C-INC and HSR-4
ANALYTICAL SERVICE AGREEMENT
FY 2003

1.0 PURPOSE

1.1 This Analytical Service Agreement (ASA) documents the requirements, products, and services to be provided by C-INC Analytical Organizations for plutonium analysis and data reporting for the Bioassay Project urine samples for HSR-4. By entering into this agreement, HSR-4 and C-INCs commit to meeting the LANL Radiation Protection Bioassay Program monitoring needs in a cost effective, efficient, accurate, well documented, and timely manner, as specified in this agreement.

1.2 The ASA will be updated annually. The existing ASA will stay in effect until the new version is signed by the Project Leaders. Any amendments to this ASA will be consistent with the change control process as identified in the Project Management Plan.

1.3 C-INC will be in full compliance with the requirements of the ASA by January 2, 2003 unless otherwise noted.

2.0 PROGRAM EVALUATION

2.1 Program Measurements

2.1.1 The program measurements are the criteria used in evaluating the quality of the analytical services procured through C-INC. HSR Division may pursue outsourcing the bioassay analytical work to an outside contractor based on cost, quality, and failure of C-INC to meet the requirements of the ASA.

2.1.1.1 There will be effective, timely, and responsive communications between the C-INC Bioassay Project Leader and the HSR Bioassay Project Leader. The C-INC Bioassay Project Leader and HSR Bioassay Project Leader will meet on a bi-weekly basis to discuss project issues. Monthly, the C-INC Budget Analyst will attend to provide monthly and projected budget information, and the QA Officer will attend to present QC reports as detailed in section 5.6.

2.1.1.2 There will be completion and implementation of all milestones, measureables, and requirements as indicated in this ASA and all documents referred to within the specified time requirements.

2.1.1.3 There will be successful implementation and completion of corrective action plans as determined by any audit and assessment findings, performance evaluations, and out of control quality control issues, in a timely fashion.

2.1.2 There will be continued participation in the Department of Energy Laboratory Accreditation Program (DOELAP) process, with continued accreditation every 3 years

2.1.3 HSR-4 will contract for a formal program evaluation to be performed during the FY03 annual audit.

2.1.4 C-INC will strive for continued cost reductions and system improvements as agreed upon by the HSR-4 and C-INC Project Leaders.

3.0 GENERAL REQUIREMENTS

3.1 Analytical Specifications

3.1.1 The analytical specifications are identified in Table 1.

3.1.2 Data quality will be evaluated as a function of data precision and bias as defined in sections 5.4 and 5.5.

3.2 Payment for Services

3.2.1 C-INC will be paid on a per (HSR-4 issued) sample basis through the Bioassay Recharge mechanism owned by HSR-4. Revenues for C-INC (below) will be collected through the recharge mechanism when the samples are submitted to C-INC.

3.2.2 C-INC will analyze all samples submitted at the sample analysis rates below. C-INC and HSR-4 will be allocated funds as the revenues are collected.

Type of analysis	C-INC Sample Analysis Rate
Pu- RAS	$450
Pu- TIMS	$1,575

3.2.3 Costs accumulated on the X7CE account code cannot exceed the revenues collected on the X7CG account code by year's end. If a negative variance occurs, the division responsible for the negative variance will be required to cover the variance at year's end.

3.2.4 Laboratory organizations will be credited the C-INC sample analysis rate for any circumstance caused by C-INC requiring HSR-4 to re-sample the individual.

3.2.5 A priority adder of 200% will added to the cost of the sample for priority1.

3.3 Sample Capacity and Turn Around Times

3.3.1 The following sample capacity levels have been defined by C-INC for each analyte, and define the analysis capabilities at the current level of funding and effort for FY03.

Analyte	Sample Capacity
Plutonium- RAS	2500-3000
Plutonium – TIMS	700- 1000

3.3.2 C-INC will meet the required data turn around times for sample transfer to analyst, analysis completion, and electronic and hard copy submissions as indicated in Table 2 for all priority classifications (defined in section 3.4).

