Radiochemist

pm mt 8-1715 Q A APPROVED:

This standard will expire one year after the calibration date.



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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 Revid 8/29/06

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 gammaray 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.

TOTAL UNCERTAINTY GAMMA-RAYS GAMMA-RAY * PER SECOND ENERGY HALF-LIFE ISOTOPE 3.0 1323 59.5 432 Am-241 γ 3.3 1872 462.6 d Cd-109 88 3.0 984.9 Co-57 122 271.79 d 2.8 137.6 đ 1391 166 Ce-139 2.7 đ 3088 46.61 279 Hq-203 2.6 1971 115.1 d Sn-113 392 3.0 1256 30.07 У Cs-137 662 2.6 4857 106.6 d 898 Ϋ́-88 2.7 2377 5.2714 У 1173 Co-60 2.6 2374 5.2714 Co-60 1332 У 2.6 5084 1836 106.6 d Y-88

Calibration date: July 1, 2006 12:00 EST

P O NUMBER 71239, Rel. 7/31/06, Item 1

SOURCE PREPARED BY: <u>M. Taskaeva</u>, Radiochemist

Q A APPROVED:

8-24-06

This standard will expire one year after the calibration date.

	06	51207D02.9	PC Analyz	ed by W				
* * * * *	******	******	*******	******	******	******	******	*******
SEEK	ER	GAMM	A ANA	LYSIS	RESUI	LTS PS	S Versio	n 1.8.4
		Par	agon Anal	ytics, Div. GammaSca	of DataChe	em Lab		
****	******	********	*******	*********	***	******	******	****
				Geo 1 / Wa	ter			
Sampl	Le ID: 06	13004-2 GE	SO 1 EFF C	AL (798)				
Samp] Samp] Build Samp] Colle	ling Star ling Stop lup Time. le Size . ection Ef	t: 07/0 : 07/0 	01/2005 12 01/2005 12 . 0.00E+0 1.00E	1:00:00 Cc 1:00:00 De 000 Hrs Li 1+000 L Re 1.0000 Sp	cay Time. ve Time . al Time . c. File .	rt: 05,	/18/2006 . 7.70 0612	09:12:40 E+003 Hrs 3600 Sec 3704 Sec 07D02.SPC
Energ FWHM	gy (keV) = (keV) =	-0.85 + (0.69 + (Detect 0.501*Ch + 0.006*En + Where	cor #: 2 (I - 0.00E+00*C - 1.18E-03*E En = Sqrt(E	Detector 2) Th ² + 0.00 Th ² + 0.00 Thergy in k	E+00*Ch^3 E+00*En^3 eV)	05/18/2 05/16/2	2006 2006
Sear	ch Sensit	ivity: 1.0	00 Sigma	Multiplier	: 2.00 S	earch Sta	rt/End:	80/4000
			 Pf	TAK SEARCH F	RESILTS			
====								
		==========	============					
D <i>U</i>				T TNT		PKC	THUM	
рк. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
PK. # 	ENERGY (keV) 59.47	ADDRESS CHANNEL 120.46	NET/MDA COUNTS 27378	UN- CERTAINTY 422	C.L. COUNTS 215	BKG COUNTS 9358	FWHM (keV) 0.80 a	FLAG HiResid
PK. # 1 2	ENERGY (keV) 59.47 69.30	ADDRESS CHANNEL 120.46 140.11	NET/MDA COUNTS 27378 727	UN- CERTAINTY 422 471	C.L. COUNTS 215 385	BKG COUNTS 9358 20558	FWHM (keV) 0.80 a 1.59 a	FLAG HiResid Wide Pk
PK. # 1 2 3	ENERGY (keV) 59.47 69.30 87.94	ADDRESS CHANNEL 120.46 140.11 177.34	NET/MDA COUNTS 27378 727 81294	UN- CERTAINTY 422 471 632	C.L. COUNTS 215 385 224	BKG COUNTS 9358 20558 10141	FWHM (keV) 0.80 a 1.59 a 0.85 a	FLAG FLAG HiResid Wide Pk
PK. # 1 2 3 4	ENERGY (keV) 59.47 69.30 87.94 122.05	ADDRESS CHANNEL 120.46 140.11 177.34 245.44	NET/MDA COUNTS 27378 727 81294 45606	UN- CERTAINTY 422 471 632 480	C.L. COUNTS 215 385 224 179	BKG COUNTS 9358 20558 10141 6492	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.85 a	FLAG FLAG A HiResid A Wide Pk A
PK. # 1 2 3 4 5	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32	NET/MDA COUNTS 27378 727 81294 45606 5577	UN- CERTAINTY 422 471 632 480 250	C.L. COUNTS 215 385 224 179 165	BKG COUNTS 9358 20558 10141 6492 5456	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.85 a 0.89 a 0.80 a	FLAG FLAG HiResid Wide Pk A HiResid
PK. # 1 2 3 4 5 6	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89	NET/MDA COUNTS 27378 727 81294 45606 5577 28936	UN- CERTAINTY 422 471 632 480 250 404	C.L. COUNTS 215 385 224 179 165 180	BKG COUNTS 9358 20558 10141 6492 5456 5965	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.80 a 0.94 a	FLAG FLAG A HiResid A Wide Pk A A HiResid
PK. # 2 3 4 5 6 7	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862	UN- CERTAINTY 422 471 632 480 250 404 223	C.L. COUNTS 215 385 224 179 165 180 177	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a	FLAG HiResid Wide Pk a HiResid a
PK. # 2 3 4 5 6 7 8	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006	UN- CERTAINTY 422 471 632 480 250 404 223 201	C.L. COUNTS 215 385 224 179 165 180 177 148	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a	FLAG FLAG HiResid Wide Pk A HiResid A
PK. # 2 3 4 5 6 7 8	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620 98	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191	UN- CERTAINTY 422 471 632 480 250 404 223 201 209	C.L. COUNTS 215 385 224 179 165 180 177 148 171	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a 1.34 a	FLAG FLAG HiResid Wide Pk HiResid HiResid
PK. # 1 2 3 4 5 6 7 8 9	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a 1.34 a 0.76 a	FLAG FLAG HiResid Wide Pk HiResid HiResid
PK. # 1 2 3 4 5 6 7 8 9 10	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03 391 75	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80 784 10	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191 112	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133 317	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108 144	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661 3832	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a 1.34 a 0.76 a 1.23 a	FLAG FLAG HiResid Wide Pk HiResid HiResid
PK. # 1 2 3 4 5 6 7 8 9 10 11	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03 391.75 511 32	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80 784.10	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191 112 17389 485	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133 317 225	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108 144 182	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661 3832 4669	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a 1.34 a 0.76 a 1.23 a 2.05 a	FLAG FLAG HiResid Wide Pk HiResid HiResid
PK. # 1 2 3 4 5 6 7 8 9 10 11 12	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03 391.75 511.32	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80 784.10 1022.89	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191 112 17389 485	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133 317 226 109	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108 144 182 89	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661 3832 4669 1796	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a 1.34 a 0.76 a 1.23 a 2.05 a 0.87 b	FLAG FLAG HiResid Wide Pk HiResid HiResid HiResid HiResid
PK. # 1 2 3 4 5 6 7 8 9 10 11 12 13	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03 391.75 511.32 513.40	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80 784.10 1022.89 1027.05	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191 112 17389 485 52	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133 317 226 109 462	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108 144 182 89 127	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661 3832 4669 1796 2989	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a 1.34 a 0.76 a 1.23 a 2.05 a 0.87 1 1.57	FLAG FLAG HiResid Wide Pk HiResid HiResid HiResid FLAG FLAG FLAG FLAG FLAG FLAG FLAG FLAG
PK. # 1 2 3 4 5 6 7 8 9 10 11 12 13 14	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03 391.75 511.32 513.40 661.77	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80 784.10 1022.89 1027.05 1323.35	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191 112 17389 485 52 47362	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133 317 226 109 462 140	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108 144 182 89 127	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661 3832 4669 1796 2989 2433	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.01 a 1.01 a 1.34 a 0.76 a 1.23 a 2.05 a 0.87 1 1.57 a 1.57 a	FLAG FLAG HiResid Wide Pk HiResid HiResid HiResid HiResid HiResid
PK. # 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03 391.75 511.32 513.40 661.77 813.72	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80 784.10 1022.89 1027.05 1323.35 1626.83	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191 112 17389 485 52 47362 267	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133 317 226 109 462 140 215	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108 144 182 89 127 112	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661 3832 4669 1796 2989 2433	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.01 a 1.01 a 1.34 a 0.76 a 1.23 a 2.05 a 0.87 1 1.57 a 1.43 a	FLAG FLAG A HiResid A Wide Pk A A A A A A A A A A A A A A A A A A A
PK. # 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03 391.75 511.32 513.40 661.77 813.72 898.19	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80 784.10 1022.89 1027.05 1323.35 1626.83 1795.52	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191 112 17389 485 52 47362 267 18141	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133 317 226 109 462 140 315	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108 144 182 89 127 112 134	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661 3832 4669 1796 2989 2433 3467	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a 1.34 a 0.76 a 1.23 a 2.05 a 0.87 1 1.57 a 1.43 a 1.86 a	FLAG FLAG A HiResid A Wide Pk A A HiResid A A A A A A A A A A A A A A A A A A A
PK. # 1 2 3 4 5 6 7 8 9 10 11 2 13 14 15 16 17	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03 391.75 511.32 513.40 661.77 813.72 898.19 1115.40	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80 784.10 1022.89 1027.05 1323.35 1626.83 1795.52 2229.34	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191 112 17389 485 52 47362 267 18141 132	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133 317 226 109 462 140 315 119	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108 144 182 89 127 112 134 96	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661 3832 4669 1796 2989 2433 3467 1955 1671	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a 1.34 a 0.76 a 1.23 a 2.05 a 0.87 1 1.57 a 1.43 a 1.86 a 1.55 a	FLAG FLAG HiResid Wide Pk HiResid HiResid HiResid NET< CL
PK. # 1 2 3 4 5 6 7 8 9 10 11 2 13 14 15 16 17 18	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03 391.75 511.32 513.40 661.77 813.72 898.19 1115.40 1173.43	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80 784.10 1022.89 1027.05 1323.35 1626.83 1795.52 2229.34 2345.22	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191 112 17389 485 52 47362 267 18141 132 52613	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133 317 226 109 462 140 315 119 474	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108 144 182 89 127 112 134 96 97	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661 3832 4669 1796 2989 2433 3467 1955 1671	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a 1.34 a 0.76 a 1.23 a 2.05 a 0.87 1 1.57 a 1.43 a 1.86 a 1.55 a	FLAG FLAG HiResid Wide Pk HiResid HiResid NET< CL A A A A A A A A A A A A A A A A A A A
PK. # 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	ENERGY (keV) 59.47 69.30 87.94 122.05 136.50 165.83 255.13 279.18 310.08 337.03 391.75 511.32 513.40 661.77 813.72 898.19 1115.40 1173.43 1332.63 1836.11	ADDRESS CHANNEL 120.46 140.11 177.34 245.44 274.32 332.89 511.23 559.26 620.98 674.80 784.10 1022.89 1027.05 1323.35 1626.83 1795.52 2229.34 2345.22 2663.19 3668.71	NET/MDA COUNTS 27378 727 81294 45606 5577 28936 862 2006 191 112 17389 485 52 47362 267 18141 132 52613 47485 10531	UN- CERTAINTY 422 471 632 480 250 404 223 201 209 133 317 226 109 462 140 315 119 474 474 443 210	C.L. COUNTS 215 385 224 179 165 180 177 148 171 108 144 182 89 127 112 134 96 97 66 37	BKG COUNTS 9358 20558 10141 6492 5456 5965 5336 4041 4619 2661 3832 4669 1796 2989 2433 3467 1955 1671 726 198	FWHM (keV) 0.80 a 1.59 a 0.85 a 0.89 a 0.80 a 0.94 a 1.07 a 1.01 a 1.34 a 0.76 a 1.23 a 2.05 a 0.87 1 1.57 a 1.43 a 1.86 a 1.55 a 2.20 a 2.38 a 2.97 a	FLAG FLAG HiResid Wide Pk HiResid HiResid NET< CL A A A A A A A A A A A A A A A A A A A

