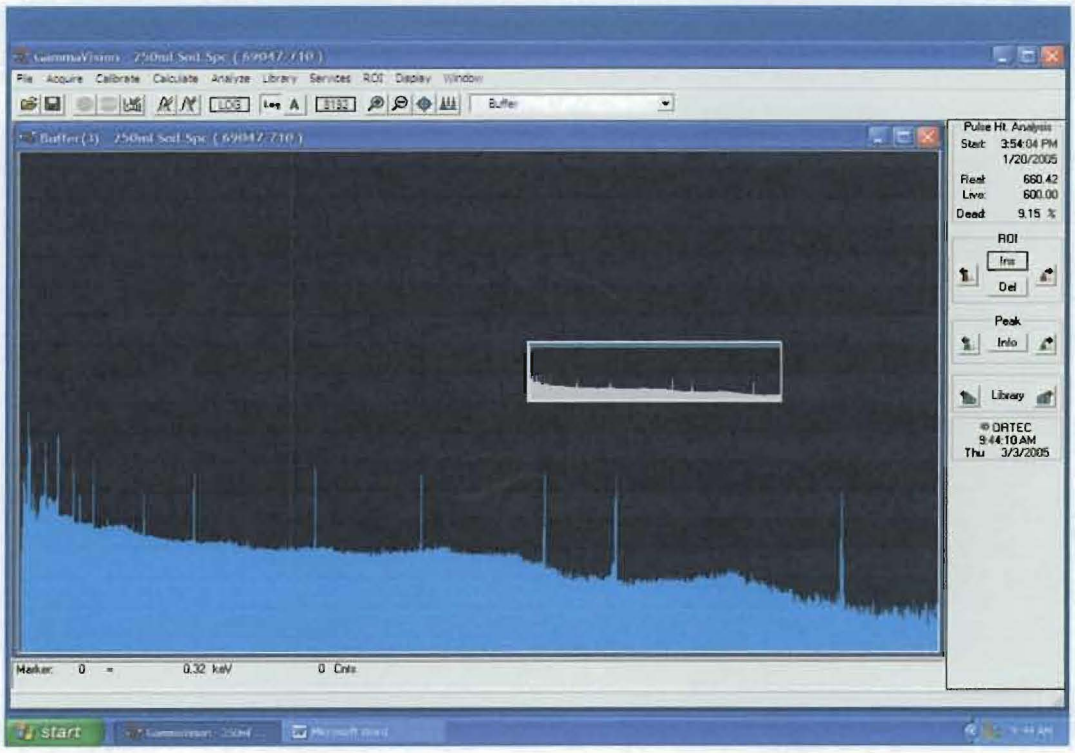
PBRF LABORATORY QUALITY ASSURANCE REPORT

January to December 2008



FIFTH EDITION
March 30, 2009
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TABLE OF CONTENTS

1.0 SUMMARY

1.1 Gamma Spectroscopy Systems

1.1.1 During the report period of January 1, 2008 and December 31, 2008, PBRF Laboratory personnel performed 4190 gamma spectroscopy sample analyses of 3006 samples. PBRF performed a total of 1547 quality assurance analyses. They include:

- 29 blank analyses on 29 samples
- 615 Quality Control (QC) checks
- 615 Background checks
- 15 Cross-check Program sample analyses on 3 samples
- 24 inter-laboratory comparison (replicate) analyses on 12 samples
- 249 intra-laboratory comparison (replicate) analyses on 132 samples

1.1.2 Of all the QA samples that were analyzed on the PBRF Gamma Spectroscopy Systems, there were 4 discrepancies that required documentation of a Sample Deviation Report (SDR).

1.2 Liquid Scintillation Analyzer

1.2.1 PBRF laboratory personnel performed 523 tritium sample analyses during this report period. PBRF performed a total of 1789 analyses of quality assurance (QA) samples. They include:

- 612 analyses on 3 reference standards
- 227 analyses on 227 blank samples
- 454 analyses on 2 background samples
- 454 analyses on 2 QC Check samples
- 8 Cross-check Program sample analyses on 2 samples
- 20 inter-laboratory comparison (replicate) on 20 samples
- 14 intra-laboratory comparison (replicate) on 14 samples

1.2.2 Of all the QA samples that were analyzed on the PBRF Liquid Scintillation Analyzer, there were no discrepancies that required documentation of a Sample Deviation Report.

1.3 Four Sample Deviation Reports were completed as a result of deficiencies found during this report period. Two were associated with MAPEP Series 18 Co-60 failures. Two were failures to attain agreement between intra-laboratory replicate analyses of K-40. These failures were investigated by the Laboratory Manager and corrective actions were documented. Refer to Section 10.0 of this report.

2.0 INTRODUCTION

2.1 This report has been prepared by the PBRF Radiological Laboratory Manager in accordance with PBRF procedure RP-060, PBRF *Radiological Laboratory Quality Assurance/Quality Control Program*. It provides a summary and interpretation of PBRF Laboratory QA Program for the period of January 1, 2008 to December 31, 2008.

3.0 DISCUSSION

3.1 A QA program is an essential part of any radiological monitoring program. It provides reasonable assurance that the results of radiation measurements are valid. To be effective, elements of QA must be evident in all phases of the monitoring program. These include, but are not limited to, sample collection, preservation and shipment, receipt of samples by the laboratory, preparation and analysis of samples and data review and reporting. An effective QA program will allow for the identification of deficiencies in all monitoring processes so that appropriate investigative and corrective actions can be implemented.

3.2 The United States Nuclear Regulatory Commission (USNRC) published Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment", which defines an acceptable QA program. The guidance contained in Regulatory Guide 4.15 and NRC 10CFR50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants" has been adopted by the PBRF Facility. Procedures have been written and implemented to meet the objectives of these position documents.

3.3 Samples are typically analyzed only once because of workload constraints. Therefore, laboratory personnel must be confident in the analytical results which are reported. One means of achieving confidence in the results is through the analysis of QA samples. This report provides the analytical results of various QA samples processed by the PBRF laboratory during this period.

3.4 Quality Control checks are performed on at least 5% of all samples analyzed on the PBRF Gamma Spectroscopy Systems and/or Liquid Scintillation Analyzer. For the purpose of comparing results, these samples may be analyzed in duplicate by an independent laboratory (inter-laboratory comparison) or by PBRF (intra-laboratory comparison) in their entirety or split to perform multiple analyses. The original analytical results are then compared with the replicate analysis results for agreement.

3.5 The PBRF laboratory participates in the United States Department of Energy Mixed Analyte Performance Evaluation Program (MAPEP) and the Eckert & Zeigler Analytics cross check programs. Blind spike samples are sent to the PBRF Laboratory for gamma spectroscopy and tritium analysis approximately twice a year. Results are submitted via the Internet and evaluated for agreement.

3.6 Blank samples are analytical control samples, usually distilled water or verified clean (non-radiological) sand or soil, used to demonstrate that reported analytical results are not the result of Laboratory and/or Sample Processing Facility contamination. They are used to evaluate the entire analytical procedure (sample preparation and analysis) and are prepared at the PBRF Facility for analysis in conjunction with batches or groups of regular samples.

3.7 This report is divided into the following sections:

- Section 4.0 - Laboratory Program
- Section 5.0 - Inter-laboratory and Intra-laboratory Comparison Analysis
- Section 6.0 – Quality Control Checks
- Section 7.0 - Background Determinations
- Section 8.0 - Blank Sample Analysis
- Section 9.0 - Cross-check Program
- Section 10.0 - Laboratory/Sample Deviation Reports
- Section 11.0 - Attachments

Brief discussions and summaries as well as applicable acceptance criteria are included for each section. Analytical results, which did not meet the specified acceptance criteria, are noted and discussed.

4.0 LABORATORY PROGRAM

4.1 The PBRF Radiological Laboratory is designed to support the analytical requirements of decommissioning work activities, environmental program, and Final Status Survey. The laboratory consists of three high resolution gamma spectroscopy units, one liquid scintillation counter, and three gas flow proportional alpha/beta counters. The laboratory is operated by qualified personnel with documented training on all of the laboratory equipment. Sample processing is performed in accordance with site procedures and chain of custody is maintained for all samples. There were no significant laboratory program changes during this period.

5.0 INTER-LABORATORY & INTRA-LABORATORY COMPARISON ANALYSIS

5.1 For this report period, 24 gamma spectroscopy comparison analyses were performed on 12 inter-laboratory samples and 249 gamma spectroscopy comparison analyses were performed on 132 intra-laboratory samples. This equates to approximately 6.5% of the total gamma spectroscopy sample analysis performed during the report period. Two intra-laboratory comparison results were not in agreement and a Sample Deviation Report was completed for each. All of the remaining comparison analyses performed in this period were in agreement.