3.3.3 Any anticipated delays in the turn around times requested by HSR-4 in Table 2 will be communicated to HSR-4 30 days in advance of the expected delay or as soon as possible.

3.3.4 C-INC shall provide adequate backup capability (both personnel and equipment), to perform contracted analyses within the agreed turn around times required in Table 2.

3.4 Definition of Priority Classifications and Requirements:

3.4.1 Priority 1 samples are emergency and incident related samples requiring the utmost attention and analysis urgency and will proceed through the analysis process without delay.

3.4.1.1 HSR-4 will notify C-INC of priority 1 samples for Pu analysis by using the CSTPU e-mail server alias.

3.4.1.2 If a priority 1 sample results indicate a low recovery of the tracer based on alpha spectroscopy and TIMS analysis is requested, the analyst will go forward with the TIMS analysis regardless of the recovery. Re-sampling decision will be made between HSR-12 Dose Assessment and the HSR-4 Bioassay Team.

3.4.1.3 Analysis completion, preliminary, and final data will be available to HSR-4 as indicated in Table 2.

3.4.2 Priority 3 samples are the routine samples.

3.4.2.1 Priority 3 samples will be submitted to the C-INC sample management office by 4:30 pm each day.

3.4.2.2 Analysis completion and final data will be available to HSR-4 within the times indicated in Table 2.

3.4.2.3 Reporting of preliminary data is not required for priority 3 data, unless "immediate notification" results, as specified in section 3.5 and Table 3, are identified.

3.5 Immediate Notification Requirements

3.5.1 High sample results will require an immediate reporting of the preliminary data to HSR-4 at the earliest confirmation of the high result, but not to exceed 2 hours after initial data review by the analyst.

3.5.2 The levels requiring immediate notification are indicated in Table 3.

3.5.3 Reporting of preliminary results will comply with the requirements identified in Electronic Data Deliverables, section 6.2.

3.5.4 Final results for high sample results will follow the required turn around times as indicated in Table 2.

3.6 Minimum Sample Volumes

3.6.1 C-INC will analyze all samples regardless of the total sample volume, unless the sample is empty.

3.6.2 If the sample volume is below the required sample volume for analysis, the minimum sample volumes to be determined by C-INC and communicated to HSR-4, deionized water of known purity will be added to bring the total sample volume to the minimum volume required.

3.6.3 Any time that deionized water is added to the sample volume to bring the total sample volume, a problem code of "ISV" will be entered in the field designated as problem code for that sample, in the C-INC LIMS system. Problem codes are defined in Appendix 1- Data Acceptance Document.

3.6.4 If the sample is empty, C-INC will use the " NSS" problem code.

3.7 Out of Scope Work

3.7.1 C-INC shall not enter into any contract for the analysis of LANL bioassay sample with an outside organization or company.

3.7.2 Any sample analysis requests outside the scope of this document will be negotiated between the respective Bioassay Project Leaders, and documented in compliance with the change control procedure.

3.8 Work Suspension Process

3.8.1 Need for a work suspension will be evaluated when an out of control situation, as identified in sections 5.4 and 5.5, affects one or more batches of samples.

3.8.2 A work suspension can only be called by the HSR Project Leader, the C-INC Project Leader, or the Bioassay QA Officer if there is any evidence of an out of control situation.

4.0 QUALITY ASSURANCE REQUIREMENTS

4.1 Program Quality Management

4.1.1 The Bioassay Project will be defined and guided by the C-INC Bioassay Project Management Plan (PMP), which includes a quality assurance project plan (QAPjP). All personnel involved in the Bioassay Project will maintain a current copy of the PMP, and be knowledgeable on applicable aspects of the document. Any revision of the PMP will be submitted to HSR-4 for review.