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061207D02.SPC Analyzed by BACKGROUND SUBTRACT RESULTS Version 1.8.2 SEEKER Paragon Analytics, Div. of DataChem Lab GammaScan Background File:. DET020517.BKG (060517-2 WEEKLY BKGD) Bkg.File Detector #: 2 BACKGROUND SUBTRACT RESULTS ENERGY OLD NET OLD UN-OLD NEW NET NEW UN-NEW (keV) COUNTS CERTAINTY CR.LEVEL COUNTS CERTAINTY CR.LEVEL FLAG PK# _____ _____ _____ 59.47 27378 422 215 27376 422 216 1 69.30 727 471 385 725 2 02.01 3 87.94 81294 4 122.05 45606 112 2 471 385
 385
 725

 224
 81288

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 108
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 2
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 3
 87.94
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 81288
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 4
 122.05
 45606
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 224 180 108

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	061	207D02.SPC And	alyzed by				
****	********	*****	******	*******	*****	*****	
SEE	KER	CALI	BRATIO	N RESU	LTS У	Version 2.0.4	
****	******	****	*****	******	******	*****	
Samp Stds	le ID: 0613 . Match Tol	004-2 GEO 1 E erance: 2.0	FF CAL (798) 0 keV)			
Dete Geom	ctor Number etry File (: 02 Ca (D02) (Sh01).EF	libration Da F ID. Geo 1	ate 05/ 1 Eff Cal	18/2006 09:	12:40	
	LIC OF BCG.	TH CATID. SOU					
Eff	= 1 / [3.0 (Where E	2e-03*En^-3.8 En = Energy in	5e+00 + 1.3 MeV)) (Expo	33e+02*En^ 7 onential)	.85e-01]		
Pk. #	Energy (kev)	Measured Efficiency	۶ Difference	Calculated Efficiency	۴ 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.

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		7/1/2003 count date 5/18/2006	B EXPECTED ACTIVITY	Mass of # of half-lives	Standard DPS pCi/L Activity Recovery Pass/Fail expired	1 L Am-241 3632.3 98170.6 98900 101% Pass 0.01	Cd-109 51578.9 1394025.6 1440000 103% Pass 2.27	Co-57 1206.9 32618.3 31900 98% Pass 3.87	Ce-139 1766.0 47730.4 >5 h-lives >5 h-lives >5 h-lives 7.64	Hg-203 4132.0 111674.4 >5 h-lives >5 h-lives >5 h-lives 22.58	Sn-113 3020.0 81622.5 >5 h-lives >5 h-lives >5 h-lives 314	Cs-137 1480.3 40007.1 41100 103% Pass 0.10	Y-88 5417.6 146420.5 >5 h-lives >5 h-lives >5 h-lives 9.87	Co-60 2402.0 64918.9 64300 99% Pass 0.55	Co-60 2427.0 65594.6 64300 98% Pass 0.55	T T V 00 E 2000 0 4 40700 0 1 4 1000 0 1 2 1 1000 1 2 1 1000 0 0 1 0 0 0 1
		count date	۲		pCi/L	98170.6	1394025.6	32618.3	47730.4	111674.4	81622.5	40007.1	146420.5	64918.9	65594.6	142782 3
			ED ACTIVI		DPS	3632.3	51578.9	1206.9	1766.0	4132.0	3020.0	1480.3	5417.6	2402.0	2427.0	5220 O
			EXPECTI			L Am-241	Cd-109	Co-57	Ce-139	Hg-203	Sn-113	Cs-137	Y-88	Co-60	Co-60	V 88
9		7/1/2003		Mass of	Standard	1										
Nuclide Sourc		F DATE :	OM ANALYTICS.LII		Gamma Fraction:	0.3590	0.0361	0.8551	0.8035	0.7730	0.6490	0.8512	0.9340	1.0000	1.0000	0.0028
a Mixed		12	IE.		Į									1		
ification: Gamma Mixed	2	RE	ICATE FR		Gammas/Sec.	1304	1862	1032	1419	3194	1960	1260	5060	2402	2427	5007
ibration Verification: Gamma Mixed	Detector 2	RE	TION CERTIFICATE FR		Half Life(v) Gammas/Sec.	432.0000 1304	1.2666 1862	0.7441 1032	0.3768 1419	0.1276 3194	0.3151 1960	30.0000 1260	0.2919 5060	5.2714 2402	5.2714 2427	C001 C000
01 Calibration Verification: Gamma Mixed	718 Detector 2		LIBRATION CERTIFICATE		KeV Half Life(v) Gammas/Sec.	59.9 432.0000 1304	88 1.2666 1862	122 0.7441 1032	166 0.3768 1419	279 0.1276 3194	392 0.3151 1960	662 30.0000 1260	898 0.2919 5060	1173 5.2714 2402	1332 5.2714 2427	1000 00010 5007

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<pre>************************************</pre>	****** S P Lab ******	25 Versi 4******* 5/18/200 . 2.5	**************************************
SEEKER GAMMA ANALYSIS RESOLT Paragon Analytics, Div. of DataChem GammaScan ************************************	5 F Lab ****** 05	5/18/200 2.5	**************************************
Paragon Analytics, Div. of DataChem GammaScan ************************************	Lab ****** 05	5/18/200 2.5	********** 6 10:32:2
Geo 1 / Water Sample ID: 0613004-2A GEO 1 CAL VER (718) Sampling Start: 07/01/2003 12:00:00 Counting Start: Sampling Stop: 07/01/2003 12:00:00 Decay Time Buildup Time 0.00E+000 Hrs Live Time Sample Size 1.00E+000 L Real Time Collection Efficiency 1.0000 Spc. File	******	5/18/200 2.5	**********
Geo 1 / Water Sample ID: 0613004-2A GEO 1 CAL VER (718) Sampling Start: 07/01/2003 12:00:00 Counting Start: Sampling Stop: 07/01/2003 12:00:00 Decay Time Buildup Time 0.00E+000 Hrs Live Time Sample Size 1.00E+000 L Real Time Collection Efficiency 1.0000 Spc. File	05	5/18/200	6 10:32:2
Sample ID: 0613004-2A GEO 1 CAL VER (718) Sampling Start: 07/01/2003 12:00:00 Counting Start: Sampling Stop: 07/01/2003 12:00:00 Decay Time Buildup Time 0.00E+000 Hrs Live Time Sample Size 1.00E+000 L Real Time Collection Efficiency 1.0000 Spc. File	05	5/18/200	6 10:32:2 [,]
Sample ID: 0613004-2A GEO 1 CAL VER (718) Sampling Start: 07/01/2003 12:00:00 Counting Start: Sampling Stop: 07/01/2003 12:00:00 Decay Time Buildup Time 0.00E+000 Hrs Live Time Sample Size 1.00E+000 L Real Time Collection Efficiency 1.0000 Spc. File	05	5/18/200	6 10:32:2
Sampling Start:07/01/2003 12:00:00Counting Start:Sampling Stop:07/01/2003 12:00:00Decay Time.Buildup Time0.00E+000 HrsLive Time1.00E+000 LReal Time.Collection Efficiency.1.0000Spc. File.	05	5/18/200	6 10:32:2·
			2E+004 Hr 1800 Se 1829 Se 208D02.SP
Detector #: 2 (Detector 2) Energy(keV) = -0.85 + 0.501*Ch + 0.00E+00*Ch ² + 0.00E+0 FWHM(keV) = 0.69 + 0.006*En + 1.18E-03*En ² + 0.00E+0 Where En = Sqrt(Energy in keV)	0*Ch^3 0*En^3	3 05/18/ 3 05/16/	2006 2006
Search Sensitivity: 1.00 Sigma Multiplier: 2.00 Sear	ch Sta	art/End:	80/4000
PEAK SEARCH RESULTS			
	BKG	FWHM	
$\frac{1}{4}$ (keV) CHANNEL COUNTS CERTAINTY COUNTS C	OUNTS	(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
	1262	0.83	a NET< CL
8 175.42 352.04 76 98 79		0.80	a
8 175.42 352.04 76 98 79 9 194.02 389.18 93 102 83	1382	0100	
8 175.42 352.04 76 98 79 9 194.02 389.18 93 102 83 10 310.09 621.00 7 75 61	1382 834	0.58	a NET< CL
8 175.42 352.04 76 98 79 9 194.02 389.18 93 102 83 10 310.09 621.00 7 75 61 11 318.89 638.57 69 79 64	1382 834 918	0.58	a NET< CL a
8 175.42 352.04 76 98 79 9 194.02 389.18 93 102 83 10 310.09 621.00 7 75 61 11 318.89 638.57 69 79 64 12 343.65 688.02 40 87 71	1382 834 918 1070	0.58 0.74 1.04	a NET< CL a a NET< CL
8 175.42 352.04 76 98 79 9 194.02 389.18 93 102 83 10 310.09 621.00 7 75 61 11 318.89 638.57 69 79 64 12 343.65 688.02 40 87 71 13 353.24 707.17 73 87 70	1382 834 918 1070 1046	0.58 0.74 1.04 0.99	a NET< CL a a NET< CL a
8 175.42 352.04 76 98 79 9 194.02 389.18 93 102 83 10 310.09 621.00 7 75 61 11 318.89 638.57 69 79 64 12 343.65 688.02 40 87 71 13 353.24 707.17 73 87 70 14 367.64 735.93 45 64 52	1382 834 918 1070 1046 657	0.58 0.74 1.04 0.99 0.62	a NET< CL a a NET< CL a a NET< CL
8 175.42 352.04 76 98 79 9 194.02 389.18 93 102 83 10 310.09 621.00 7 75 61 11 318.89 638.57 69 79 64 12 343.65 688.02 40 87 71 13 353.24 707.17 73 87 70 14 367.64 735.93 45 64 52 15 391.82 784.22 151 107 85	1382 834 918 1070 1046 657 1350	0.58 0.74 1.04 0.99 0.62 1.34	a NET< CL a a NET< CL a a NET< CL a
8 175.42 352.04 76 98 79 9 194.02 389.18 93 102 83 10 310.09 621.00 7 75 61 11 318.89 638.57 69 79 64 12 343.65 688.02 40 87 71 13 353.24 707.17 73 87 70 14 367.64 735.93 45 64 52 15 391.82 784.22 151 107 85 16 661.73 1323.28 22741 313 70	1382 834 918 1070 1046 657 1350 894	0.58 0.74 1.04 0.99 0.62 1.34 1.58	a NET< CL a a NET< CL a a NET< CL a a
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1382 834 918 1070 1046 657 1350 894 1050	0.58 0.74 1.04 0.99 0.62 1.34 1.58 2.21	a NET< CL a a NET< CL a a NET< CL a a NET< CL a a
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1382 834 918 1070 1046 657 1350 894 1050 498	0.58 0.74 1.04 0.99 0.62 1.34 1.58 2.21 2.06	a NET< CL a a NET< CL a a NET< CL a a NET< CL a a NET< CL a HiResid
8 175.42 352.04 76 98 79 9 194.02 389.18 93 102 83 10 310.09 621.00 7 75 61 11 318.89 638.57 69 79 64 12 343.65 688.02 40 87 71 13 353.24 707.17 73 87 70 14 367.64 735.93 45 64 52 15 391.82 784.22 151 107 85 16 661.73 1323.28 22741 313 70 17 762.31 1524.16 53 99 81 18 1173.35 2345.07 19174 284 53 19 1332.58 2663.08 17943 270 28	1382 834 918 1070 1046 657 1350 894 1050 498 133	0.58 0.74 1.04 0.99 0.62 1.34 1.58 2.21 2.06 2.39	a NET< CL a NET< CL a NET< CL a NET< CL a A a NET< CL a HIRESIG