5.2 Air filter and smear samples are not typically sent to an off site laboratory for gross activity comparison analysis. In addition, the PBRF laboratory does not perform gross activity analysis on water or soil samples. Therefore, no inter-laboratory or intra-laboratory gross alpha/beta comparative analyses were performed during this period.

5.3 For this report period, 14 intra-laboratory tritium comparative analyses were performed on 14 samples and 20 inter-laboratory tritium comparative analyses were performed on 20 samples. This is approximately 6.5% of the total tritium sample analysis performed during the report period. All of the comparative analyses performed in this period were in agreement.

TABLE 1

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-00020	PB08-00021	1/10/2008	Paint Chips	PBRF	K-40	pCi/g	6.78E+02	9.09E+02	3.20E+02	4.0	0.75	YES	N/A
PB08-00020	PB08-00021	1/10/2008	Paint Chips	PBRF	Co-60	pCi/g	8.02E+01	8.10E+01	2.44E+01	7.0	0.99	YES	N/A
PB08-00040	PB08-00041	1/14/2008	Puck	PBRF	K-40	pCi/g	9.40E+00	8.60E+00	2.60E+00	7.0	1.09	YES	N/A
PB08-00040	PB08-00041	1/14/2008	Puck	PBRF	Co-60	pCi/g	1.35E+01	1.32E+01	8.20E-01	33.0	1.02	YES	N/A
PB08-00040	PB08-00041	1/14/2008	Puck	PBRF	Cs-137	pCi/g	2.30E+00	2.70E+00	3.90E-01	12.0	0.85	YES	N/A
PB08-00060	PB08-00061	1/15/2008	Soil	PBRF	K-40	pCi/g	1.35E+01	1.19E+01	1.95E+00	14.0	1.13	YES	N/A
PB08-00080	PB08-00081	1/16/2008	Air	PBRF	K-40	uCi/ml	1.44E-09	1.60E-09	4.30E-10	7.0	0.90	YES	N/A
PB08-00100	PB08-00101	1/17/2008	Soil	PBRF	Co-60	pCi/g	2.50E+02	2.47E+02	8.30E+00	60.0	1.01	YES	N/A
PB08-00100	PB08-00101	1/17/2008	Soil	PBRF	Cs-137	pCi/g	1.40E+04	1.38E+04	4.50E+02	62.0	1.01	YES	N/A
PB08-00120	PB08-00121	1/23/2008	Air	PBRF	K-40	uCi/ml	2.60E-09	2.20E-09	6.90E-10	8.0	1.18	YES	N/A
PB08-00140	PB08-00141	1/28/2008	Puck	PBRF	Ag108m	pCi/g	1.20E+00	1.20E+00	1.50E-01	16.0	1.00	YES	N/A
PB08-00140	PB08-00141	1/28/2008	Puck	PBRF	Cs-137	pCi/g	7.50E-01	9.30E-01	2.30E-01	7.0	0.81	YES	N/A
PB08-00160	PB08-00161	1/28/2008	Water	PBRF	K-40	pCi/g	8.50E-01	9.70E-01	3.40E-01	5.0	0.88	YES	N/A
PB08-00160	PB08-00161	1/28/2008	Water	PBRF	Cs-137	pCi/g	6.80E-01	6.00E-01	9.00E-02	15.0	1.13	YES	N/A
PB08-00160	PB08-00161	1/28/2008	Water	PBRF	Co-60	pCi/g	1.40E-01	1.20E-01	4.00E-02	7.0	1.17	YES	N/A
PB08-00160	PB08-00161	1/28/2008	Water	PBRF	H3	pCi/ml	9.44E+01	8.96E+01	4.22E+00	45.0	1.05	YES	N/A
PB08-00180	PB08-00181	1/22/2008	Water	PBRF	K-40	pCi/g	6.40E-01	7.30E-01	2.60E-01	5.0	0.88	YES	N/A
PB08-00180	PB08-00181	1/22/2008	Water	PBRF	H3	pCi/ml	1.00E+00	4.00E-01	1.00E+00	2.0	2.50	YES	N/A
PB08-00200	PB08-00201	1/30/2008	Air	PBRF	K-40	uCi/ml	7.11E-10	7.00E-10	1.80E-11	79.0	1.02	YES	N/A
PB08-00220	PB08-00221	2/5/2008	Soil	PBRF	K-40	pCi/g	6.10E+00	3.80E+00	1.70E+00	7.0	1.61	YES	N/A
PB08-00220	PB08-00221	2/5/2008	Soil	PBRF	Cs-137	pCi/g	1.00E+00	1.10E+00	2.70E-01	7.0	0.91	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-00240	PB08-00241	2/6/2008	Air	PBRF	K-40	uCi/ml	7.44E-10	8.10E-10	2.00E-10	7.0	0.92	YES	N/A
PB08-00260	PB08-00261	2/6/2008	Soil	PBRF	K-40	pCi/g	2.31E+01	2.10E+01	4.10E+00	11.0	1.10	YES	N/A
PB08-00280	PB08-00281	2/6/2008	Soil	PBRF	K-40	pCi/g	1.35E+01	1.79E+01	2.90E+00	9.0	0.75	YES	N/A
PB08-00303	PB08-00304	2/11/2008	Soil	PBRF	K-40	pCi/g	1.88E+01	1.73E+01	3.20E+00	12.0	1.09	YES	N/A
PB08-00320	PB08-00321	2/12/2008	Soil	PBRF	K-40	pCi/g	1.84E+01	2.05E+01	3.20E+00	12.0	0.90	YES	N/A
PB08-00340	PB08-00341	2/13/2008	Soil	PBRF	K-40	pCi/g	2.23E+01	1.60E+01	3.60E+00	12.0	1.39	YES	N/A
PB08-00360	PB08-00361	2/13/2008	Soil	PBRF	K-40	pCi/g	1.62E+01	1.96E+01	3.10E+00	10.0	0.83	YES	N/A
PB08-00380	PB08-00381	2/12/2008	Air	PBRF	K-40	uCi/ml	2.20E-11	2.90E-11	6.20E-12	7.0	0.76	YES	N/A
PB08-00422	PB08-00423	2/20/2008	Water	PBRF	K-40	pCi/g	1.02E+00	7.10E-01	3.30E-01	6.0	1.44	YES	N/A
PB08-00422	PB08-00423	2/20/2008	Water	PBRF	H3	pCi/g	2.00E-01	2.00E-01	1.17E+00	0.3	1.00	YES	N/A
PB08-00440	PB08-00441	2/21/2008	Soil	PBRF	K-40	pCi/g	1.66E+01	1.73E+01	3.10E+00	11.0	0.96	YES	N/A
PB08-00460	PB08-00461	2/21/2008	Soil	PBRF	K-40	pCi/g	1.56E+01	1.42E+01	3.00E+00	10.0	1.10	YES	N/A
PB08-00480	PB08-00481	2/22/2008	Air	PBRF	K-40	uCi/ml	5.90E-10	6.50E-10	1.50E+10	0.0	0.91	YES	N/A
PB08-00500	PB08-00501	2/25/2008	Soil	PBRF	K-40	pCi/g	1.61E+01	1.50E+01	2.90E+00	11.0	1.07	YES	N/A
PB08-00534	PB08-00535	2/27/2008	Soil	PBRF	K-40	pCi/g	1.71E+01	1.59E+01	3.10E+00	11.0	1.08	YES	N/A
PB08-00540	PB08-00541	2/27/2008	Soil	PBRF	K-40	pCi/g	4.40E+00	5.00E+00	1.40E+00	6.0	0.88	YES	N/A
PB08-00560	PB08-00561	2/27/2008	Soil	PBRF	K-40	pCi/g	1.39E+01	1.57E+01	2.50E+00	11.0	0.89	YES	N/A
PB08-00580	PB08-00581	2/29/2008	Water	PBRF	K-40	pCi/g	7.80E-01	7.50E-01	1.70E-01	9.0	1.04	YES	N/A
PB08-00580	PB08-00581	2/29/2008	Water	PBRF	H3	pCi/g	4.00E-01	1.00E+00	7.00E-01	1.1	0.40	YES	N/A
PB08-00600	PB08-00602	3/3/2008	Puck	PBRF	K-40	pCi/g	7.90E+00	7.70E+00	2.40E+00	7.0	1.03	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-00620	PB08-00621	3/3/2008	Soil	PBRF	K-40	pCi/g	1.60E+01	1.97E+01	2.95E+00	11.0	0.81	YES	N/A
PB08-00640	PB08-00641	3/4/2008	Soil	PBRF	K-40	pCi/g	1.27E+01	1.17E+01	2.60E+00	10.0	1.09	YES	N/A
PB08-00660	PB08-00661	3/4/2008	Soil	PBRF	K-40	pCi/g	1.72E+01	1.64E+01	2.90E+00	12.0	1.05	YES	N/A
PB08-00683	PB08-00684	3/5/2008	Air	PBRF	K-40	uCi/ml	5.50E-10	4.20E-10	1.50E-10	7.0	1.31	YES	N/A
PB08-00683	PB08-00684	3/5/2008	Air	PBRF	Cs-137	uCi/ml	2.10E-11	1.10E-11	7.80E-12	5.0	1.91	YES	N/A
PB08-00700	PB08-00701	3/6/2008	Air	PBRF	K-40	uCi/ml	6.60E-10	6.50E-10	1.90E-10	7.0	1.02	YES	N/A
PB08-00720	PB08-00721	3/10/2008	Soil	PBRF	K-40	pCi/g	1.59E+01	1.84E+01	2.90E+00	11.0	0.86	YES	N/A
PB08-00740	PB08-00741	3/10/2008	Soil	PBRF	K-40	pCi/g	1.86E+01	2.13E+01	3.30E+00	11.0	0.87	YES	N/A
PB08-00764	PB08-00765	3/12/2008	Soil	PBRF	K-40	pCi/g	1.38E+01	1.35E+01	2.70E+00	10.0	1.02	YES	N/A
PB08-00764	PB08-00765	3/12/2008	Soil	PBRF	Cs-137	pCi/g	2.70E-01	1.60E-01	9.40E-02	6.0	1.69	YES	N/A
PB08-00780	PB08-00781	3/12/2008	Soil	PBRF	K-40	pCi/g	1.49E+01	1.30E+01	2.70E+00	11.0	1.15	YES	N/A