4.1.2 C-INC shall ensure that all aspects of the Quality Program Documents for the C-INC Bioassay Project are compliant with the following requirements documents, and fully address the 10 criteria for quality management.

- 4.1.2.1 10CFR835
- 4.1.2.2 10CFR830.120
- 4.1.2.3 DOE Technical Standard 1112-98 "Department of Energy Laboratory Accreditation Program for Radiobioassay"
- 4.1.2.4 ANSI N13.30-1996 "Performance Criteria for Radiobioassay"
- 4.1.2.5 LANL Quality Assurance Management Plan, LPR 308.00-00.0
- 4.1.2.6 LANL Radiation Protection Program
- 4.1.2.7 LIMS Quality Assurance Plan/Program Management Plan (C-AAC)

4.2 Program Audits

4.2.1 An annual audit of the C-INC Bioassay Project will be initiated and performed by HSR-4. The scope of this audit will include compliance to the ASA, PMP, QAPjP, and related quality documents, management systems, performance, surveillance (bench level), data, and calculations.

4.2.2 The timing of the annual audit will be determined by the HSR Bioassay Project Leader. C-INC will be provided with the date and scope of the audit 30 days prior to the audit.

4.2.3 Corrective action plans will be created, implemented, and completed by C-INC for all audit finding deficiencies and concerns, as defined in the C-INC Bioassay QAPjP.

4.3 DOELAP

4.3.1 C-INC is required to meet and maintain the requirements of the Department of Energy Laboratory Accreditation Program (DOELAP).

4.3.2 C-INC must successfully maintain accreditation for all bioassay programs through analysis of PE samples and an on site assessment every 3 years.

5.0 QUALITY CONTROL REQUIREMENTS

5.1 Quality Control Materials

5.1.1 Quality control materials will consist of blind QC samples, urine blanks, and internal tracers (where applicable).

5.2 Quality Control Sample Rates

5.2.1 Blind QC samples will be included into bioassay submissions at a minimum rate of 1 blind QC sample per 20 samples.

5.2.2 Matrix Blank

5.2.2.1 A single urine blank will be used for all plutonium submissions.

5.2.3 Internal tracers will be added to bioassay samples for all RAS analyses. The internal tracers used will be out of the analyte(s) of concern region of interest, and within a range technically acceptable for the analytical procedure and the MDA for that process.

5.2.3.1 Pu-242 will be used as the tracer for all plutonium analyses.

5.3 Quality Control Spike Levels

5.3.1 For alpha spec and thermal ionization mass spec the QC spike levels are defined in Table 4.

5.3.2 Pu-239 and Pu-240 spike levels will be based on the TIMS MDA for that isotope.

5.4 Precision Acceptance Criteria

5.4.1 Acceptance levels for the QC samples will be the following.

5.4.1.1 Blind QC samples spiked at greater than 10 times the MDA will have relative precision less than or equal to .40, as defined in ANSI N13.30.

5.4.1.2 The precision related to tracer results will be provided to HSR-4 for this fiscal year, and it's use as a quality management tool will be evaluated for the future.

5.4.2 Out of control precision measurements will be tracked by the QA Officer, and will be evaluated using the criteria defined in the C-INC QAPjP.

5.5 Bias Acceptance Criteria

5.5.1 Each quarter the relative bias will be computed for the last 30 relevant samples or the quarterly average (whichever gives the largest number of samples) for matrix blanks, using the relative bias method defined in ANSI N13.30. Bias values for the matrix blanks will be considered in control if the

Average < 0.05(MDA) and

St Dev. < 0.2(MDA).

5.5.2 Blind QC samples spiked at greater than or equal to 10 times the MDA will be considered in control if the relative bias is greater than or equal to -0.25 and less than or equal to +0.25, using the relative bias method defined in ANSI N13.30.