061208D02.SPC Analyzed by BACKGROUND SUBTRACT RESULTS Vers. 2.2.1 SEEKER Paragon Analytics, Div. of DataChem Lab GammaScan Background File:. . . . DET020517.BKG (060517-2 WEEKLY BKGD) Bkg.File Detector #: 2 BACKGROUND SUBTRACT RESULTS OLD UN-OLD NEW NET NEW UN-NEW ENERGY OLD NET COUNTS CERTAINTY CR.LEVEL FLAG COUNTS CERTAINTY CR.LEVEL PK# (keV) _____ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ 2 59.48 13766 274 116 13765 274 116 59.48 66.05 95 87 69 89 87 70 3 87.93 13237 122.06 3486 261 101 13234 85 3486 261 101 4

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****		061208	D02.	SPC An	aly	zed	by	.	*****			ىلە بەر بەر بەر بەر	• • • • • • • • • •		4. ab. ab. ab. ab. ab. ab.
SEEKEI	2	F	IN	TA L	A	СТ	IVI	 I '	ТҮ	RE	PO	R T	Versi	on	2.2.1
			Pa	ragon	Ana	lyti	ics, I	Di	v. of	Data	Chem	Lab			
			****				Gamma	aS •••	can		ىلە بار بار بار	ىلە باد ئە باد باد	له ماه باه بله بله ماه ماه ماه .	ماد ماد ماد ه	باله باله باله باله باله باله
~ ~ ~ ~ ~ ~								~ ~			****	*****	*******		*****
						Ge	eo 1 ,	/	Water						
Sample	e ID: (061300	4-2A	GEO 1	. CA	T AF	SR (71	18)						
Sampl: Sampl: Build Sampl Colle Cr. L	ing Sta ing Stoj up Time e Size ction E evel Con	rt: p: fficie nfiden	07/ 07/ ncy ce 1	(01/200 (01/200 . 0.0 . 1)3 1)3 1)0e+ .00	.2:00 .2:00 -000)e+00 1.0):00):00 Hrs)0 L)000 95 %		Count: Decay Live ' Real ' Spect: Det.	ing S Time Fime Fime Limit	tart	: C	05/18/200 . 2.5 061 Se Interv)6 1 52e+ 1 1 1208 7al:	0:32:24 004 Hrs 800 Sec 829 Sec D02.SPC 95 %
Effic Eff.	iency F: =1/[3.0:	ile: (2E-03*	D02) En^-	De (Sh01) -3.85E+	etec .EF	tor F (0 + 1	#: : Geo 1 .33E+(2 E 02	(Dete ff Ca *En^7	ctor 1) .85E-	2) 01]	05/18	3/2006		
Libra	rv File	:	7	NALYTI		LII.	3 (A)	na	lvtic	al)					
			====	======				==		=====					
				MEA	ASUF	SED (or MDA	A	CONCE	NTRAT	IONS	;			
					-==-			==							
		N		_											
Muali	EN. de (ERGY E	1.	Concer	itra	at101	n)		MD	7	Crit	ical wel	Halflife	9	
	ue (.	I					, 			n. 			(III 8)		
Am-24	1 5	9.54	9.8	39E+04	+-	1.90	6E+03		1.68E	+03	8.31	.E+02	3.79E+00	5	
Cd-10	98	8.02	1.4	44E+06	+-	2.84	4E+04		2.23E	+04	1.10)E+04	1.11E+04	1	
Co-57	12	2.07	3.3	L9E+04	+-	1.44	4E+03		1.59E	+03	7.81	E+02	6.50E+03	3	
Ce-13	9 16	5.85	4.3	73E+04	+-	1.5	6E+04		2.47E	+04	1.22	E+04	3.30E+03	3	
Cs-13	7 66	1.62	4.3	11E+04	+-	5.6	6E+02		2.56E	+02	1.26	5E+02	2.64E+0	5	
Co-60	Ave	rage:x	6.4	43E+04	+-	6.8	0E+02		••		• •	• •	4.62E+04	1	
	117	3.21	6.3	33E+04	+-	9.3	9E+02		3.59E	+02	1.75	5E+02	4.62E+0	4	
	133	2.48	6.5	55E+04	+-	9.8	5E+02		2.17E	+02	1.04	LE+02	4.62E+04	4	
Hg-20	3 27	9.18		MDA		•			1.09E	+09	5.37	7E+08	1.12E+0	3	
Sn-11	3 39	1.68		MDA		•			8.95E	+04r	4.36	5E+04	2.76E+0	3	
Y-88	89	8.02		MDA		•	• • •		3.20E	+05	1.58	3E+05	2.56E+0	3	
MEA	SURED T	OTAL:	1.	73E+06	+-	4.8	7E+04	ŗ	oCi/L						
				 ເກ	JKN	OWN.	SUM 0	r	ESCAP	E PE ²	AKS				
=====	a==aaa =		====			====		==		====					
PK.	ENERGY	ADDRE	ISS	NET	г	U.	N-		C	.L.		BKG	FWHM		
#	(keV)	CHANN	IEL	COUI	NTS	CER	TAINT	Y	CO	UNTS	C	COUNTS	(keV)	FLA	.G
 1	42.76	 87.	09		 92		 11	 .5		 93		1925	0.71	Del	eted
3	66.05	133.	61		89		8	7		70		1189	0.41	Unk	nown
б	136.40	274.	10	4	473		12	5		96		1720	0.95	Unk	nown
8	175.42	352.	04		76		9	8		79		1262	0.83	Del	eted
ġ İ	194.02	389.	18		93		10	2		83		1382	0.80	Unk	nown
		Page	003												

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061208D02.SPC Analyzed by

			ONVINC	JWN, SOM OF E	CALP LINK	5		
	202323 3 81	.=============						
РК. #	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

IINKNOWN SIM or Escape peaks

062299D06.SPC Analyzed by ****** GAMMA ANALYSIS SEEKER RESULTS PS Version 1.8.4 Paragon Analytics, Div. of DataChem Lab GammaScan ************* 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 07/01/2006 12:00:00 | Decay Time. 1.73E+003 Hrs Sampling Stop: Sample Size 1.00E+000 L | Real Time 3816 Sec Detector #: 6 (Detector 6) Energy(keV) = -0.69 + 0.501*Ch +-1.21E-08*Ch² + 0.00E+00*Ch³ 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 ADDRESS NET/MDA UN-C.L. BKG FWHM # (keV) CHANNEL COUNTS CERTAINTY COUNTS COUNTS (keV) FLAG _____ - - -59.52 120.20 17321 1 432 282 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 85.57 6 172.22 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 1.04 a 284 17005 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 4242 0.68 a 131 15 391.79 783.63 6023 64255 552 181 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 814.06 1626.80 19 2938 1148 160 120 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 Page 001

062299D06.SPC Analyzed by

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			PE	LAK SEARCH	RESULTS			

РК. #	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	
24	1835.95	3667.36	43750	422	46	363	2.29	a Hikesid

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	0	62299D06.S	PC Analyzed	l by				
****	******	*******	********	*******	*******	******	*******	****
SEEF	ER B	ACKGR	OUND S	UBTRA	CT RE	SULTS	Version 1	8.2
* * * * *		Par	agon Analyt	ics, Div. GammaScan	of DataCh	em Lab	****	
Backg	ground Fi	le:	DET060	908.BKG (060908-6	WEEKLY BKGD)	
Bkg.H	Tile Dete	ctor #: 6						
			BACKGROU	ND SUBTRAC	T 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	

	06	2299D06.SPC Ana	alyzed by				
****	*******	******	********	*****	*******	*****	***
SEEK	ER	CALII	BRATIO	N RESU	LTS V	Version 2.0.4	
*****	******	*****	********	******	********	******	***
Sampl	e ID: 061	.3004-6 GEO 1 EI	FF CAL (824))			
Stds.	Match To	lerance: 2.00	0 keV	,			
Detec Geome Amour	tor Numbe try File t of Std.	er: 06 Cal (D06)(Sh01).EFI in Calib. Sour	libration Da F ID. Geo I rce: 1.0000	ate 09/ 1 Eff Cal 000 gm	11/2006 10:0)6:11	
Cross	over: 1	.80.00 keV					
Above Eff = Pk.	(Where Knee Eff 10 ^ [-1 (Where Energy	En = LOG(Energy Siciency Fit: .40e+00 + 1.000 En = LOG(Energy Measured	<pre>y in keV)) e+00*En +-6 y in keV)) *</pre>	(Polynomial) .55e-01*En ² (Polynomial) 	+ 7.72e-02	'En ³] 'En ³] Prev.Calc.	
# 	(kev)	Efficiency	Difference	AILICIENCY	Difference	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.

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	MIXED NUCHDE SOURCE	5							
1									
	EF DATE :	7/1/2005			count date		9/11/2006		
١œ	OM ANALYTICS.LIE	8	EXPECTED	ACTIVITY					
		Mass of							# of half-lives
-	Gamma Fraction:	Standard	-	DPS	pCi/g	Activity	Recovery	Pass/Fail	expired
1	0.3590	-	L Am-241	3768.8	101859.5	97000	95%	Pass	0.00
	0.0361		Cd-109	52964.0	1431459.2	1490000	104%	Pass	0.94
	0.8551		Co-57	1225.6	33124.0	32000	97%	Pass	1.61
	0.8035		Ce-139	1774.7	47965.8	48500	101%	Pass	3,17
	0.7730		Ha-203	4217.3	113982.0	AN	>5 h-lives	>5 h-lives	9.38
	0.6490		Sn-113	3140.2	84870.7	88200	104%	Pass	3.80
	0.8512		Cs-137	1489.7	40261.1	41000	102%	Pass	0.04
ł	0.9340		Y-88	5361.9	144915.8	146000	101%	Pass	4.10
	1 0000		Co-60	2475.0	66891.9	68600	103%	Pass	0.23
1	1 0000		Co-60	2499.0	67540.5	68100	101%	Pass	0.23
	0 9938		Y-88	5256.6	142070.0	144000	101%	Pass	4.10
	2222						R:Vinst/g	amma\ST796.xls	