PB08-00800	PB08-00801	3/13/2008	Soil	PBRF	K-40	pCi/g	1.05E+01	1.52E+01	2.60E+00	8.0	0.69	YES	N/A
PB08-00800	PB08-00801	3/13/2008	Soil	PBRF	Cs-137	pCi/g	2.40E+00	2.10E+00	5.40E-01	9.0	1.14	YES	N/A
PB08-00820	PB08-00821	3/14/2008	Soil	PBRF	K-40	pCi/g	1.64E+01	1.98E+01	2.98E+00	11.0	0.83	YES	N/A
PB08-00840	PB08-00841	3/17/2008	Puck	PBRF	K-40	pCi/g	1.50E+01	1.61E+01	2.90E+00	10.0	0.93	YES	N/A
PB08-00860	PB08-00861	3/18/2008	Puck	PBRF	K-40	pCi/g	1.46E+01	1.70E+01	3.20E+00	9.0	0.86	YES	N/A
PB08-00877	PB08-00878	3/19/2008	Soil	PBRF	K-40	pCi/g	1.11E+01	1.53E+01	2.40E+00	9.0	0.73	YES	N/A
PB08-00900	PB08-00901	3/19/2008	Soil	PBRF	K-40	pCi/g	1.26E+01	1.35E+01	2.50E+00	10.0	0.93	YES	N/A
PB08-00920	PB08-00921	3/19/2008	Soil	PBRF	K-40	pCi/g	4.70E+00	2.90E+00	1.50E+00	6.0	1.62	YES	N/A
PB08-00940	PB08-00941	3/20/2008	Water	PBRF	K-40	pCi/g	7.30E-01	6.60E-01	2.80E-01	5.0	1.11	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-00960	PB08-00961	3/20/2008	Soil	PBRF	K-40	pCi/g	1.65E+01	1.60E+01	3.00E+00	11.0	1.03	YES	N/A
PB08-00980	PB08-00981	3/24/2008	Soil	PBRF	K-40	pCi/g	1.22E+01	1.28E+01	2.50E+00	10.0	0.95	YES	N/A
PB08-01000	PB08-01001	3/24/2008	Soil	PBRF	K-40	pCi/g	1.32E+01	1.55E+01	2.50E+00	11.0	0.85	YES	N/A
PB08-01020	PB08-01021	3/25/2008	Puck	PBRF	K-40	pCi/g	9.60E+00	7.50E+00	3.40E+00	6.0	1.28	YES	N/A
PB08-01020	PB08-01021	3/25/2008	Puck	PBRF	Cs-137	pCi/g	1.89E+01	1.73E+01	1.40E+00	27.0	1.09	YES	N/A
PB08-01042	PB08-01043	3/25/2008	Puck	PBRF	K-40	pCi/g	1.02E+01	9.10E+00	4.20E+00	5.0	1.12	YES	N/A
PB08-01042	PB08-01043	3/25/2008	Puck	PBRF	Cs-137	pCi/g	1.25E+02	1.22E+02	5.80E+00	43.0	1.02	YES	N/A
PB08-01060	PB08-01061	3/26/2008	Puck	PBRF	K-40	pCi/g	7.70E+00	8.60E+00	3.00E+00	5.0	0.90	YES	N/A
PB08-01060	PB08-01061	3/26/2008	Puck	PBRF	Cs-137	pCi/g	3.24E+02	3.14E+02	1.25E+01	52.0	1.03	YES	N/A
PB08-01080	PB08-01081	3/26/2008	Soil	PBRF	K-40	pCi/g	1.35E+01	1.45E+01	2.80E+00	10.0	0.93	YES	N/A
PB08-01080	PB08-01081	3/26/2008	Soil	PBRF	Cs-137	pCi/g	9.50E-01	1.20E+00	2.10E-01	9.0	0.79	YES	N/A
PB08-01080	PB08-01081	3/26/2008	Soil	PBRF	Co-60	pCi/g	3.10E+00	3.70E+00	3.20E-01	19.0	0.84	YES	N/A
PB08-01103	PB08-01104	4/1/2008	Air	PBRF	K-40	uCi/ml	3.20E-10	3.00E-10	9.00E-11	7.0	1.07	YES	N/A
PB08-01120	PB08-01121	4/1/2008	Puck	PBRF	K-40	pCi/g	6.80E+00	9.30E+00	2.10E+00	6.0	0.73	YES	N/A
PB08-01143	PB08-01144	4/2/2008	Air	PBRF	K-40	uCi/ml	7.60E-10	7.20E-10	2.50E-10	6.0	1.06	YES	N/A
PB08-01143	PB08-01144	4/2/2008	Air	PBRF	Cs-137	uCi/ml	3.50E-11	2.30E-11	1.70E-11	4.0	1.52	YES	N/A
PB08-01160	PB08-01161	4/3/2008	Puck	PBRF	K-40	pCi/g	1.23E+01	8.30E+00	2.20E+00	11.0	1.48	YES	N/A
PB08-01160	PB08-01161	4/3/2008	Puck	PBRF	Cs-137	pCi/g	1.90E-01	1.00E-01	9.00E-02	4.0	1.90	YES	N/A
PB08-01180	PB08-01181	4/3/2008	Soil	PBRF	K-40	pCi/g	1.73E+01	1.98E+01	3.00E+00	12.0	0.87	YES	N/A
PB08-01180	PB08-01181	4/3/2008	Soil	PBRF	Cs-137	pCi/g	4.00E-01	3.40E-01	1.40E-01	6.0	1.18	YES	N/A
PB08-01200	PB08-01201	4/7/2008	Puck	PBRF	K-40	pCi/g	9.90E+00	9.60E+00	2.60E+00	8.0	1.03	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-01228	PB08-01229	4/8/2008	Soil	PBRF	K-40	pCi/g	1.27E+01	1.26E+01	2.70E+00	9.0	1.01	YES	N/A
PB08-01228	PB08-01229	4/8/2008	Soil	PBRF	Cs-137	pCi/g	3.10E-01	3.30E-01	1.20E-01	5.0	0.94	YES	N/A
PB08-01250	PB08-01251	4/9/2008	125	PBRF	K-40	pCi/g	4.50E+00	5.70E+00	1.60E+00	6.0	0.79	YES	N/A
PB08-01280	PB08-01281	4/15/2008	Soil	PBRF	K-40	pCi/g	1.36E+01	1.45E+01	2.70E+00	10.0	0.94	YES	N/A
PB08-01307	PB08-01310	4/17/2008	Air	PBRF	K-40	uCi/ml	3.30E-10	2.15E-10	7.98E-11	8.0	1.53	YES	N/A
PB08-01320	PB08-01321	4/17/2008	Soil	PBRF	K-40	pCi/g	6.00E+00	9.90E+00	2.60E+00	5.0	0.61	YES	N/A
PB08-01320	PB08-01321	4/17/2008	Soil	PBRF	Cs-137	pCi/g	4.10E-01	4.90E-01	1.20E-01	7.0	0.84	YES	N/A
PB08-01340	PB08-01341	4/22/2008	Air	PBRF	K-40	uCi/ml	4.70E-10	8.10E-10	1.50E-10	6.0	0.58	YES	N/A
PB08-01360	PB08-01361	4/24/2008	Air	PBRF	K-40	uCi/ml	7.60E-10	5.70E-10	1.70E-10	9.0	1.33	YES	N/A
PB08-01380	PB08-01381	4/28/2008	Water	PBRF	K-40	pCi/g	5.60E-01	5.50E-01	1.70E-01	7.0	1.02	YES	N/A
PB08-01380	PB08-01381	4/28/2008	Water	PBRF	H3	pCi/ml	<MDA	<MDA	N/A	N/A	N/A	YES	N/A
PB08-001400	PB08-001401	5/1/2008	Air	PBRF	K-40	uCi/ml	4.30E-10	5.30E-10	9.30E-11	9.0	0.81	YES	N/A
PB08-001420	PB08-001421	5/6/2008	Air	PBRF	K-40	uCi/ml	4.80E-10	6.85E-10	1.40E-10	7.0	0.70	YES	N/A
PB08-001440	PB08-001441	5/8/2008	Air	PBRF	K-40	uCi/ml	9.90E-10	9.12E-10	2.50E-10	8.0	1.09	YES	N/A
PB08-001460	PB08-001461	5/13/2008	Puck	PBRF	K-40	pCi/g	9.40E+00	9.70E+00	2.40E+00	8.0	0.97	YES	N/A
PB08-001480	PB08-001481	5/13/2008	Puck	PBRF	K-40	pCi/g	1.17E+01	9.40E+00	2.85E+00	8.0	1.24	YES	N/A
PB08-001480	PB08-001481	5/13/2008	Puck	PBRF	Cs-137	pCi/g	2.10E+03	2.10E+03	7.30E+01	58.0	1.00	YES	N/A
PB08-001480	PB08-001481	5/13/2008	Puck	PBRF	Co-60	pCi/g	2.40E+00	2.10E+00	3.10E-01	15.0	1.14	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-001500	PB08-001501	5/14/2008	Puck	PBRF	K-40	pCi/g	9.10E+00	8.30E+00	2.40E+00	8.0	1.10	YES	N/A
PB08-001500	PB08-001501	5/14/2008	Puck	PBRF	Cs-137	pCi/g	5.83E+01	5.61E+01	2.60E+00	45.0	1.04	YES	N/A
PB08-001500	PB08-001501	5/14/2008	Puck	PBRF	Co-60	pCi/g	1.20E+00	1.50E+00	1.98E-01	12.0	0.80	YES	N/A
PB08-001520	PB08-001521	5/14/2008	Puck	PBRF	K-40	pCi/g	1.10E+01	9.70E+00	3.00E+00	7.0	1.13	YES	N/A
PB08-001520	PB08-001521	5/14/2008	Puck	PBRF	Cs-137	pCi/g	3.80E+00	3.80E+00	5.00E+00	1.5	1.00	YES	N/A
PB08-001540	PB08-001541	5/15/2008	Water	PBRF	K-40	pCi/g	6.30E-01	6.50E-01	2.50E-01	5.0	0.97	YES	N/A
PB08-001540	PB08-001541	5/15/2008	Water	PBRF	Cs-137	pCi/g	1.60E-01	1.70E-01	3.40E-02	9.0	0.94	YES	N/A
PB08-001540	PB08-001541	5/15/2008	Water	PBRF	H3	pCi/ml	3.68E+01	3.50E+01	2.67E+00	28.0	1.05	YES	N/A
PB08-001560	PB08-001561	5/15/2008	125	PBRF	K-40	pCi/g	4.20E+00	4.90E+00	1.50E+00	6.0	0.86	YES	N/A
PB08-001580	PB08-001581	5/19/2008	Water	PBRF	K-40	pCi/g	1.03E+00	8.60E-01	1.97E-01	10.0	1.20	YES	N/A
PB08-001580	PB08-001581	5/19/2008	Water	PBRF	Cs-137	pCi/g	1.70E-01	1.80E-01	2.60E-02	13.0	0.94	YES	N/A