5.5.3 Tracer recovery results will be evaluated in the following manner:

In control for RAS if tracer recovery >= 40% or <= 110%

In control for TIMS if tracer recovery >= 15% or <=110%

Out of control for RAS if tracer recovery < 40% or >110%

Out of control for TIMS if tracer recovery <=15% or >=110%

5.5.3.1 Samples with out of control tracer results will be re-sampled.

5.5.3.2 Out of control matrix blanks will be excluded from bias and MDA calculations.

5.5.4 The frequency and quantity of out of control bias measurements will be tracked by the QA Officer, and will be evaluated using the criteria defined in the C-INC QAPjP.

5.5.5 Samples with less than 15% tracer recovery that are scheduled for TIMS will have the TIMS portion of the analysis cancelled and required data fields reported with a problem code of "LR" EXCEPT for priority 1 samples, which will be analyzed, regardless of tracer recovery.

5.6 Quality Control Communications

5.6.1 Monthly quality control reports will be supplied to HSR-4 by the QA Officer at a monthly meeting with the HSR and C-INC project leaders. The report will consist of a quality evaluation of the Bioassay Project, to include:

1). A summary report of all tracer recover data for Pu with the total number of samples, the mean recovery, the standard deviation of the mean recovery, and the percentage of samples meeting the acceptance criteria between 40% and 110%. Each month, the preceding month's recovery data shall be added to a cumulative recovery plot. The cumulative plot should show approximately one year of data for comparison.

2). A histogram of all the blank urine matrix data for Pu, including data from FY00 when all matrix blanks were transitioned to real urine. Separate histograms should be shown for RAS and TIMS.

5.6.2 Quarterly quality control reports shall be supplied to HSR-4 by the QA officer at the appropriate monthly meeting with the HSR and C-INC project leaders. The quarterly report shall resemble the monthly reports, with the addition of the following:

1). A summary of quarterly non-conformance reports (NCR), corrective action reports (CAR), and work suspension reports (WSR).

2). All data described in 5.6.1-1), above, but for the entire quarter.

5.6.3 Annual quality control reports shall be supplied to HSR-4 by the QA officer at the appropriate monthly meeting with the HSR and C-INC project leaders. The annual report shall consiste of a quality evaluation of the Bioassay Project, to include:

1). An annual summary of all QC data organized by QC sample number including QC spike level, result measurement, % bias, and running % precision (over time, per QC sample number). Additionally, bias should be tracked using a bias histogram that tracks bias across submission ID's. This should be done for each analyte and each technique.

2). A determination of MDA for each analyte and each technique.

3). A QA program summary including a discussion of all NCR's, CAR's, WSR's, and results of any program audits conducted over the past year.

5.7 Calibrations

5.7.1 Automatic pipettes, analytical balances, and other instruments requiring calibration will have calibration requirements documented in the C-INC Biossay Project QAPjP.

5.7.2 All instrument calibration notebooks shall be referenced in the data packages.

5.8 Performance Evaluation Programs

5.8.1 The C-INC Bioassay Project will participate in the following performance evaluation (PE) programs:

- Oak Ridge Performance Evaluation on Urine- Semi-annually for plutonium.
- Department of Energy Laboratory Accreditation Program for Radiobioassay Performance Evaluation Samples, as required for accreditation.
- NIST Low Level Inter-comparison of ICP-MS, TIMS, and Fission Track Methods for ^{239}Pu in synthetic urine (when offered).

5.8.2 All results of Inter-comparisons and Performance Evaluations of Radiobioassay samples will be formally transmitted to HSR-4 within 10 days of receipt of results by C-INC.

5.8.3 PE sample results exceeding the required measurement bias, as stipulated by the PE program, will be tracked by the QA Officer. Follow up actions will meet the requirements of the C-INC QAPjP.

5.9 Reference Material Traceability

5.9.1 All chemical standards will be NIST or IRMM traceable.

5.9.2 Traceability will be documented in the data packages.

5.10 Analysis of Duplicate Samples

5.10.1 ANSI N13.30-1996 suggests the periodic analysis of replicate samples. Restrictions on required MDA's and volume concerns do not allow for replicate samples. C-INC, therefore, is not required by the terms of this ASA to perform duplicate analyses.