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****	0 ********	62302D06.	SPC Analyz *********	ed by <i>W</i>	*******	****	*******	****
SEE	KER	GAMM	A ANA	LYSIS	RESUI	LTS P	S Versio	n 1.8.4
		Pa	ragon Anal	ytics, Div.	of DataChe	em Lab		
				GammaScar	1			
****	*******	********	********	********	********	******	******	*******
				Geo 1 / Wat				
				Geo T / Mai	-er			
Samp	le ID: 06	13004-6A (GEO 1 CAL	VER (798)				
Samp	ling Star	t: 07/1	01/2005 12	1:00:00 Cor	nting Star	 rt• 09	/11/2006	11.24.12
Samp	ling Stop	: 07/	01/2005 12	:00:00 Ded	av Time.		. 1.05	E+004 Hrs
Buil	dup Time.		. 0.00E+0	00 Hrs Liv	ve Time .			5400 Sec
Samp	le Size .		1.008	1+000 L Rea	al Time .			5543 Sec
Coll	ection Ef	ficiency		1.0000 Spo	. File .		0623	02D06.SPC
								~
			Detect	or #: 6 (De	etector 6)			
Ener	gy (keV) =	-0.69 +	0.501*Ch +	-1.21E-08*C	$1^2 + 0.001$	3+00*Ch^3	09/11/2	006
FWHM	i(keV) =	1.19 + -	0.002*En +	- 7.29E-04*Ei	$1^2 + 0.001$	E+00*En^3	07/24/2	006
			Where	En = Sqrt(Er	ergy in ke	eV)		
Sear	ch Sensit	ivity: 1.	00 Sigma	Multiplier	: 2.00 Se	earch Sta	rt/End:	80/4000
			PH	AK SEARCH RI	ESULTS			
====				=======================================				
				,				
PK.	ENERGY	ADDRESS	NET/MDA	UN-	C.L.	BKG	FWHM	
#	(keV)	CHANNEL	COUNTS	CERTAINTY	COUNTS	COUNTS	(keV)	FLAG
								1 1110
1	59.48							
2		120.14	25644	420	224	10565	0.93 a	HiResid
	86.98	120.14 175.03	25644 3233	420 643	224 521	10565 33393	0.93 a 2.65 a	HiResid Wide Pk
5	86.98 88.01	120.14 175.03 177.10	25644 3233 79514	420 643 632	224 521 236	10565 33393 11715	0.93 a 2.65 a 1.03 b	HiResid Wide Pk
3 4 5	86.98 88.01 122.07	120.14 175.03 177.10 245.11	25644 3233 79514 43091	420 643 632 497	224 521 236 224	10565 33393 11715 9901	0.93 a 2.65 a 1.03 b 1.08 a	HiResid Wide Pk
3 4 5	86.98 88.01 122.07 136.45	120.14 175.03 177.10 245.11 273.81	25644 3233 79514 43091 5438	420 643 632 497 271	224 521 236 224 187	10565 33393 11715 9901 7422	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a	HiResid Wide Pk
3 4 5 6 7	86.98 88.01 122.07 136.45 165.85	120.14 175.03 177.10 245.11 273.81 332.52	25644 3233 79514 43091 5438 20801	420 643 632 497 271 379	224 521 236 224 187 202	10565 33393 11715 9901 7422 8020	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 1.08 a	HiResid Wide Pk
3 4 5 6 7	86.98 88.01 122.07 136.45 165.85 255.21	120.14 175.03 177.10 245.11 273.81 332.52 510.93	25644 3233 79514 43091 5438 20801 358	420 643 632 497 271 379 180	224 521 236 224 187 202 145	10565 33393 11715 9901 7422 8020 4784	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 1.08 a 0.82 a	HiResid Wide Pk
3 4 5 6 7 8	86.98 88.01 122.07 136.45 165.85 255.21 279.26	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95	25644 3233 79514 43091 5438 20801 358 327	420 643 632 497 271 379 180 168	224 521 236 224 187 202 145 135	10565 33393 11715 9901 7422 8020 4784 4143	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 1.08 a 0.82 a 0.77 a	HiResid Wide Pk
3 4 5 6 7 8 9	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60	25644 3233 79514 43091 5438 20801 358 327 11517	420 643 632 497 271 379 180 168 287	224 521 236 224 187 202 145 135 157	10565 33393 11715 9901 7422 8020 4784 4143 4568	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 1.08 a 0.82 a 0.77 a 1.31 a	HiResid Wide Pk
3 4 5 6 7 8 9 10	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60 864.01	25644 3233 79514 43091 5438 20801 358 327 11517 65	420 643 632 497 271 379 180 168 287 158	224 521 236 224 187 202 145 135 157 129	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 1.08 a 0.82 a 0.77 a 1.31 a 1.00 a	HiResid Wide Pk NET< CL
3 4 5 6 7 8 9 10 11	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34	120.14 175.03 177.10 245.11 332.52 510.93 558.95 783.60 864.01 1020.35	25644 3233 79514 43091 5438 20801 358 327 11517 65 452	420 643 632 497 271 379 180 168 287 158 205	224 521 236 224 187 202 145 135 157 129 165	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 1.08 a 0.82 a 0.77 a 1.31 a 1.00 a	HiResid Wide Pk NET< CL
3 4 5 6 7 8 9 10 11 12	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34 512.17	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60 864.01 1020.35 1024.00	25644 3233 79514 43091 5438 20801 358 327 11517 65 452 224	420 643 632 497 271 379 180 168 287 158 205 133	224 521 236 224 187 202 145 135 157 129 165 106	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781 2608	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 0.82 a 0.77 a 1.31 a 1.00 a 1.82 a 1.05 b	HiResid Wide Pk NET< CL
3 4 5 6 7 8 9 10 11 12 13	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34 512.17 611.66	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60 864.01 1020.35 1024.00 1222.65	25644 3233 79514 43091 5438 20801 358 327 11517 65 452 224 131	420 643 632 497 271 379 180 168 287 158 205 133 130	224 521 236 224 187 202 145 135 157 129 165 106 105	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781 2608 2407	0.93 a 2.65 a 1.03 b 1.08 a 1.08 a 0.82 a 0.77 a 1.31 a 1.00 a 1.82 a 1.05 b 1.22 a	HiResid Wide Pk
3 4 5 6 7 8 9 10 11 12 13 14	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34 512.17 611.66 661.68	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60 864.01 1020.35 1024.00 1222.65 1322.53	25644 3233 79514 43091 5438 20801 358 327 11517 65 452 224 131 60926	420 643 632 497 271 379 180 168 287 158 205 133 130 518 222	224 521 236 224 187 202 145 135 157 129 165 106 105 128 222	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781 2608 2407 3184	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 0.82 a 0.77 a 1.31 a 1.00 a 1.82 a 1.05 b 1.22 a 1.50 a	HiResid Wide Pk NET< CL
3 4 5 6 7 8 9 10 11 12 13 14 15	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34 512.17 611.66 661.68 813.20	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60 864.01 1020.35 1024.00 1222.65 1322.53 1625.08	25644 3233 79514 43091 5438 20801 358 327 11517 65 452 224 131 60926 362	420 643 632 497 271 379 180 168 287 158 205 133 130 518 282	224 521 236 224 187 202 145 135 157 129 165 106 105 128 230	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781 2608 2407 3184 6496	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 1.08 a 0.82 a 0.77 a 1.31 a 1.00 a 1.82 a 1.05 b 1.22 a 1.50 a 3.23 a	HiResid Wide Pk NET< CL
3 4 5 6 7 8 9 10 11 12 13 14 15 16	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34 512.17 611.66 661.68 813.20 815.26 836 24	120.14 175.03 177.10 245.11 332.52 510.93 558.95 783.60 864.01 1020.35 1024.00 1222.65 1322.53 1625.08 1629.18	25644 3233 79514 43091 5438 20801 358 327 11517 65 452 224 131 60926 362 -99	420 643 632 497 271 379 180 168 287 158 205 133 130 518 282 97	224 521 236 224 187 202 145 135 157 129 165 106 105 128 230 81	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781 2608 2407 3184 6496 1624 3578	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 1.08 a 0.82 a 0.77 a 1.31 a 1.00 a 1.82 a 1.05 b 1.22 a 1.50 a 3.23 a 0.86 b	HiResid Wide Pk NET< CL Wide Pk NET< CL
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34 512.17 611.66 661.68 813.20 815.26 836.24 898.13	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60 864.01 1020.35 1024.00 1222.65 1322.53 1625.08 1629.18 1671.08 1794.65	25644 3233 79514 43091 5438 20801 358 327 11517 65 452 224 131 60926 362 -99 248	420 643 632 497 271 379 180 168 287 158 205 133 130 518 282 97 176 274	224 521 236 224 187 202 145 135 157 129 165 106 105 128 230 81 143 145	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781 2608 2407 3184 6496 1624 3578 3901	0.93 a 2.65 a 1.03 b 1.08 a 1.00 a 1.08 a 0.82 a 0.77 a 1.31 a 1.00 a 1.82 a 1.05 b 1.22 a 1.50 a 3.23 a 0.86 b 1.88 a	HiResid Wide Pk NET< CL Wide Pk NET< CL
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34 512.17 611.66 661.68 813.20 815.26 836.24 898.13	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60 864.01 1020.35 1024.00 1222.65 1322.53 1625.08 1629.18 1671.08 1794.65 2344.11	25644 3233 79514 43091 5438 20801 358 327 11517 65 452 224 131 60926 362 -99 248 11035 64793	420 643 632 497 271 379 180 168 287 158 205 133 130 518 282 97 176 274 522	224 521 236 224 187 202 145 135 157 129 165 106 105 128 230 81 143 145 04	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781 2608 2407 3184 6496 1624 3578 3901	0.93 a 2.65 a 1.03 b 1.08 a 1.08 a 0.82 a 0.77 a 1.31 a 1.00 a 1.82 a 1.05 b 1.22 a 1.50 a 3.23 a 0.86 b 1.88 a 1.63 a 1.63 a	HiResid Wide Pk NET< CL Wide Pk NET< CL
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 9 20	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34 512.17 611.66 661.68 813.20 815.26 836.24 898.13 1173.29 1324 43	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60 864.01 1020.35 1024.00 1222.65 1322.53 1625.08 1629.18 1671.08 1794.65 2344.11 2645.91	25644 3233 79514 43091 5438 20801 358 327 11517 65 452 224 131 60926 362 -99 248 11035 64793	420 643 632 497 271 379 180 168 287 158 205 133 130 518 282 97 176 274 522	224 521 236 224 187 202 145 135 157 129 165 106 105 128 230 81 143 145 94 69	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781 2608 2407 3184 6496 1624 3578 3901 1687 780	0.93 a 2.65 a 1.03 b 1.08 a 1.08 a 0.82 a 0.77 a 1.31 a 1.00 a 1.32 a 1.05 b 1.22 a 1.50 a 3.23 a 0.86 b 1.88 a 1.63 a 1.63 a 1.87 a	HiResid Wide Pk NET< CL Wide Pk NET< CL HiResid
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 9 20 21	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34 512.17 611.66 661.68 813.20 815.26 836.24 898.13 1173.29 1324.43 1332 56	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60 864.01 1020.35 1024.00 1222.65 1322.53 1625.08 1629.18 1671.08 1794.65 2344.11 2645.91	25644 3233 79514 43091 5438 20801 358 327 11517 65 452 224 131 60926 362 -99 248 11035 64793 169 57861	420 643 632 497 271 379 180 168 287 158 205 133 130 518 282 97 176 274 522 88 487	224 521 236 224 187 202 145 135 157 129 165 106 105 128 230 81 143 145 94 69	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781 2608 2407 3184 6496 1624 3578 3901 1687 780 749	0.93 a 2.65 a 1.03 b 1.08 a 1.08 a 0.82 a 0.77 a 1.31 a 1.00 a 1.32 a 1.05 b 1.22 a 1.50 a 3.23 a 0.86 b 1.88 a 1.63 a 1.63 a 1.87 a 2.54 a	HiResid Wide Pk NET< CL Wide Pk NET< CL HiResid
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	86.98 88.01 122.07 136.45 165.85 255.21 279.26 391.77 432.05 510.34 512.17 611.66 661.68 813.20 815.26 836.24 898.13 1173.29 1324.43 1332.56 1460 94	120.14 175.03 177.10 245.11 273.81 332.52 510.93 558.95 783.60 864.01 1020.35 1024.00 1222.65 1322.53 1625.08 1629.18 1671.08 1794.65 2344.11 2645.91 2662.14 2918.51	25644 3233 79514 43091 5438 20801 358 327 11517 65 452 224 131 60926 362 -99 248 11035 64793 169 57861	420 643 632 497 271 379 180 168 287 158 205 133 130 518 282 97 176 274 522 88 487 52	224 521 236 224 187 202 145 135 157 129 165 106 105 128 230 81 143 145 94 69 64	10565 33393 11715 9901 7422 8020 4784 4143 4568 3513 4781 2608 2407 3184 6496 1624 3578 3901 1687 780 749 225	0.93 a 2.65 a 1.03 b 1.08 a 1.08 a 0.82 a 0.77 a 1.31 a 1.00 a 1.31 a 1.05 b 1.22 a 1.50 a 3.23 a 0.86 b 1.88 a 1.63 a 1.63 a 1.96 a 1.96 a 1.76 a	HiResid Wide Pk NET< CL Wide Pk NET< CL HiResid