PB08-001600	PB08-001601	5/19/2008	Water	PBRF	K-40	pCi/g	7.80E-01	6.00E-01	3.00E-01	5.0	1.30	YES	N/A
PB08-001600	PB08-001601	5/19/2008	Water	PBRF	H3	pCi/ml	<MDA	<MDA	N/A	N/A	N/A	YES	N/A
PB08-001620	PB08-001621	5/13/2008	Water	PBRF	K-40	pCi/g	8.40E-01	5.40E-01	2.50E-01	7.0	1.56	YES	N/A
PB08-001620	PB08-001621	5/13/2008	Water	PBRF	H3	pCi/ml	<MDA	<MDA	N/A	N/A	N/A	YES	N/A
PB08-001640	PB08-001641	5/16/2008	125	PBRF	K-40	pCi/g	5.00E+00	5.40E+00	1.30E+00	8.0	0.93	YES	N/A
PB08-001640	PB08-001641	5/16/2008	125	PBRF	Cs-137	pCi/g	3.50E-01	3.20E-01	8.90E-02	8.0	1.09	YES	N/A
PB08-001660	PB08-001661	5/22/2008	Puck	PBRF	K-40	pCi/g	1.16E+01	8.00E+00	3.00E+00	8.0	1.45	YES	N/A
PB08-001680	PB08-001681	5/21/2008	Puck	PBRF	K-40	pCi/g	1.04E+01	7.60E+00	2.90E+00	7.0	1.37	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-001720	PB08-001721	6/4/2008	Water	PBRF	K-40	pCi/g	5.70E-01	6.10E-01	1.60E-01	7.0	0.93	YES	N/A
PB08-001720	PB08-001721	6/4/2008	Water	PBRF	H3	pCi/g	<MDA	<MDA	N/A	N/A	N/A	YES	N/A
PB08-001740	PB08-001741	6/16/2008	Puck (T)	PBRF	K-40	pCi/g	7.80E+00	1.03E+01	1.60E+00	10.0	0.76	YES	N/A
PB08-001740	PB08-001741	6/16/2008	Puck (T)	PBRF	Cs-137	pCi/g	7.60E-01	7.00E-01	1.60E-01	10.0	1.09	YES	N/A
PB08-001740	PB08-001741	6/16/2008	Puck (B)	PBRF	K-40	pCi/g	9.00E+00	1.12E+01	1.80E+00	10.0	0.80	YES	N/A
PB08-001740	PB08-001741	6/16/2008	Puck (B)	PBRF	Cs-137	pCi/g	5.80E-01	4.60E-01	1.40E-01	8.0	1.26	YES	N/A
PB08-001760	PB08-001761	6/17/2008	Puck (T)	PBRF	K-40	pCi/g	1.00E+01	5.20E+00	2.84E+00	7.0	1.92	YES	N/A
PB08-001760	PB08-001761	6/17/2008	Puck (T)	PBRF	Cs-137	pCi/g	1.94E+00	2.10E+00	3.30E-01	12.0	0.92	YES	N/A
PB08-001760	PB08-001761	6/17/2008	Puck (B)	PBRF	K-40	pCi/g	1.00E+01	1.11E+01	2.70E+00	7.0	0.90	YES	N/A
PB08-001760	PB08-001761	6/17/2008	Puck (B)	PBRF	Cs-137	pCi/g	1.70E+00	1.60E+00	2.90E-01	12.0	1.06	YES	N/A
PB08-001780	PB08-001781	6/19/2008	Air	PBRF	K-40	uCi/ml	2.30E-09	1.70E-09	6.00E-10	8.0	1.35	YES	N/A
PB08-001800	PB08-001801	6/23/2008	Puck (T)	PBRF	K-40	pCi/g	7.97E+00	9.20E+00	2.23E+00	7.0	0.87	YES	N/A
PB08-001800	PB08-001801	6/23/2008	Puck (T)	PBRF	Cs-137	pCi/g	6.30E-01	5.30E-01	1.80E-01	7.0	1.19	YES	N/A
PB08-001800	PB08-001801	6/23/2008	Puck (B)	PBRF	K-40	pCi/g	9.05E+00	9.40E+00	2.40E+00	8.0	0.96	YES	N/A
PB08-001800	PB08-001801	6/23/2008	Puck (B)	PBRF	Cs-137	pCi/g	5.00E-01	6.10E-01	1.90E-01	5.0	0.82	YES	N/A
PB08-001820	PB08-001821	6/25/2008	Water	PBRF	K-40	pCi/g	7.10E-01	8.80E-01	1.90E-01	7.0	0.81	YES	N/A
PB08-001820	PB08-001821	6/25/2008	Water	PBRF	H3	pCi/g	<MDA	<MDA	N/A	N/A	N/A	YES	N/A
PB08-001840	PB08-001841	6/27/2008	Puck (T)	PBRF	K-40	pCi/g	7.80E+00	7.30E+00	1.30E+00	12.0	1.07	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-001860	PB08-001861	6/30/2008	Puck (T)	PBRF	K-40	pCi/g	1.22E+01	8.10E+00	3.35E+00	7.0	1.51	YES	N/A
PB08-001860	PB08-001861	6/30/2008	Puck (B)	PBRF	K-40	pCi/g	1.16E+01	9.70E+00	2.32E+00	10.0	1.20	YES	N/A
PB08-001860	PB08-001861	6/30/2008	Puck (B)	PBRF	Cs-137	pCi/g	3.70E-01	3.70E-01	1.60E-01	5.0	1.00	YES	N/A
PB08-001860	PB08-001861	6/30/2008	Puck (T)	PBRF	Cs-137	pCi/g	3.40E-01	1.71E-01	1.10E-01	6.0	1.99	YES	N/A
PB08-001880	PB08-001881	7/2/2008	Air	PBRF	K-40	uCi/ml	9.30E-10	8.20E-10	1.96E-10	9.0	1.13	YES	N/A
PB08-001900	PB08-001901	7/2/2008	Puck	PBRF	K-40	pCi/g	9.00E+00	7.50E+00	2.20E+00	8.0	1.20	YES	N/A
PB08-001900	PB08-001901	7/2/2008	Puck	PBRF	K-40	pCi/g	6.90E+00	9.80E+00	1.90E+00	7.0	0.70	YES	N/A
PB08-001920	PB08-001921	7/8/2008	125	PBRF	K-40	pCi/g	4.60E+00	4.80E+00	1.30E+00	7.0	0.96	YES	N/A
PB08-001920	PB08-001921	7/8/2008	125	PBRF	Co-60	pCi/g	1.50E-01	1.00E-01	5.00E-02	6.0	1.50	YES	N/A
PB08-001920	PB08-001921	7/8/2008	125	PBRF	Cs-137	pCi/g	5.80E-01	6.30E-01	1.30E-01	9.0	0.92	YES	N/A
PB08-001940	PB08-001941	7/9/2008	Puck	PBRF	K-40	pCi/g	4.40E+00	4.60E+00	1.20E+00	7.0	0.96	YES	N/A
PB08-001940	PB08-001941	7/9/2008	Puck	PBRF	K-40	pCi/g	3.70E+00	4.00E+00	1.10E+00	7.0	0.93	YES	N/A
PB08-001960	PB08-001961	7/10/2008	Puck	PBRF	K-40	pCi/g	7.80E+00	7.40E+00	2.20E+00	7.0	1.05	YES	N/A
PB08-001960	PB08-001961	7/10/2008	Puck	PBRF	K-40	pCi/g	6.90E+00	7.50E+00	2.00E+00	7.0	0.92	YES	N/A
PB08-001980	PB08-001981	7/14/2008	Puck	PBRF	K-40	pCi/g	7.40E+00	7.00E+00	2.00E+00	7.0	1.06	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-001980	PB08-001981	7/14/2008	Puck	PBRF	Cs-137	pCi/g	2.40E+01	2.44E+01	1.20E+00	40.0	0.98	YES	N/A
PB08-001980	PB08-001981	7/14/2008	Puck	PBRF	K-40	pCi/g	7.30E+00	7.00E+00	1.90E+00	8.0	1.04	YES	N/A
PB08-001980	PB08-001981	7/14/2008	Puck	PBRF	Cs-137	pCi/g	2.44E+01	2.40E+01	1.30E+00	38.0	1.02	YES	N/A
PB08-002000	PB08-002001	7/16/2008	Puck	PBRF	K-40	pCi/g	7.70E+00	8.10E+00	2.10E+00	7.0	0.95	YES	N/A
PB08-002000	PB08-002001	7/16/2008	Puck	PBRF	K-40	pCi/g	7.10E+00	6.80E+00	2.00E+00	7.0	1.04	YES	N/A
PB08-002020	PB08-002021	7/21/2008	Puck	PBRF	K-40	pCi/g	5.80E+00	5.10E+00	1.40E+00	8.0	1.14	YES	N/A
PB08-002020	PB08-002021	7/21/2008	Puck	PBRF	K-40	pCi/g	5.10E+00	5.10E+00	1.30E+00	8.0	1.00	YES	N/A
PB08-002040	PB08-002041	7/22/2008	Puck	PBRF	K-40	pCi/g	9.50E+00	7.10E+00	2.40E+00	8.0	1.34	YES	N/A
PB08-002040	PB08-002041	7/22/2008	Puck	PBRF	Cs-137	pCi/g	2.25E+00	2.40E+00	3.22E-01	14.0	0.94	YES	N/A
PB08-002060	PB08-002061	7/23/2008	Puck	PBRF	K-40	pCi/g	9.10E+00	9.40E+00	2.20E+00	8.0	0.97	YES	N/A
PB08-002060	PB08-002061	7/23/2008	Puck	PBRF	Cs-137	pCi/g	1.26E+01	1.18E+01	8.30E-01	30.0	1.07	YES	N/A
PB08-002060	PB08-002061	7/23/2008	Puck	PBRF	Co-60	pCi/g	9.50E-01	7.50E-01	2.30E-01	8.0	1.27	YES	N/A
PB08-002080	PB08-002081	7/24/2008	Air	PBRF	K-40	uCi/ml	1.90E-09	1.60E-09	5.00E-10	8.0	1.19	YES	N/A
PB08-002100	PB08-002101	7/24/2008	Puck	PBRF	K-40	pCi/g	9.30E+00	9.20E+00	2.95E+00	6.0	1.01	YES	N/A
PB08-002100	PB08-002101	7/24/2008	Puck	PBRF	Cs-137	pCi/g	1.45E+01	1.57E+01	1.10E+00	26.0	0.92	YES	N/A
PB08-002120	PB08-002121	7/29/2008	Puck	PBRF	K-40	pCi/g	9.50E+00	9.50E+00	2.50E+00	8.0	1.00	YES	N/A
PB08-002120	PB08-002121	7/29/2008	Puck	PBRF	Cs-137	pCi/g	4.32E+02	4.28E+02	1.57E+01	55.0	1.01	YES	N/A