6.0 DATA DELIVERABLES

6.1 Data Acceptance Criteria Document

6.1.1 All data acceptance criteria will be documented in 'Data Acceptance Criteria Document- HSR-12-DAC-00.01'(DAC), a companion document to the ASA. The portions of the DAC referring to americium, fecal, tritium and uranium analyses do not currently apply to C-INC.

6.1.2 The DAC documents the specific fields/components required for each analyte and technique, a description of the field/component, and the required formula for calculated fields/components.

6.1.3 Changes to data acceptance criteria will be evaluated on an as needed basis, and implemented through the change control process.

6.1.4 Once the ASA has been signed, there will be no exceptions to the field requirements in the DAC. All data fields will become mandatory fields within the C-INC templates, and will also become part of the hard copy reports. Required fields left as empty will not be accepted.

6.2 Preliminary Data Report

6.2.1 Preliminary data will be sent to HSR-4 for all data meeting or exceeding the reporting criteria in Table 3 for any analyte.

6.2.2 A record will be reported for each isotope measured.

6.2.3 Reporting of preliminary data will consist of the following data items; HSR-4 kit number, C-INC sample ID, C-INC submission ID.

6.2.4 All preliminary data reports shall be transmitted by email to the "ESHDOSE" email alias. The HSR-4 and HSR-12 contact list is contained in that email alias and will be maintained by HSR-4.

6.3 Data packages

6.3.1 All archival records will be maintained by C-INC with retention times and data storage criteria as defined in ANSI N13.30 and DOE 1324.2A (Records Retention Schedule) of 75 years.

6.3.2 Data Packages shall contain at a minimum:

- Case Narrative for each submission
- Service Agreement (w/documentation of HSR-4 chain of custody)
- Final Data Report, meeting all requirements of the DAC
- Laboratory Bench Sheets, with a sample of any manual calculations, if done
- Documentation of C-INC chain of custody (Sample management to analyst, and all analyst to analyst sample transfers)
- Spectral and Channel Outputs for RAS data
- Individual counter efficiencies and backgrounds for RAS data
- Notebook reference for NIST traceability calibration standards, or equivalent.
- Notebook reference for required pipet, analytical balance, and instrument calibrations.
- Reference to documentation of the most recent applicable MDA study results.
- Procedure reference to all equations used to calculate MDA or sample results.

6.4 Availability of Electronic Data

6.4.1 Login and result reporting turn around times in Table 2 will be considered met when data are made available for transfer to HSR-4.

6.4.2 The following sample conditions shall be identified prior to transfer to HSR-4. For login data, a status of 'Logged' and a condition of 'On-line' is required. For results data, a Submission Method fields QC date, and at the task level, a condition of 'Approved' and a status of 'Completed or Suspect' is required.

6.4.3 For all samples having problem codes of LIA, ABORT, LR, TNN (TIMS), 240NM (TIMS), NSS, OTHER, where no numerical data will be reported, a condition of 'Approved' and a task level status of 'Active' will be required.

6.4.4 Correction of all suspect login data will be made within 3 working days of written notification (e-mail or fax) to C-INC by HSR-4. The QA Officer will be the point of contact for the resolution of suspect login data.

6.4.5 Correction of all suspect result data will be made within 7 working days of written notification (e-mail or fax) to C-INC by HSR-4. The C-INC Project Leader and QA Officer will be the points of contact for the resolution of suspect login data.

6.5 Electronic Data Extraction

6.5.1 Two or more HSR-4 data extraction batch programs will run every night on the CLSCMR computer. HSR-4 access to the CLSCMR computer (to include Oracle) is required.

6.5.2 C-INC is responsible for managing the code necessary for the electronic data extraction for the current SQL*LIMS system, compliant with the Electronic Data Deliverable file layouts contained in Table 5.