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	0	52302D06.5	SPC Analyzed	by			
****	*******	********	*******	*******	*******	******	*****
SEEK	ER I	васкс	ROUND	SUBTR	ACT R	ESULT	S Vers. 2.2.1
****	******	Pa:	ragon Analyt	GammaScan	of DataCh ********	em Lab *********	****
Back Bkg.	ground Fi	le: ctor #: 6	DET060	908.BKG (060908-6	WEEKLY BKGD)
8533	 _		BACKGROU	IND SUBTRAC	T RESULTS		.
====				*********			angangkakanan a
	ENERGY	OLD NET	OLD UN-	OLD	NEW NET	NEW UN-	NEW
PK#	(keV)	COUNTS	CERTAINTY	CR.LEVEL	COUNTS	CERTAINTY	CR.LEVEL FLAG
11	510.34	452	205	165	336	206	167
22	1460.94	46	52	41	21	52	42 NET <cl< td=""></cl<>

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ىقە ھادىقە ھار ھار	0	62302D	06.SPC Ar	aly	zed by	<u>له</u> بله بله بله بله بله بله بله بله بله	ﻮﻟﻪ ﺑﻪ	ىلە بە بە بە بە بە بە	ﻮ ﻮ ﻪ • • • • • • • • • • • • • • • • •
SEEKER		F	INAL	A	стіvі	TY RE	PORT	Versi	on 2.2.1
		_	Paragon	Ana	lytics, Di	v. of Data	Chem Lab		
*****	******	*****	******	***	Gauuna: ********	*********	********	******	******
					Geo 1 /	Water			
Sample	ID: 0	613004	-6A GEO :	L CA	L VER (798)			
Sampli Sampli Buildu Sample Collec Cr. Le	ng Star ng Stop p Time. Size . stion Ef	t: ficien	07/01/200 07/01/200 cy e Interva	05 1 05 1 00e+ 1.00 al:	2:00:00 2:00:00 000 Hrs e+000 L 1.0000 95 %	Counting S Decay Time Live Time Real Time Spectrum H Det. Limit	Start: 0	9/11/200 1.0 062 e Interv	6 11:24:12 5e+004 Hrs 5400 Sec 5543 Sec 302D06.SPC al: 95 %
Effici Eff=1 Eff.=1	ency Fi .0^[-2.8 .0^[-1.4	le: (D 37E+01 40E+00	D(06)(Sh01) +2.52E+0 +1.00E+0	etec).EF 1*L 0*L	tor #: 6 F (Geo 1 E +-5.85E+00 +-6.55E-01	(Detector Eff Cal))*L ² 2 +0.00 _*L ² 2 +7.72	6))E+00*L^3] ?E-02*L^3]	09/11/20 Above	06 180.00 keV
Librar	y File:	•••	. ANALYT	ICAL	LIB (Ana	lytical)			
				====					
			Me	ASUR ====	ed of Mua	CONCENTRA			
		N							
Nuclid	ENH le ()	RGY E CeV) T	Conce: (pCi/L	ntra	tion)	MDA	Critical Level	Halflife (hrs)	:
		 Э БЛ	9 70E+04	 	1 59R±03	1.70E+03	8.46F+02	3.79E+06	
Cd-109	9 88	3.02	1.49E+06	• +-	1.19E+04	8.90E+03	4.43E+03	1.11E+04	
Co-57	122	2.07	3.20E+04	+-	3.69E+02	3.35E+02	1.67E+02	6.50E+03	-
Ce-139	9 16	5.85	4.85E+04	4	8.83E+02	9.47E+02	4.70E+02	3.30E+03	5
Sn-113	3 393	1.68	8.82E+04	+-	2.20E+03	2.43E+03	1.20E+03	2.76E+03	•
Cs-137	7 66:	1.62	4.10E+04	+-	3.48E+02	1.74E+02	8.60E+01	2.64E+05	5
Y-88	Ave	rade:x	1.45E+05	+-	2.58E+03			2.56E+03	6
	89	3.02	1.46E+05	+	3.64E+03	3.89E+03	1.92E+03	2.56E+03	,
	183	5.01	1.44E+05	+-	3.67E+03	1.21E+03	5.74E+02	2.56E+03)
Co-60	Ave:	rage:x	6.84E+04	+-	3.98E+02			4.62E+04	Ł
	117:	3.21	6.86E+04	+-	5.52E+02	2.01E+02	9.90E+01	4.62E+04	Ł
	133:	2.48	6.81E+04	+-	5.73E+02	1.53E+02	7.49E+01	4.62E+04	L
Hg-203	3 27	9.18	MDA			5.19E+04r	2.57E+04	1.12E+03	ł
MEAS	SURED TO	OTAL:	2.01E+06	+-	2.03E+04]	pCi/L ·			
			========== 11	NKM			===== === ===== aks		
=====			U =======	====		aduria fa		********	
рк. 1 #	ENERGY (keV)	ADDRES CHANNI	SS NE EL COU	T NTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
						 E01	 		Inlmorm
2	136 15	175.0	ມວ ວັ ຊ1 ⊑	420	54J 271	541 197	23233 7477	4.00 1 00	Inknown
5	T20.42	Page (003 S	-107	211	T01	/746	1.00	0117140W11

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062302D06.SPC Analyzed by

	UNKNOWN, SUM OF ESCAPE PEAKS													
⋳⋕⋍⋍⋍⋍⋨⋠⋍⋍≒⋭⋳⋭⋬⋻⋍⋍∊⋳∊⋬⋿⋹⋍⋵⋭⋍⋸⋓ ⋍⋺⋭ ⋬⋋⋧⋻⋵⋷⋍⋞⋳⋍⋵⋓⋹⋹⋹∊⋸⋓⋻⋹∊⋍⋸⋓⋻⋫⋳⋍⋵⋾⋒⋇⋳∊⋍∊⋳∊⋳∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊∊														
РК. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG						
	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 (******* ****** SEEKER GAMMA ANALYSIS RESULTS PS Version 1.8.4 Paragon Analytics, Div. of DataChem Lab GammaScan 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 Sample Size 1.00E+000 L | Real Time 2049 Sec Detector #: 8 (Detector 8) Energy(keV) = -0.62 + 0.500*Ch + 0.00E+00*Ch² + 0.00E+00*Ch³ 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 ADDRESS NET/MDA UN-C.L. BKG FWHM # (keV) CHANNEL COUNTS CERTAINTY COUNTS COUNTS (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 67.15 7399 3 135.46 791 635 42570 2.50 a Wide Pk 70.44 4 142.04 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 121.85 244.80 58833 8 546 206 8546 0.88 a 135.93 272.96 9 1240 572 2.38 a Wide Pk 467 22990 10 136.29 273.67 6261 285 195 7663 0.82 Ъ 11 165.69 332.44 60012 549 204 7690 0.93 a HiResid 12 198.98 1062 398.98 259 206 7259 1.11 a 13 255.03 511.01 1843 214 161 4782 0.99 a 279.11 559.15 14 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 87 105 130 2194 1.17 a NET< CL 511.08 1022.85 18 871 229 182 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 3044 132 1.41 a NET< CL 21 698.28 1397.03 112 107 86 1691 0.83 b 813.99 1628.32 22 720 111 80 1376 1.22 a 23 898.11 1796.49 48656 459 104 2086 1.53 a 1006.86 2013.86 24 66 85 69 1093 0.94 a NET< CL

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062650D08.SPC Analyzed by

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			PI	eak search i	RESULTS			
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РК. #	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	L ⁱ
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	L
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	L
31	1856.91	3713.03	43	28	20	88	1.36 ł)

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		062	26503	80C	.SP	C An	alyzed	đ 1	by																	
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SEEK	ER B	A	СК	GΙ	RO	UN	D S	S I	UВ	тI	RA	C	Т	R	Ε	S	υ	L	т	S	Ve	rs:	ion	. 1	L.8	. 2
****	*****	**:	****	Pa ***	ara ***	gon ****	Analyi	ti (cs, Gam ***	Div maSo ****	v. can ***	of ***	Da	taC ***	he **	m **	Lal	b **	**	**	* * *	**	***	***	* * *	***
Backg	round F	ile	8:.		•		DET08	09	08.	BKG	(060	080	9-8	Ŵ	EF	KL	Y	BK	GI))					
Bkg.F	ile Det	ect	tor :	#: :	8																					
		==:		===;	===	==== BA ====	CKGRO	= = UN = =	D S'	=== UBT1 ===	RAC	T I	RES	UL1 ===	'S			==			===					===
рк#	ENERGY (keV)		CO. OFD	NE' UNT:	T S	OL CERI	D UN- AINTY		O CR.	LEVI	EL	נא י	ew : Cou	NEI NTS	:	CE	NE RT	W AI	UN IN	I 'Y	C	NI R.I	ew Lev	EL	F	LAG
3.	67.15			739	 9		791			63	5		7	394				7	91	-			63	5		
12	198.98			106	2		259			20	6		1	056	5			2	159)			20	6		
18	511.08			87	1.		229			18:	2			820)			2	22)			18	2		
23	898.11		4	865	б		459			104	4		48	654	•			4	59)			10	4		

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	062	650D08.SPC An	alyzed by				
**** SEEI ****	* * * * * * * * * * * * * KER * * * * * * * * * * * *	CALI: ***************	**************************************	**************************************	************ LTS *****	<pre>************************************</pre>	*****).4 *****
Sampi Stds	le ID: 0613 . Match Tol	8004-8 GEO 1 E lerance: 2.0	FF CAL (824) 0 keV)			
Dete Geom Amou	ctor Number etry File nt of Std.	: 08 Ca (D08) (Sh01).EF in Calib. Sou	libration Da F ID. Geo I rce: 1.0000	ate 09/ 1 Eff Cal 000 gm	11/2006 14::	14:16	
Eff :	= 1 / [6.3 (Where H	36e-01*En^-1.1 En = Energy in	9e+00 + 1.2 MeV)) (Expo	20e+02*En^ 9 onential)	.04e-01]		
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	3.930-02	2.60	4.03e-02	0.09	4.068-02	
3 4	165 85	3.998-02	-2.42	3.45e-02	-0.24	3.90e-02 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	

9.14e-03

7.20e-03

6.43e-03

4.82e-03

2.72

-0.21

-2.44

-3.63

Calibration Results Saved.