PB08-002136	PB08-002141	7/31/2008	Puck	PBRF	K-40	pCi/g	8.50E+00	6.60E+00	2.14E+00	8.0	1.29	YES	N/A
PB08-002136	PB08-002141	7/31/2008	Puck	PBRF	Cs-137	pCi/g	8.90E-01	9.60E-01	1.90E-01	9.0	0.93	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-02160	PB08-02161	8/4/2008	Puck	PBRF	K-40	pCi/g	3.70E+00	2.24E+00	9.20E-01	8.0	1.65	YES	N/A
PB08-02180	PB08-02181	8/5/2008	Water	PBRF	K-40	pCi/g	7.90E-01	9.70E-01	1.80E-01	9.0	0.81	YES	N/A
PB08-02180	PB08-02181	8/5/2008	Water	PBRF	H3	pCi/ml	<MDA	<MDA	N/A	N/A	N/A	YES	N/A
PB08-02200	PB08-02201	8/6/2008	Puck	PBRF	K-40	pCi/g	3.20E+00	2.90E+00	1.20E+00	5.0	1.10	YES	N/A
PB08-02200	PB08-02201	8/6/2008	Puck	PBRF	Co-60	pCi/g	3.30E-01	4.20E-01	8.50E-02	8.0	0.79	YES	N/A
PB08-02220	PB08-02221	8/6/2008	Puck	PBRF	K-40	pCi/g	1.40E+01	1.14E+01	3.70E+00	8.0	1.23	YES	N/A
PB08-02220	PB08-02221	8/6/2008	Puck	PBRF	Co-60	pCi/g	2.20E+00	2.00E+00	3.40E-01	13.0	1.10	YES	N/A
PB08-02220	PB08-02221	8/6/2008	Puck	PBRF	Cs-137	pCi/g	4.70E+00	5.14E+00	5.90E-01	16.0	0.91	YES	N/A
PB08-02240	PB08-02241	8/7/2008	Puck	PBRF	K-40	pCi/g	8.20E+00	8.80E+00	2.30E+00	7.0	0.93	YES	N/A
PB08-02240	PB08-02241	8/7/2008	Puck	PBRF	Co-60	pCi/g	4.50E-01	4.10E-01	1.20E-01	8.0	1.10	YES	N/A
PB08-02240	PB08-02241	8/7/2008	Puck	PBRF	Cs-137	pCi/g	6.30E+00	6.40E+00	5.80E-01	22.0	0.98	YES	N/A
PB08-02260	PB08-02261	8/11/2008	Puck	PBRF	K-40	pCi/g	8.00E+00	8.80E+00	1.80E+00	9.0	0.91	YES	N/A
PB08-02280	PB08-02281	8/12/008	Puck	PBRF	K-40	pCi/g	7.50E+00	7.10E+00	2.30E+00	7.0	1.06	YES	N/A
PB08-02300	PB08-02301	8/13/2008	Puck	PBRF	K-40	pCi/g	7.70E+00	5.20E+00	1.80E+00	9.0	1.48	YES	N/A
PB08-02300	PB08-02301	8/13/2008	Puck	PBRF	Cs-137	pCi/g	9.00E-01	9.90E-01	1.60E-01	11.0	0.91	YES	N/A
PB08-02320	PB08-02321	8/19/2008	Air	PBRF	K-40	uCi/ml	6.60E-10	8.30E-10	2.30E-10	6.0	0.80	YES	N/A
PB08-02340	PB08-02343	8/21/2008	Puck	PBRF	K-40	pCi/g	1.26E+01	6.50E+00	3.00E+00	8.0	1.94	NO	003
PB08-02360	PB08-02361	8/21/2008	Puck	PBRF	K-40	pCi/g	9.90E+00	1.12E+01	2.70E+00	7.0	0.88	YES	N/A
PB08-02360	PB08-02361	8/21/2008	Puck	PBRF	Cs-137	pCi/g	8.40E-01	1.20E+00	2.20E-01	8.0	0.70	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-02380	PB08-02381	8/26/2008	Puck	PBRF	K-40	pCi/g	7.70E+00	9.00E+00	2.12E+00	7.0	0.86	YES	N/A
PB08-02400	PB08-02400-R	8/27/2008	Puck	PBRF	K-40	pCi/g	7.80E+00	7.23E+00	2.20E+00	7.0	1.08	YES	N/A
PB08-02420	PB08-02422	8/28/2008	Puck	PBRF	K-40	pCi/g	1.19E+01	1.09E+01	2.90E+00	8.0	1.09	YES	N/A
PB08-02340	PB08-02500	9/8/2008	Puck	PBRF	K-40	pCi/g	8.40E+00	6.50E+00	2.20E+00	8.0	1.29	YES	003
PB08-02340	PB08-02500	9/8/2008	Puck	PBRF	K-40	pCi/g	8.40E+00	1.26E+01	2.20E+00	8.0	0.67	YES	003
PB08-02440	PB08-02441	9/2/2008	Puck	PBRF	K-40	pCi/g	1.16E+01	9.50E+00	2.80E+00	8.0	1.22	YES	N/A
PB08-02460	PB08-02461	9/3/2008	Puck	PBRF	K-40	pCi/g	7.50E+00	6.60E+00	2.20E+00	7.0	1.14	YES	N/A
PB08-02460	PB08-02461	9/3/2008	Puck	PBRF	Cs-137	pCi/g	4.60E-01	6.50E-01	1.60E-01	6.0	0.71	YES	N/A
PB08-02480	PB08-02481	9/4/2008	Puck	PBRF	K-40	pCi/g	5.70E+00	4.30E+00	1.70E+00	7.0	1.33	YES	N/A
PB08-02480	PB08-02481	9/4/2008	Puck	PBRF	Cs-137	pCi/g	1.80E+01	1.83E+01	1.10E+00	33.0	0.98	YES	N/A
PB08-02500	PB08-02501	9/8/2008	Puck	PBRF	K-40	pCi/g	8.40E+00	9.40E+00	2.20E+00	8.0	0.89	YES	N/A
PB08-02500	PB08-02501	9/8/2008	Puck	PBRF	Cs-137	pCi/g	2.70E-01	3.70E-01	1.00E-01	5.0	0.73	YES	N/A
PB08-02520	PB08-02521	9/9/2008	Puck	PBRF	K-40	pCi/g	8.40E+00	1.27E+01	2.30E+00	7.0	0.66	YES	N/A
PB08-02520	PB08-02521	9/9/2008	Puck	PBRF	Cs-137	pCi/g	4.60E-01	3.10E-01	1.70E-01	5.0	1.48	YES	N/A
PB08-02540	PB08-02541	9/9/2008	Water	PBRF	K-40	pCi/g	7.40E-01	6.60E-01	1.98E-01	7.0	1.12	YES	N/A
PB08-02560	PB08-02561	9/15/2008	Puck	PBRF	K-40	pCi/g	1.23E+01	7.42E+00	2.80E+00	9.0	1.66	YES	N/A
PB08-02580	PB08-02581	9/17/2008	Puck	PBRF	K-40	pCi/g	9.30E+00	1.05E+01	2.10E+00	9.0	0.89	YES	N/A
PB08-02580	PB08-02581	9/17/2008	Puck	PBRF	Cs-137	pCi/g	2.90E-01	2.10E-01	1.20E-01	5.0	1.38	YES	N/A
PB08-02600	PB08-02601	9/22/2008	Puck	PBRF	K-40	pCi/g	1.54E+01	1.01E+01	3.60E+00	9.0	1.52	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-02600	PB08-02601	9/22/2008	Puck	PBRF	Cs-137	pCi/g	6.60E-01	4.50E-01	2.20E-01	6.0	1.47	YES	N/A
PB08-02620	PB08-02621	9/23/2008	Puck	PBRF	K-40	pCi/g	8.60E+00	8.50E+00	2.40E+00	7.0	1.01	YES	N/A
PB08-02620	PB08-02621	9/23/2008	Puck	PBRF	Co-60	pCi/g	5.30E-01	5.30E-01	1.60E-01	7.0	1.00	YES	N/A
PB08-02620	PB08-02621	9/23/2008	Puck	PBRF	Cs-137	pCi/g	4.00E-01	4.10E-01	1.20E-01	7.0	0.98	YES	N/A
PB08-02640	PB08-02641	9/25/2008	Puck	PBRF	K-40	pCi/g	1.31E+01	9.30E+00	3.22E+00	8.0	1.41	YES	N/A
PB08-02640	PB08-02641	9/25/2008	Puck	PBRF	Co-60	pCi/g	4.00E-01	3.30E-01	1.80E-01	4.0	1.21	YES	N/A
PB08-02640	PB08-02641	9/25/2008	Puck	PBRF	Cs-137	pCi/g	5.90E-01	3.00E-01	2.20E-01	5.0	1.97	YES	N/A
PB08-02660	PB08-02661	9/29/2008	Water	PBRF	K-40	pCi/g	8.00E-01	8.80E-01	1.70E-01	9.0	0.91	YES	N/A
PB08-02660	PB08-02661	9/29/2008	Water	PBRF	Cs-137	pCi/g	2.30E-02	4.30E-02	9.00E-03	5.0	0.53	YES	N/A
PB08-02820	PB08-02821	11/5/2008	Water	PBRF	K-40	pCi/g	5.80E-01	7.60E-01	1.20E-01	10.0	0.76	YES	N/A
PB08-02820	PB08-02821	11/5/2008	Water	PBRF	Cs-137	pCi/g	2.00E-02	1.00E-02	8.00E-03	5.0	2.00	YES	N/A
PB08-02840	PB08-02841	11/12/2008	Soil	PBRF	K-40	pCi/g	1.63E+01	1.63E+01	3.80E+00	9.0	1.00	YES	N/A
PB08-02840	PB08-02841	11/12/2008	Soil	PBRF	Cs-137	pCi/g	4.20E-01	3.40E-01	1.60E-01	5.0	1.24	YES	N/A
PB08-02860	PB08-02861	11/17/2008	Soil	PBRF	K-40	pCi/g	9.30E+00	1.16E+01	2.40E+00	8.0	0.80	YES	N/A
PB08-02860	PB08-02861	11/17/2008	Soil	PBRF	Cs-137	pCi/g	2.60E-01	1.60E-01	7.20E-02	7.0	1.63	YES	N/A
PB08-02880	PB08-02881	11/24/2008	Puck	PBRF	K-40	pCi/g	9.60E+00	9.30E+00	2.40E+00	8.0	1.03	YES	N/A
PB08-02880	PB08-02881	11/24/2008	Puck	PBRF	Cs-137	pCi/g	3.60E+00	3.40E+00	4.30E+00	1.7	1.06	YES	N/A
PB08-02900	PB08-02901	11/24/2008	Puck	PBRF	K-40	pCi/g	1.11E+01	8.10E+00	2.50E+00	9.0	1.37	YES	N/A
PB08-02920	PB08-02921	12/2/2008	Water	PBRF	K-40	pCi/g	7.00E-01	7.20E-01	2.60E-01	5.0	0.97	YES	N/A