6.5.3 C-INC will notify HSR-4 of any changes to SQL*LIMS effecting bioassay data, compliant with the Change Control Procedure, prior to those changes.

6.6 Electronic Data Back- Up

6.6.1 All C-INC systems maintaining electronic data will have back- up plans on file with HSR-4.

6.7 Data Hand Entry

6.7.1 All hand entry of data will be minimized. The only hand-entered data acceptable for bioassay samples will be bioassay preparation data, to include balance, pipette and specific gravity measurements, and manual data corrections.

6.7.2 C-INC will have all data acquisition and reduction programs electronically linked to data management systems.

Table 1: Analytical Requirements

ANALYTE	MATRIX	TECHNIQUE/ISOTOPES ANALYZED	MDA[1]
PLUTONIUM	URINE	RAS Pu-238 Pu-239	0.010 pCi/sample 0.010 pCi/sample
PLUTONIUM	URINE	TIMS Pu-239 Pu- 240	200 aCi/sample 750 aCi/sample

[1] As defined in the DAC.

Table 2: Required Turn Around Times for Priority Levels

	Login data available for extraction by HSR-4. Time from HSR-4 sample submission.	**Final data completed. Hard and electronic copy sent to HSR-4. Time from HSR-4 sample submission.
Priority 1- Plutonium RAS TIMS	All priority 1 login data will be available in 1 day from C-INC receipt of the sample.	8 days 14 days
Priority 3- Plutonium RAS TIMS	All priority 3 login data will be available within 1 day of sample submission to sample management.	25 days 35 days

**Note: All days are indicated as working days.

Table 3: Levels Requiring Two Hour Notification** to HSR-4

Analyte	Level
Pu-238/239 (RAS)	0.10 pCi/sample

** Note: 2 hours from time of preliminary data review by the analysts.

Table 4: QC Spike Level Activities in fCi

Analyte	Category 1	Category 2	Category 3
Pu-238	100 – 200	100 – 200	100 – 200
Pu-239	100 – 200	1.5 – 3	32 – 43
Pu-240	5 – 10	100 – 200	118 – 187
Pu-239+Pu-240	100 – 200	100 – 200	150 – 200

Table(s) 5: Electronic Data Deliverable File Layouts

Login File: fixed format of 139 bytes

Begin Column	End Column	Column Length	Column Name	Comments
1	9	9	Sample id	Laboratory tracking number.
11	20	10	Kit number	A number matching kit number in our tables or less than 1 (I.e. 0.43295) indicating qc sample
22	27	6	Matrix	The sample matrix, where first letter is one of 'U' for urine, 'W' for water
29	36	8	Rec Type	one of 'BLIND QC', 'OPEN QC', 'CUSTOMER', 'METHOD B'
38	48	11	Login date	format dd-mmm-yyyy
50	60	11	collected date	format dd-mmm-yyyy
62	70	9	submission id	The sample batch number
72	81	10	method id	one of 'LS', 'RAS', 'DNA', 'PHW', 'TIMS', 'UNK'
83	112	30	compid	text naming component (see ** below)
114	123	10	kitno	duplicate of kit number - no longer needed except by program which hasn't been modified
125	135	11	due date	format dd-mmm-yyyy
137	137	1	priority	either '1' or '3'

Results data: fixed format of 132 bytes

Begin Column	End Column	Column Length	Column Name	Comments
1	9	9	submission id	The sample batch number
11	19	9	sample id	Laboratory tracking number.
21	29	9	kit number	A number matching kitnumber in our tables or less than 1 (I.e. 0.43295) indicating qc sample
31	31	1	matrix	The sample matrix, where first letter is one of 'U' for urine, 'W' for water
33	37	5	method id	one of 'LS', 'RAS', 'DNA', 'PHW', 'TIMS', 'UNK'
39	68	30	compid	text naming component (see ** below)
70	79	10	result	number or text depending on compid
81	95	15	units	text
97	111	15	analyst	currently must be z-number/employee number - will have to change
113	120	8	rec type	one of 'BLIND QC', 'OPEN QC', 'CUSTOMER', 'METHOD B'