8.90e-03

7.22e-03

6.58e-03

4.99e-03

898.02

1173.21

1332.48

1836.01

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11

0K GR 9/11/06

9.18e-03

7.26e-03

6.49e-03

4.89e-03

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					# of half-lives	expired	0.00	0.94	1.61	3.17	9.38	3.80	0.04	4,10	0.23	0.23	4.10	
						Pass/Fail	Pass	Pass	Pass	Pass	>5 h-lives	Pass	Pass	Pass	Pass	Pass	Pass	amma\ST798.xts
			9/11/2006			Recovery	102%	98%	102%	89%	>5 h-lives	96%	98%	%66	101%	101%	106%	R:Vinst/g:
						Activity	104000	1400000	33900	47700	NA	81700	39300	144000	67500	68000	151000	
			count date	۲		pCi/g	101859.5	1431459.2	33124.0	47965.8	113982.0	84870.7	40261.1	144915.8	66891.9	67540.5	142070.0	
				D ACTIVIT		SHO	3768.8	52964.0	1225.6	1774.7	4217.3	3140.2	1489.7	5361.9	2475.0	2499.0	5256.6	
	-	÷		EXPECTE			. Am-241	Cd-109	Co-57	Ce-139	Hg-203	Sn-113	Cs-137	Y-88	Co-60	Co-60	Y-88	
0			7/1/2005	8	Mass of	Standard	1									-		
na Mixed Nuclide Sourc			REF DATE :	FROM ANALYTICS.LIE		Gamma Fraction:	0.3590	0.0361	0.8551	0.8035	0.7730	0.6490	0.8512	0.9340	1.0000	1.0000	8666.0	
ification: Gamn	8			FICATE		Gammas/Sec.	1353	1912	1048	1426	3260	2038	1268	5008	2475	2499	5224	
ibration Ver	Detector		798	TION CERTIF		Half Life(y)	432.0000	1.2666	0.7441	0.3768	0.1276	0.3151	30.0000	0.2919	5.2714	5.2714	0.2919	
01 Cal	798		IRCE :	LIBRA ⁷		KeV	59.9	88	122	166	279	392	662	898	1173	1332	1836	
Geometry	Std. #		NEW SOU	FROM CA		Isotope	Am-241	Cd-109	Co-57	Ce-139	Hg-203	Sn-113	Cs-137	Y-88	Co-60	Co-60	<u>Y-88</u>	

Page 1

062651D08.SPC Analyzed by (/ ************ SEEKER GAMMA ANALYSIS RESULTS PS Version 1.8.4 Paragon Analytics, Div. of DataChem Lab GammaScan Geo 1 / Water Sample ID: 0613004-8A GEO 1 CAL VER (798) Sampling Start:07/01/2005 12:00:00Counting Start:09/11/2006 14:56:51Sampling Stop:07/01/2005 12:00:00Decay Time.1.05E+004 Hrs Sample Size 1.00E+000 L | Real Time 1921 Sec Detector #: 8 (Detector 8) Energy (keV) = -0.62 + 0.500 *Ch + 0.00 E + $FWHM(keV) = 0.72 + 0.007*En + 8.11E-04*En^2 + 0.00E+00*En^3 08/17/2006$ Where En = Sqrt(Energy in keV) Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000 PEAK SEARCH RESULTS PK. ENERGY ADDRESS NET/MDA UN-C.L. BKG FWHM # (keV) CHANNEL COUNTS CERTAINTY COUNTS COUNTS (keV) FLAG _ _ _ . ------399 315 43.03 87.26 1. 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 65.67 132.50 296 726 239 9759 1.15 a HiResid Wide Pk 7 67.33 135.83 3785 555 445 20913 2.50 b HiResid 87.81 8 176.76 70894 578 184 6817 0.84 a 121.82 9 244.75 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 240 13 279.10 559.13 120 96 1692 1.00 a 14 391.62 784.06 4771 175 89 1549 1.10 a 15 510.79 1022.26 831 57 75 60 0.83 a NET< CL 661.73 1323.98 16 25997 76 336 1079 1.37 a 17 898.03 1796.32 4783 172 84 1373 1.55 a 18 1115.21 2230.44 80 101 82 2.03 a NET< CL 1238 19 1173.14 2346.24 27650 340 59 676 1.73 a 20 1323.29 2646.38 28 1.02 a NET< CL 18 35 194 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 Page 001

	0	62651D08.S	PC Analyzed	by				
****	*******	*******	********	*******	********	*******	******	***
SEEKE	R	BACKG	ROUND	SUBTR	ACT R	ESULT	S Vers. 2.	2.1
****	****	Par	agon Analyt *********	ics, Div. GammaScan	of DataCh 1 ********	em Lab *********	*****	****
Backg	round Fi	le:	DET080	908.BKG ((060809-8	WEEKLY BKGD)	
Bkg.F	ile Dete	ctor #: 8						
							==================	====
			BACKGROU	ND SUBTRAC	T 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	
4 6	51.68 65.67	523 726	186 296	148 239	522 721	186 296	148 239	
4 6 15	51.68 65.67 510.79	523 726 57	186 296 75	148 239 60	522 721 7	186 296 75	148 239 62 NE	T <cl< td=""></cl<>

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****	(*******	062651	D08	.SPC Ar	naly	zed	by	****	****	****	******	****		*****
SEEKE	R	F	'I]	NAL	A	СТ	IVJ	I T	Y	RE	PORT	ve	rsion	2.2.1
			n		3				-5	Date	all and the task			
			E	aragon	Alla	цусз	Gamma	aSca	. OI an	Data	achelli Lab			
****	******	*****	***	*****	* * * *	****	*****	****	****	****	******	*****	*****	******
						Ge	eo 1 /	/ Wa	ater					
Sampl	e ID: (061300	4-8	a geo :		L VI	ER (79	98)						
Sampl	ing Sta	rt:	07	/01/200	05 1	2:00	00:00	Co	ount:	ing s	Start:	09/11/	2006 1	4:56:51
Sampl	ing Sto	p:	07	/01/200	05 1	.2:00	0:00	De	ecay	Time	3	•••	1.05e+	004 Hrs
Build	up Time	• • •	•••	. 0.0	00e4	-000	Hrs		Lve :		• • • •	• • • •	1	.800 Sec
Colle	e Size	 Fficie	 nev	••••		1.0			eat : hecti	ບັນແອ ຕາມທີ່ໄ	 Mile	••••	1 062651	DAS SPC
Cr. 1	evel Co	nfiden	ice	Interva	al:	9	95 %	De	et.]	Limit	: Confide	nce Int	erval:	95 %
									- -					
REELO	domant B	11a. (-	De V (Shoi V	etec	tor	3 :# 	8 (I	Dete	tor	8)			
Eff.	=1/(6.3)	11e: (6R-01*	En^)(SNUL) -1.19E-).E5₽ ⊾00	r£r (0 ⊥ 1	30ET(30ET	ビエI いつ * F	t Ca. ₹n^q	L) 04ਵ.	-011 09/	11/2006		
									~		-01] 03/			
Libra	ry File	:	• •	ANALYT	ICAI	.LIE	3 (Ar	naly	<i>y</i> tica	al)				
=====				2202021 MD1								******	=====	
			===	MF4 ======										
		N	ſ											
	EN	ERGY E	3	Concer	ntra	ntior	1				Critical	Halfl	ife	
Nucli	.de ()	keV) I	: ()	pCi/L)		MD	A	Level	(hrs)	
Am-24	1 5	 9 51		04R+05	 	7 64	 \$\		378.	 102	2 67F±02	3 705	 +06	
Cd-10	9 8	8.02	1.	40E+06	+-	1.14	4E+04	7	.34E	+03	3.64E+03	1.11E	+04	
Co-57	12	2.07	з.	39E+04	+-	4.76	5E+02	3.	.30E-	+02	1.63E+02	6.50E	+03	
Ce-13	9 16	5.85	4.	77E+04	+-	1.18	3E+03	1.	.12E-	+03	5.51E+02	3.30E	+03	
Sn-11	.3 39:	1.68	8.	17E+04	+-	3.00	DE+03	3.	.08E	+03	1.52E+03	2.76E	+03	
CS-13	7 65. Ave:	1.62	3.	93E+04	+-	5.07	7E+02	2.	.35E-	+02	1.16E+02	2.64E	+05	
1-00	AVE.	rage:x 8 02	· ⊥.	4/5+05	+-	5 19	3E+03	5	 150.	• •	2 525102	2.565	+03	
	183	6.01	1.	51E+05	+-	5.79	9E+03	1.	.89E	+03	8.72E+02	2.56E	+03	
Co-60	Ave	rage:x	6.	77E+04	+	6.01	LE+02					4.62E	+04	
	117	3.21	б.	75E+04	+-	8.31	LE+02	2.	.96E	+02	1.44E+02	4.62E	+04	
	133:	2.48	б.	80E+04	+-	8.71	LE+02	2.	.05E	+02	9.89E+01	4.62E	+04	
Hg-20	3 27	9.18		MDA		•	• • •	7.	.24E	+04r	3.55E+04	1.12E	+03	
MEA	SURED T	OTAL:	1.	93E+06	+-	2.18	8E+04	pC	i/L					
		zzen:		======: m		·===·		==≡= r E§	SCAD	==== 7 pr:			*****	
				=====		====	=====		=====	=====				
DK	FNFDAV	יימטעע	200	NTT	Ţ.	776	×۲_		a	Ŧ	D 77	THEFT		
#	(keV)	CHANN	IET.	COLL TOTA	⊥ אידינ	U TRED	א־ דא־דאיז	Y	C CO1	∙ц. ТNITI©	COINT	rwhm Vai) S	र, गन्न ('	NG .
								- 					, r	
1	43.03	87.	26	:	399		31	5		257	1129	8 1.1	5 Unk	nown
2	48.88	98.	95	23	906		406	6		322	1767	2 1.0	9 Unk	nown
3	50.16	101. Bacc	51	34	433		512	2		410	2487	6 1.5	0 Unk	mown
		FAUR	UU.5											

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	(062651D08	.SPC Analy	yzed by				
* = * *			======== UNKNO	WN.SUM or 1	======== ESCAPE PEAK	======== S	******	
====	========							*******
РК. #	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.



March 1999

Gamma Spectroscopy

Quality Control Data

Weekly Background Calibrations

Paragon Analytics

Gamma Spectrometer Calibration Log

Date: 02706

Reviewed By/Date: JP 10/27/06

		Backs	round		Source	Check		Repeat S	ource Check	
Det. No.	Out Of Service	Started	ок	Started	OK.	Failed Parameter(s)	OK.	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP.		/						·····	
2.		6	H	JP	· ·	662 FWHM	JP			
3.	TP								· · · · · · · · · · · · · · · · · · ·	· · · ·
4		G	X	JP		1332 Centroid	JP		· · · · · · · · · · · · · · · · · · ·	
5.:	JP									
6.	<u></u>	B	P	JP	JP					
7.	JP		/							· · · · · ·
8.	• ·	A	JP	JP		GO FINHM	TP	,	-	······
9.		(X)	JP	JP.	JP.				· · · · · · · · · · · · · · · · · · ·	· · ·
10.	JP	P			/ "	· ·				1
11.						•				
12.	, ,							.î		·

** Corrective Action:

* Recount. Peak Shift JP 10/30/06

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Form 754r11a.doc (6/13/2005)