TABLE 1 (Continued)

INTRA-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-02920	PB08-02921	12/2/2008	Water	PBRF	H3	pCi/ml	<MDA	<MDA	N/A	N/A	N/A	YES	N/A
PB08-02940	PB08-02941	12/2/2008	Water	PBRF	K-40	pCi/g	<MDA	<MDA	N/A	N/A	N/A	YES	N/A
PB08-02940	PB08-02941	12/2/2008	Water	PBRF	H3	pCi/ml	<MDA	<MDA	N/A	N/A	N/A	YES	N/A
PB08-02960	PB08-02961	12/10/2008	Soil	PBRF	K-40	pCi/g	1.70E+00	1.06E+01	7.20E-01	5.0	0.16	NO	004
PB08-02960	PB08-02961	1/6/2009	Soil	PBRF	K-40	pCi/g	1.00E+01	1.01E+01	1.80E+00	11.0	0.99	YES	N/A
PB08-02980	PB08-02981	12/17/2008	Puck	PBRF	K-40	pCi/g	5.76E+00	6.34E+00	1.54E+00	7.0	0.91	YES	N/A
PB08-02980	PB08-02981	12/17/2008	Puck	PBRF	Cs-137	pCi/g	4.97E+01	3.90E+01	2.10E+00	47.0	1.27	YES	N/A
PB08-03000	PB08-03001	12/23/2008	Puck	PBRF	K-40	pCi/g	6.15E+00	4.60E+00	1.40E+00	9.0	1.34	YES	N/A