Results constants data: fixed format of 482 bytes

Begin Column	End Column	Column Length	Column Name	Comments
1	9	9	submission id	The sample batch number
10	18	9	sample id	Laboratory tracking number.
19	27	9	kit number	A number matching kit number in our tables or less than 1 (i.e. 0.43295) indicating qc sample
28	36	9	count time	
37	51	15	ct units	Count time units
52	60	9	detector number	
61	69	9	efficiency	
70	78	9	efficiency unc	Uncertainty of the efficiency
79	87	9	f-factor	
88	102	15	ff-units	f-factor units
103	111	9	f-factor-uncertainty	f-factor uncertainty
112	126	15	ffu-units	f-factor uncertainty units
127	135	9	mass	total sample mass
136	150	15	mass-units	
151	159	9	mass-analyzed	sample mass analyzed
160	174	15	ma-units	mass analyzed units
175	183	9	sample temperature	
184	198	15	st-units	sample temp units
199	207	9	specific gravity	

Begin Column	End Column	Column Length	Column Name	Comments
208	222	15	sg-units	sp. grav units
223	231	9	tracer dpm	
232	246	15	td units	tracer dpm unit
247	255	9	tracer uncertainty	
256	270	15	tu units	
271	279	9	volume	
280	294	15	vol-units	
295	295	1	matrix	The sample matrix, where first letter is one of 'U' for urine, 'W' for water
296	300	5	method id	one of 'LS', 'RAS', 'DNA', 'PHW', 'TIMS', 'UNK'
301	308	8	analysis date	yyyymmdd
309	316	8	rec type	one of 'BLIND QC', 'OPEN QC', 'CUSTOMER', 'METHOD B'
317	361	45	instrument	instrument id number for tracking
362	406	45	notebook	reference to notebook if used.
407	416	10	problem code	see DAC for defined problem codes
417	456	40	procedure code	procedure number indicating procedure that is currently being followed
457	462	6	team leader	currently must be z-number/employee number - will have to change
463	482	20	operation	Pu Generic Prep, Pu Generic RAS, Pu Generic TIMS

** Valid Compids:

Login	Results
PU-238	PU-238
PU-239	PU-238 BACKGROUND COUNTS
PU-239+240	PU-238 BACKGROUND SD
PU-240	PU-238 GROSS COUNTS
PU-240/239 AR	PU-238 MDA
PU-242T RECOVERY	PU-238 SD
	PU-239 (and blank corrected for TIMS)
	PU-239 BACKGROUND COUNTS
	PU-239 BACKGROUND SD
	PU-239 GROSS COUNTS
	PU-239 MDA
	PU-239 SD (and blank corrected for TIMS)
	PU-239+240 (and blank corrected)

Login	Results
	PU-239+240 SD (and blank corrected)
	PU-240 (and blank corrected)
	PU-240 SD (and blank corrected)
	PU-240/239 AR (and blank corrected)
	PU-240/239 AR SD (and blank corrected)
	PU-242T BACKGROUND COUNTS
	PU-242T BACKGROUND SD
	PU-242T GROSS COUNTS
	PU-242T RECOVERED SD
	PU-242T RECOVERY
	PU-242T SPIKE
	Number of blank measurements for Pu-239
	Average value of blank for Pu-239
	Standard Deviation of blank for Pu-239
	Matrix code for Pu-239
	Number of blank measurements for Pu-240
	Average value of blank for Pu-240
	Matrix code for Pu-240
	Standard Deviation of blank for Pu-240

SIGNATURES:

_____ _____

Dawn Lewis, HSR Bioassay Project Leader Date

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Sandy Wagner, C-INC Bioassay Project Leader Date