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062512D02.SPC Analyzed by										
SEEK	ER	GAMMA	ANAL	YSIS	RESUL	TS PS	S Version · 1.8.4			
		Deser		D <i>i</i>		1 .				
		Para	Igon Analyti	cs, Div. GammaScar	or Datache	m Lao				
*****	******	******	*****	*****	- :********	******	*****			
	Weekly Background Check									
Sample ID: 061027-2 WEEKLY BKG										
Sampl Sampl Build Sampl Colle	ing Star ing Stop up Time. e Size . ction Ef	t: 10/27 : 10/27 ficiency .	7/2006 18:03 7/2006 18:03 0.00E+000 . 1.00E+00 1.0	:56 Cou :56 Dec Hrs Lix 0 L Rea 000 Spo	Inting Star cay Time ve Time al Time c. File	t: 10,	/27/2006 18:03:56 . 0.00E+000 Hrs . 60000 Sec . 60060 Sec . 062512D02.SPC			
Energ FWHM (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)									
Searc	h Sensit	ivity: 1.00) Sigma Mu	ltiplier	: 2.00 Se	arch Sta	rt/End: 80/4000			
			======================================							
			<i>F DA</i> A. ==============							
PK.	ENERGY	ADDRESS	NET/MDA U	IN –	C.L.	BKG	FWHM			
++ 	(VGA)		COUNTS CER							
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 D NET< CL			
8	92.71	186.6/	430	92	6/ 50	//6	1.10 a			
10	140.17	281.50	104	/5	58	621 211	0.90 a			
11	160 70	209.21	47	40	30	211				
10	195 76	340.09	777	6 P	50	530 E12				
12	109 70	312.30	252 101	60	50	512	0.00 a			
14	120.32	337.02	210	70	50	510	0.70 a . 1 00 p			
15	230.07	470.30	87	73	59	595	1.00 a			
16 16	268 30	-04.00 537 51	21	74	55	595	+++++ ** 1.24 a NIETT- CT.			
17	295 28	591 A1	90	57	44	386				
18	351.81	704.35	216	63	46	401	1.15 a			
19	511 12	1022-65	1648	126	79	733	2.77 a Wide Pk			
20	558 51	1117 33	157	49	25	235	1.21 a			
21	570.32	1140 93	86	54	42	320	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			
_	Page 001									

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062512D02.SPC Analyzed by

	PEAK SEARCH RESULTS										
====	╡┱┰╖┲┲┲┲┲┲╡┙┙╧┲╓╓╓╓┝╬╬╝╝╘╓┲╓┲╔╬╬┢┺┲┲╘╼┲┲╓╓┵╡┲┲╧╍╌╌╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴╴										
РК. #	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			

Page 002

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062512D02.SPC Analyzed by

***********	*****	***	***	****	* * :	****	*****	*****	****	***	* * * *	***	****	******
SEEKER	ВА	C	ΚG	RC) U	N D	Q.	с.	AN	AI	ьγ	S :	IS	Version 2.2.2
*****	*****	***	****	****	**	****	*****	*****	****	***	* * * *	***	****	*****

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.	
1415	40-> 50 keV Bkg	2.939	N.A.	Pass	N	.A.

Q.C. Results Saved.

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062598D06.SPC Analyzed by ****** SEEKER GAMMA ANALYSIS RESULTS PS Version 1.8.4 Paragon Analytics, Div. of DataChem Lab GammaScan ***** ****** Weekly Background Check Sample ID: 061027-6 WEEKLY BKG 10/27/2006 18:04:33 | Counting State. _____ 10/27/2006 18:04:33 | Decay Time. 0.00E+000 Hrs 60000 Sec Sampling Start: Sampling Stop: Buildup Time. 0.00E+000 Hrs | Live Time Sample Size 1.00E+000 L | Real Time 60022 Sec Detector #: 6 (Detector 6) Energy(keV) = -0.65 + 0.501*Ch +-2.40E-08*Ch² + 0.00E+00*Ch³ 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 ADDRESS NET/MDA UN-С.L. BKG FWHM COUNTS CERTAINTY COUNTS # (keV) CHANNEL COUNTS (keV) FLAG _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ 1 53.57 108.25 65 71 57 739 0.80 a 2 66.40 73 133.87 126 58 754 0.80 a 3 74.79 150.61 57 63 50 615 0.69 a 92.58 186.13 4 178 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 0.69 a 301 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 570.37 1139.98 13 48 42 32 242 1.06 a 583.17 1165.54 14 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 11440 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 0.92 a 112 21 1460.97 2918.22 326 45 22 88 1.91 a 22 1765.12 3525.56 23 49 32 84 2.73 a

062598D06.SPC Analyzed by

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.



Paragon Analytics

Gamma Spectrometer Calibration Log

Date: 11 3:04

Reviewed By/Date: JP 113/06

Repeat Source Check Source Check Background Corrective Action Taken ** Removed Failed Failed Out Of Service Det. No from Service Parameter(s) OK. Parameter(s) OK. Started OK Started I 1. TD JP J 6 2. . 3 3. 4. 5. JP JP TP 6. 1332 Central JP TP 7. 8. 662 FWHM 9. P 10. 11. 12.

.** Corrective Action:

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Form 754r11a.doc (6/13/2005)

318720

	06	2549D02.S	PC Analyzed	1 by JP						
*****	******	*******	*********	*******	*********	*******	******	*******		
SEEKE	3R	GAMMI	A ANAI	JYSIS	RESUL	TS PS	Version	1.8.4		
		Para	agon Analyt	cics, Div. GammaScan	of DataChe	m Lab				
*****	GammaDCan * * * * * * * * * * * * * * * * * * *									
Weekly Background Check										
Sample	e ID: 061	L103-2 WEE	KLY BKG							
Sampl: Sampl: Buildu Sample Colled	ing Start ing Stop up Time. e Size . ction Ef:	: 11/0 : 11/0 :	3/2006 17:0 3/2006 17:0 0.00E+000 . 1.00E+ 1	00:00 Cou 00:00 Dec 0 Hrs Liv 000 L Rea .0000 Spc	nting Star ay Time e Time 1 Time . File	t: 11/	/03/2006 . 5.28E 6 6 06254	17:03:10 2-002 Hrs 50000 Sec 50021 Sec 19D02.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)										
Searc	h Sensit	ivity: 1.0	0 Sigma 1	Multiplier:	2.00 Se	arch Star	rt/End:	80/4000		
	*******						=========================			
	*********	*=======	======================================	======================================						
РК. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS C	UN- ERTAINTY	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	1		
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	WIGE PK		
		Page 001								

062549D02.SPC Analyzed by

	PEAK SEARCH RESULTS								
рк. #	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	L	
26	569.33	1139.36	76	52	41	339	1.27 a	L	
27	582.97	1166.63	141	58	43	349	1.62 a	L [.]	
28	609.28	1219.21	176	65	49	460	1.40 a	1	
29	692.70	1385.91	90	60	47	389	1.82 a	ì	
30	695.09	1390.67	112	68	54	460	2.21 k)	
31	802.84	1605.99	132	48	35	225	1.64 a	ı	
32	897.97	1796.08	73	47	36	234	2.07 a	1	
33	911.51	1823.14	83	39	29	167	1.63 a	1	
34	961.63	1923.29	44	32	24	134	1.11 a	1	
35	1014.29	2028.51	40	47	37	236	2.29 a	1	
36	1120.28	2240.28	42	29	21	104	1.11 a	1	
37	1460.68	2920.35	178	41	25	105	2.43 a	a	
38	1764.85	3528.00	37	26	19	65	2.02 a	ì	

Page 002

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0	62550D	02.SPC Anal	yzed by			
*****	*****	*******	*******	********	******	*****
SEEKER		CALIB	RATION	RESU	LTS Ver	sion 2.0.4
********	* * * * * *	*******	****	******	*****	*****
Sample ID: DA	ІГА СН	ECK				
Stds. Match T	oleran	ce: 2.00	keV			
Detector Numb	er: 02	Cali	bration Date	11/0	4/2006 09:49:	55
Energy(keV) =	-0.7	6 + 0.500	*Ch + 4.70e-	08*Ch^2 +	0.00e+00*Ch^3	
	Pk.	Measured	Calculated	Energy	8	
	#	Centroid	Energy	(keV)	Difference	
E BURESSEE	===== 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.

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062549D02.SPC Analyzed by

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SEEKER	В	Α	C	к	G	R	0	υ	N	D	Q.	c.		A	N	A	Г	Y	S	I	S	Version 2.2.2
********	**	**1	***	***	**	**	***	**	**:	***	****	***	****	**	**	**	**	* *	**	**	***	******

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.

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مقد ملد ملد ملد		63142D08.S	PC Analyzed	Dy JP	*****	*****	******	******	* *
SEEK	ER	GAMM	A ANAL	YSIS	RESUL	TS PS	3 Versio	n 1.8.4	4
		Par	agon Analyti	cs, Div.	of DataChe	m Lab			
				GammaScar	1.	ale de ale de ale de la compañía			44.
****	******	******	******	******	*******	*******	*******	******	* *
			Weekly	Backgrou	nd Check				
Sampl	e ID: 06	1103-8 WEE	KLY BKG						
Sampl Sampl Build Sampl Colle	ing Star ing Stop up Time. e Size . ection Ef	t: 11/0 : 11/0 	03/2006 17:00 03/2006 17:00 0.00E+000 . 1.00E+00 . 1.0	:00 Con :00 Dec Hrs Lin 0 L Rea 000 Spo	unting Star cay Time ve Time al Time c. File	t: 11,	/03/2006 . 6.47 0631	17:03: E-002 H: 60000 S 60109 S 42D08.S	 53 rs ec ec PC
Energ FWHM (Jy (keV) = (keV) =	-0.50 + 0 0.72 + 0	Detector).500*Ch + 2.).007*En + 8. Where En	#: 8 (De 17E-07*C] 11E-04*E = Sqrt(E)	etector 8) h ² + 0.00E n ² + 0.00E nergy in ke	+00*Ch^3 +00*En^3 :V)	11/03/2 08/17/2	:006 :006	
Searc	ch Sensit	ivity: 1.0)0 Sigma Mu	ltiplier	: 2.00 Se	arch Sta	rt/End:	80/400	0
=====									==
=====			FLAR ====================================	========		==========			==
		· .							
PK.	ENERGY	ADDRESS	NET/MDA U	N-	C.L.	BKG	FWHM		
#	(keV)	CHANNEL	COUNTS CER	TAINTY	COUNTS	COUNTS	(keV)	FLAG	
	46 41	93 78	437	76	 53	611	0.71 a	1	
2	63.18	127.31	560	88	61	755	0.80 a		
3	66.15	133.25	244	91	70	906	1.06 l	-	
4	74.78	150.50	216	81	62	783	0.80 a	1	
5	77.05	155.03	219	81	62	783	0.81 h)	
б	84.45	169.83	85	75	60	717	0.88 a	1	
7	87 26	175 43	80	54	42	430	0.43	- 1	
8	92 58	186 07	773	98	66	813	1.01 5	3	
9	139 71	280.28	184	61	45	453	0.68 6	-	
10	178.44	357.69	50	55	44	424	0.65 a	- 1	
11	185.72	372.24	360	80	58	624	0.97 a	- 1	
12	198.26	397 31	216	76	58	621	0.98 a	- 1	
13	202 53	405 83	51	72	58	621	0.90 1	- NET< C	T.
14	205 80	412 36	51	54	43	414	0.68		
15	238 54	477 80	320	70	50	495	0.88 a	3	
16	241.93	484 57	42	44	35	297	0.52 1	~ ר	
17	295 03	590 68	121	67	52	497	1.06 a	7	
18	351.93	704.37	224	72	54	497	1.11 =	1	
19	511 10	1022 35	1699	128	80	825	2.47 #	a Wide P	k
20	537 50	1075 25	1000	20	21	214	0.84		
20	557.50	1117 06		57	47	322	1.52 #	 a	j.
22	220.27	1130 70	27 4 60	61	40	410	1.47 =	-	
22	593.03	1166 76	144	54	40	321	1.26		
23	505.4V 609 27	1219 /2	170	κa 20		480	1.54	-	
<u>4</u> 4	002.27	1210.43 Dage 001	1 I I	0.2		200	2.01 (-	

063142D08.SPC Analyzed by

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			PI	EAK SEARCH F	RESULTS						
====											
PK.	ENERGY	ADDRESS	NET/MDA	UN-	C.L.	BKG	FWHM				
#	(keV)	CHANNEL	COUNTS	CERTAINTY	COUNTS	COUNTS	(keV)	FLAG			
25	670.16	1340.03	39	41	32	219	0.96 a	 1			
26	691.87	1383.38	35	34	26	168	0.73 a	a Wide Pk			
27	694.16	1387.96	145	88	70	630	2.45 1	o			
28	726.90	1453.34	36	42	33	218	1.12 a	a.			
29	803.21	1605.70	156	53	38	270	1.65 a	a			
30	898.82	1796.57	47	38	29	178	1.35 a	4			
31	911.55	1821.98	58	42	33	207	1.54 a	1			
32	962.38	1923.43	39	53	42	296	2.02 a	A NET CI			
33	1460.99	2918.19	175	41	26	128	1.76 a	1			
34	1765.56	3525.39	54	35	26	104	2.88 a	1			

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063142D08.SPC Analyzed by

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.