TABLE 2

INTER-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-00071	F8A170276-001	1/15/2008	Water	TA/STL	Cs-137	uCi/ml	8.30E-08	6.00E-08	1.70E-08	10.0	1.38	YES	N/A
PB08-00071	F8A170276-001	1/15/2008	Water	TA/STL	H3	uCi/ml	2.02E-05	2.16E-05	3.40E-09	11882.0	0.94	YES	N/A
PB08-00072	F8A170276-002	1/15/2008	Water	TA/STL	Cs-137	uCi/ml	1.52E-06	1.60E-06	1.10E-07	28.0	0.95	YES	N/A
PB08-00072	F8A170276-002	1/15/2008	Water	TA/STL	H3	uCi/ml	2.78E-04	2.92E-04	1.80E-05	31.0	0.95	YES	N/A
PB08-00088	F8A180273-001	1/16/2008	Water	TA/STL	Cs-137	uCi/ml	5.60E-08	8.00E-08	1.30E-08	9.0	0.70	YES	N/A

TABLE 2 (Continued)

INTER-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-00088	F8A180273-001	1/16/2008	Water	TA/STL	H3	uCi/ml	1.55E-05	1.54E-05	1.10E-06	28.0	1.01	YES	N/A
PB08-00089	F8A180273-001	1/16/2008	Water	TA/STL	Cs-137	uCi/ml	5.58E-07	6.00E-07	5.20E-08	21.0	0.93	YES	N/A
PB08-00089	F8A180273-001	1/16/2008	Water	TA/STL	H3	uCi/ml	2.79E-04	2.95E-04	1.80E-05	31.0	0.95	YES	N/A
PB08-00528	F8B280209-003	2/27/2008	Water	TA/STL	Cs-137	uCi/ml	4.20E-08	5.00E-08	1.30E-08	6.0	0.84	YES	N/A
PB08-00528	F8B280209-003	2/27/2008	Water	TA/STL	H3	uCi/ml	7.03E-04	7.31E-04	4.40E-05	32.0	0.96	YES	N/A
PB08-00526	F8B280209-001	2/27/2008	Water	TA/STL	Cs-137	uCi/ml	1.58E-06	1.90E-06	2.00E-07	16.0	0.83	YES	N/A
PB08-00526	F8B280209-001	2/27/2008	Water	TA/STL	H3	uCi/ml	2.96E-04	3.10E-04	1.90E-05	31.0	0.95	YES	N/A
PB08-00527	F8B280209-002	2/27/2008	Water	TA/STL	Cs-137	uCi/ml	6.50E-08	7.00E-08	1.50E-08	9.0	0.93	YES	N/A
PB08-00527	F8B280209-002	2/27/2008	Water	TA/STL	H3	uCi/ml	5.05E-05	5.14E-05	3.20E-06	32.0	0.98	YES	N/A
PB08-01019	F8C260229-001	3/25/2008	Water	TA/STL	Cs-137	uCi/ml	6.50E-07	5.90E-07	7.00E-08	19.0	1.10	YES	N/A
PB08-01019	F8C260229-001	3/25/2008	Water	TA/STL	H3	uCi/ml	1.57E-04	1.91E-04	5.34E-06	59.0	0.82	YES	N/A
PB08-01463	L35200-1	5/13/2008	Puck	TBE	K-40	pCi/g	1.07E+01	1.03E+01	3.10E+00	7.0	1.04	YES	N/A
PB08-01463	L35200-1	5/13/2008	Puck	TBE	Cs-137	pCi/g	3.50E-01	3.00E-01	1.40E-01	5.0	1.17	YES	N/A
PB08-01505	L35264-1	5/14/2008	Water	TBE	K-40	pCi/g	2.80E-01	3.00E-01	1.50E-01	3.7	0.93	YES	N/A
PB08-01505	L35264-1	5/14/2008	Water	TBE	Cs-137	pCi/g	3.80E+00	3.80E+00	2.00E-01	38.0	1.00	YES	N/A
PB08-01505	L35264-1	5/14/2008	Water	TBE	H3	pCi/g	5.82E+01	5.77E+01	3.30E+00	35.0	1.01	YES	N/A
PB08-01506	L35264-3	5/14/2008	Water	TBE	K-40	pCi/g	9.80E-01	9.40E-01	3.20E-01	6.0	1.04	YES	N/A
PB08-01506	L35264-3	5/14/2008	Water	TBE	Cs-137	pCi/g	2.50E-01	1.80E-01	5.00E-02	10.0	1.39	YES	N/A

TABLE 2 (Continued)