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Gamma Spectroscopy

Quality Control Data

Daily Instrument Performance Checks

1



0126 A TT JT. 1380 Senhourd Industrial Boulevard Atlantia Georgia 30318 414 35246.77 12.29.9 Secol

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 gammaray 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, Februarry, 1979.

Calibration date: October 1, 1994 12:00 EST

			· · ·	
ISOTOPE	, GAMMA-RAY ENERGY	HALF-LIFE	GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241 Cd-109 Co-57 Ce-139 Hg-203 Sn-113 Cs-137 Y-88 Co-60 Co-60 Y-88	59.5 88 122 166 279 392 662 898 1173 1332 1836	$\begin{array}{ccccccc} 432 & y \\ 462.6 & d \\ 271.79 & d \\ 137.64 & d \\ 46.595 & d \\ 115.09 & d \\ 30.0 & y \\ 106.63 & d \\ 5.2714 & y \\ 5.2714 & y \\ 106.63 & d \end{array}$	$ \begin{array}{r} 1759\\ 2622\\ 1472\\ 2037\\ 3978\\ 2862\\ 1735\\ 7290\\ 3347\\ 3355\\ 7630 \end{array} $	5,0 4,5 4,2 4,6 4,5 4,7 4,7 4,7 4,4 4,3 4,8 4,3

50,8520 grams solution 4M HCl. P O NUMBER 45864, Item 1 SOURCE PREPARED BY: Radiochemist Цĥ 12-23-94 Q A APPROVED:

This standard will expire one year after the calibration date.

ATT ID ORG

Acalytics, Ene. 1380 Senbourd Industrial Doulevard 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 88 122 166 279 392 662 898 1173 1332 1836	2.0 1.5 1.6 2.1 1.5 1.9 1.9 1.4 1.5 2.0 1.2	•	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
· · ·			

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 Galihersburg, 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,

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J.M. Robin Hutchinson, Acting Group Leader Radioactivity Group Physics Laboratory (over)

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1.4	Sn-113	392	2862	0,64	9	50	. 4	100	)	95.3	5	953	5 7	95) - 771	348 074	ፈ 1	29.0 38.8	163	.1
Ì	Cs-137	662	1735	0.851	2.	50	4	100	)	44."	 >	440 1887	6	168	760	5	83.2	624	.4
	Y-88	898	7290	0,93	4	50 50	4	101 101	ן ר	750,0	4	723	7	72	368	2	67.8	267	.8
	Co-60 Co-60	1173 1220	- 3347 3355		1 1	50 50	4	10	) D	72.	5	725	64	72	541	2	68.4	268	3.4 1 2
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## Gamma Spectrometer Calibration Log

Date: 11/2/06

Reviewed By/Date: JP 11206

		Backg	round		Source (	Check	Repeat Source Check				
Det.	Out Of Service	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					·				<u> </u>	
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12.											

** Corrective Action:

<u>318719 A</u>

Form 754r11a.doc (6/13/2005)

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#### 062625D06.SPC Analyzed by

#### 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	n Value	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></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.	

		TT.	2		
	062626D06.SPC A	nalyzed by 🔾			
****	*****	********	******	*******	******
SEE	KER DETECT	OR Q.C.	ANA	LYSIS	Version 2.2.2
****	*****	*****	*****	******	******
тр.	DATLY CHECK				
Doto	ator # 6 Detector 0 C	Analygig for	11/02/2	006 08.07.	01
Dece	denda Tilo #. 08 (Deile	Analysis tor	11/02/2 Shaala 40		21
Scan	dards File #: 98 (Darly	Periormance C	neck 49	500-307)	
					· <u> </u>
		n	Sigma	Bounds	T-
#	Parameter	Value	Test	Test	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 .
ă	1332 keV Efficiency	9 3718-03	NA	Daga	ΝΔ
	1925 VEA FILICIENCA	9.3/IE-03	TA'NY'	rass	N.A.

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#### Gamma Spectrometer Calibration Log

Date: 11 3 0

Reviewed By/Date: JP 113/06

		_Backs	round		Source	Check		Repeat S	ource Check	
Det. No.	Out Of Service	Stærted	OK	Started	OK	Failed Parameter(s)	ок	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
· 1.	JP			_	<u> </u>					
2.				JP	JP					<u></u>
3.	F				$\square$					
4.	JP	$\sim$								
5.	JP									
6.				JP	JP					
7.	TP								· .	
8.				JP		1332 Centrard	Æ		- ····	
9.				JP	H	662 FWHM	H			
10.	JP									
11.										
12.										

.** Corrective Action:

318721 A

Form 754r11a.doc (6/13/2005)

**	062542D02.SPC	Analyzed by	JP	ada ala ala da da da ala ata ana se		
s **	EEKER DETEC	TOR Q. C	. A N A	LYSI *****	5 Version	**************************************
ID De St	): DAILY CHECK etector # 2 Detector Q.C andards File #: 98 (Dail	. Analysis f y Performanc	or 11/03/2 e Check 49	006 06:54: 500-307)	:58	
#	Parameter	Value	n Sigma Test	Bounds Test	T- Test	
	1 60 keV Centroid	120.471	N.A.	Pass	N.A.	

8.471E-01 N.A.

1.297E-02 N.A.

2.131E-02 N.A.

1.067E-02 N.A.

N.A.

N.A.

N.A.

N.A.

1323.814

2664.197

1.745

2.713

Pass

Pass

Pass

Pass

Pass

Pass

Pass

Pass

N.A.

N.A.

N.A.

N.A.

N.A.

N.A.

N.A.

N.A.

Page 001

2

3

4

5

6

7

60 keV FWHM

662 keV FWHM

8 1332 keV FWHM

60 keV Efficiency

662 keV Centroid

662 keV Efficiency

1332 keV Centroid

9 1332 keV Efficiency

## 062635D06.SPC Analyzed by TP

	062635D06.5PC A	maryzed by UI			
****	*****	*****	******	******	******
SEE	KER DETECT	OR Q.C.	ANA	LYSIS	Version 2.2.2
****	*****	*****	******	******	* * * * * * * * * * * * * * * * * * * *
TD:	DAILY CHECK				
Dete	rate = 6 Detector 0.C.	Analysis for	11/03/2	006 06:55:	13
Cton	darde File #, 98 (Daily	Performance C	,, - heck 49	500-307)	
ocan	dards File #: 50 (baily				
		۳	Sima	Bounda	· Ψ_
н	Demonstran	II Voluo	Toat	Toat	Toat
Ħ	Parameter	varue	TEBL	TEBC	1650
	Co how Controid	120 119	N λ	Dagg	N 7
<u>ـ</u> ـــــــــــــــــــــــــــــــــــ	60 Kev Centroru	120.110	N.A.	Fass	M.A.
2	60 KeV FWHM	8.1488-01	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.
•					

#### Gamma Spectrometer Calibration Log

Date: 11 4 06 .

Reviewed By/Date: TP 11.406

ĺ	ļ	Backg	round	Source Check		Repeat Source Check				
Det. No.	Out Of Service	Started	OK	Started	OK.	Failed . Parameter(s)	OĶ	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP				/.	·		• • •	•	
2.				JP	JP					·
3.	JP.		_	/						
4.	JP.							· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
5.	JP				/	×			·,	
б.				CTP.	JP					
7.	JP									
8.				OP	JP			· ·		
9.				JP	JP					
10.	JP							···· · · · · · · · · · · · · · · · · ·		
11.				-	د <u>م</u>					<u>·</u>
12.							·			

#### ** Corrective Action:

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Form 754r11a.doc (6/13/2005)

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#### 062550D02.SPC Analyzed by

#### ID: DAILY CHECK

Detector # 2 Detector Q.C. Analysis for 11/04/2006 09:49:55 Standards File #: 98 (Daily Performance Check 49500-307)

		<b></b>	.~~			
#	Parameter	n Value	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.	
З	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.	

### Gamma Spectrometer Calibration Log

Date: 11506

Reviewed By/Date: JP 11506

Repeat Source Check Source Check Background Corrective Action Taken ** Failed Removed · Failed Out Of Det. from Service OK Parameter(s) OK. OK Parameter(s) Started Started No. Service JP 1. ۰. TP 2. 7 . JV 3. • 4. 5. JP D 6. . : • TD 7 P J Л 8.; ÷ 662 FWHM D T 9. TP 10. 11. 12.

.** Corrective Action:

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Form 754r11a.doc (6/13/2005)

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	062553D02.SPC A	nalyzed by J	)		
****	*****	*******	******	*******	* * * * * * * * * * * * * * * * * * * *
SEE	KER DETECT	OR Q.C.	ANA	LYSIS	Version 2.2.2
****	* * * * * * * * * * * * * * * * * * * *	*****	******	******	* * * * * * * * * * * * * * * * * * * *
ID:	DAILY CHECK				
Dete	ctor # 2 Detector Q.C.	Analysis for	11/05/2	006 09:01:	31
Stan	dards File #: 98 (Daily	Performance C	heck 49	500-307)	
		n	Sigma	Bounds	т-
#	Parameter	Value	Test	Test	Test
	60 keV Centroid	120 419		 Dogg	NT 7
2	60 kev centroid	0 261E A1	111.A1.	Pass	N.A.
- 4		0.301E-UI	N.A.	Pass	N.A.
د	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.

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063146D08.SPC Analyzed by JT DETECTOR Q.C. ANALYSIS Version 2.2.2 SEEKER ID: DAILY CHECK Detector # 8 Detector Q.C. Analysis for 11/05/2006 08:55:13 Standards File #: 98 (Daily Performance Check 49500-307) n Sigma Bounds T-Test Test Test Test Test # Parameter Value ______ 

 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.

 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.

Gamma Spectrometer Calibration Log

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Reviewed By/Date:

		Backg	round	Source Check		Repeat Source Check				
Det. No.	Out Of Service	Started	· OK	Started	OK	Failed , Parameter(s)	OK.	Failed Parameter(s)	Corrective Action Taken.**	Removed from Service
1.	Gi.		,				i.			
2. ·				G	SE .					4
3.	9			- <del>O</del> -		·	1	- •		
4.	G			į	- •					•
5.	G	•							•	
6.	0			Q	SI				:4 I .	
7.	Q									
8.				G	SI					
9.				G	ţ,					
10.	A					1				
$11.^{*}$	0					**				
12.										

** Corrective Action:

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Form 754r11a.doc (6/13/2005)

#### 062556D02.SPC Analyzed by

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#### 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	n Value	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.

		$\bigcirc$	×		
	063149D08.SPC #	nalyzed by $\mathcal{Q}$			
****	****	************	******	*******	*****
SEE	KER DETECT	COR Q.C.	ANA	LYSIS	5 Version 2.2.2
****	****	**********	******	*******	*********************
<b>T</b> 72	DATEX OURCE				
ID:	DAILI CHECK	Analygig for	11/06/2	006 09.17	24
Dece	dorde File #, 98 (Dails	, Analysis IOL , Derformance (	TI/VO/2 book 49	500-307)	24
otan	Qards File #: 95 (Dari)	· ·····			
		n	Sigma	Bounds	Т-
#	Parameter	Value	Test	Test	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.

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