INTER-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-01506	L35264-3	5/14/2008	Water	TBE	H3	pCi/g	1.48E+01	1.48E+01	1.80E+00	16.0	1.00	YES	N/A
PB08-01507	L35264-2	5/14/2008	Water	TBE	K-40	pCi/g	7.30E-01	1.10E+00	2.80E-01	5.0	0.66	YES	N/A
PB08-01507	L35264-2	5/14/2008	Water	TBE	Cs-137	pCi/g	1.30E-01	1.10E-01	3.00E-02	9.0	1.18	YES	N/A
PB08-01507	L35264-2	5/14/2008	Water	TBE	H3	pCi/g	5.20E+00	5.80E+00	1.30E+00	8.0	0.90	YES	N/A
PB08-01539	L35266-1	5/15/2008	Water	TBE	K-40	pCi/g	9.70E-01	1.20E+00	3.00E-01	6.0	0.81	YES	N/A
PB08-01539	L35266-1	5/15/2008	Water	TBE	Cs-137	pCi/g	7.40E-01	7.10E-01	8.00E-02	19.0	1.04	YES	N/A
PB08-01539	L35266-1	5/15/2008	Water	TBE	H3	pCi/g	1.96E+01	1.93E+01	2.10E+00	19.0	1.02	YES	N/A
PB08-01540	L35266-2	5/15/2008	Water	TBE	K-40	pCi/g	6.30E-01	1.10E+00	2.50E-01	5.0	0.57	YES	N/A
PB08-01540	L35266-2	5/15/2008	Water	TBE	Cs-137	pCi/g	1.70E-01	1.10E-01	3.00E-02	11.0	1.55	YES	N/A
PB08-01540	L35266-2	5/15/2008	Water	TBE	H3	pCi/g	3.42E+01	3.48E+01	2.60E+00	26.0	0.98	YES	N/A
PB08-01997	L35820	7/16/2008	Water	TBE	Cs-137	pCi/g	1.90E-01	1.60E-01	2.30E-02	17.0	1.19	YES	N/A
PB08-01997	L35820	7/16/2008	Water	TBE	H3	pCi/ml	8.06E+01	8.26E+01	3.84E+00	42.0	0.98	YES	N/A
PB08-01998	L35820	7/16/2008	Water	TBE	Cs-137	pCi/g	3.70E-01	3.81E-01	3.00E-02	25.0	0.97	YES	N/A
PB08-01998	L35820	7/16/2008	Water	TBE	H3	pCi/ml	3.67E+02	3.94E+02	8.04E+00	91.0	0.93	YES	N/A
PB08-02184	L36026-1	8/5/2008	Water	TBE	Cs-137	pCi/g	2.60E-01	2.21E-01	3.60E-02	14.0	1.18	YES	N/A
PB08-02184	L36026-1	8/5/2008	Water	TBE	H3	pCi/ml	2.86E+01	2.80E+01	2.85E+00	20.0	1.02	YES	N/A
PB08-02183	L36026-2	8/5/2008	Water	TBE	Cs-137	pCi/g	2.40E-01	2.31E-01	3.30E-02	15.0	1.04	YES	N/A

TABLE 2 (Continued)

INTER-LABORATORY COMPARISON (REPLICATE) RESULTS

Gamma Log Number (Original)	Sample ID Number (Replicate)	Acquisition Date	Sample Type	Replicate Analysis Performed By	Nuclide	Units	Original Result	Replicate Result	Original 2 Sigma Uncertainty	Resolution	Ratio	Agreement	SDR Number SDR-08-###
PB08-02183	L36026-2	8/5/2008	Water	TBE	H3	pCi/ml	1.70E+01	1.80E+01	1.86E+00	18.0	0.94	YES	N/A
PB08-02291	L36082-1	8/13/2008	Water	TBE	Cs-137	pCi/g	2.00E-01	2.30E-01	3.20E-02	13.0	0.87	YES	N/A
PB08-02291	L36082-1	8/13/2008	Water	TBE	H3	pCi/ml	2.00E+00	1.60E+00	9.90E-01	4.0	1.25	YES	N/A
PB08-02292	L36082-2	8/13/2008	Water	TBE	Cs-137	pCi/g	1.00E-01	8.80E-02	2.30E-02	9.0	1.14	YES	N/A
PB08-02292	L36082-2	8/13/2008	Water	TBE	H3	pCi/ml	2.10E+01	1.84E+01	2.07E+00	20.0	1.14	YES	N/A
PB08-02317	L36161-2	8/19/2008	Water	TBE	Cs-137	pCi/g	1.00E+00	1.06E+00	7.10E-02	28.0	0.94	YES	N/A
PB08-02317	L36161-2	8/19/2008	Water	TBE	H3	pCi/ml	9.36E+01	9.07E+01	4.13E+00	45.0	1.03	YES	N/A
PB08-02318	L36161-1	8/19/2008	Water	TBE	Cs-137	pCi/g	2.10E-01	1.90E-01	3.00E-02	14.0	1.11	YES	N/A
PB08-02318	L36161-1	8/19/2008	Water	TBE	H3	pCi/ml	2.86E+01	2.99E+01	2.37E+00	24.0	0.96	YES	N/A
PB08-02451	L36292-1	9/3/2008	Water	TBE	Cs-137	pCi/g	1.05E-01	7.00E-02	3.50E-02	6.0	1.50	YES	N/A
PB08-02451	BT10	9/3/2008	Water	TBE	H3	pCi/ml	3.60E+00	3.30E+00	1.17E+00	6.0	1.09	YES	N/A
PB08-02452	L36292-2	9/3/2008	Water	TBE	Cs-137	pCi/g	3.90E-01	3.10E-01	6.00E-02	13.0	1.26	YES	N/A
PB08-02452	L36292-2	9/3/2008	Water	TBE	H3	pCi/ml	1.26E+01	1.64E+01	1.73E+00	15.0	0.77	YES	N/A
PB08-02823	L37083	11/6/2008	Water	TBE	Cs-137	pCi/g	1.44E+00	1.46E+00	8.70E-02	33.0	0.99	YES	N/A
PB08-02823	L37083	11/6/2008	Water	TBE	H3	pCi/ml	4.03E+02	4.68E+02	3.87E+01	21.0	0.86	YES	N/A
PB08-02824	L37083	11/6/2008	Water	TBE	Cs-137	pCi/g	7.17E-01	7.50E-01	6.00E-02	24.0	0.96	YES	N/A
PB08-02824	L37083	11/6/2008	Water	TBE	H3	pCi/ml	1.27E+03	1.45E+03	1.22E+02	21.0	0.88	YES	N/A

Note: TA/STL – Test America/Severn-Trent Laboratory

TBE – Teledyne Brown Engineering

TABLES 1&2 - NOTES

To determine agreement:

1. The original result is divided by its associated one sigma uncertainty to obtain the resolution.
2. The original result is then divided by the corresponding replicate result to obtain the ratio.
3. The measurement is in agreement if the value of the ratio falls within the limits shown in Table 3 for the corresponding resolution. The criteria are similar to those listed in USNRC Inspection Procedure 84750 "Radioactive Waste Treatment, and Effluent and Environmental Monitoring" with minor adjustments to account for activity concentrations with large uncertainties.
4. If both sample results are less than Minimum Detectable Activity (MDA), they are in agreement. When comparing a positive result to a <MDA result, the <MDA result is assumed to be positive activity and used to calculate the ratio.
5. Those sample analyses that do not agree are annotated by a "NO" answer in the "Agreement" column. The corresponding Sample Deviation Report (SDR) number can be located in the "SDR Number" column.

TABLE 3: SAMPLE RESOLUTION AND RATIO AGREEMENT CRITERIA

RESOLUTION	RATIO
< 4	0.4 - 2.5
4-7	0.5 - 2.0
8-15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.8 - 1.25
> 200	0.85 - 1.18

6.0 QUALITY CONTROL CHECKS

6.1 A Quality Control Check is performed on the PBRF Gamma Spectroscopy Systems daily before analyzing samples and immediately after changes in electronic components that may affect system operability. The results are compared to parameters specified in RP-021, Rev. 0, *Operation and Calibration of the ORTEC Gamma Spectroscopy System.* Results that are not within the prescribed ranges are investigated prior to placing the system in operation. A total of 615 Quality Control Checks were performed during this period. No deficiencies were noted.

6.2 A system normalization and calibration using flame-sealed unquenched Carbon-14, Tritium, and background reference standards traceable to the National Institute of Standards (NIST) is performed on the PBRF Liquid Scintillation Analyzer daily before analyzing samples and immediately after changes in electronic components that may affect system operability. The results are compared to parameters specified in RP-020, Rev. 0, *Packard TriCarb 2900 TR Liquid Scintillation Analyzer.* Results that are not within the prescribed ranges are

investigated prior to placing the system in operation. A total of 204 system normalization and calibrations were performed. No deficiencies were noted.

6.3 Two tritium QC Check samples are analyzed on the Liquid Scintillation Analyzer with each batch of samples. The QC check samples are prepared from a NIST traceable tritium source solution and scintillation cocktail. One QC Check sample is placed before the sample set and one is placed after the sample set. Tritium QC check samples were analyzed in 227 sample batches during this report period. No deficiencies were noted.

7.0 BACKGROUND DETERMINATIONS

7.1 A background check is performed on the Gamma Spectroscopy Systems at least daily as required by procedure PBRF-RP-021, Rev. 2, *Operation and Calibration of the ORTEC Gamma Spectroscopy System*. Background determinations are used to ensure that the counting environment is free of contamination. Background results are plotted daily to observe trends and unusual results. A total of 615 background checks were performed on the PBRF Gamma Spectroscopy Systems during this report period. All background checks were performed satisfactorily. No deficiencies were noted.

7.2 A background reference sample is analyzed daily prior to sample counting to calculate the figure of merit (FOM) quench indicating parameter (QIP) of E^2/B. This value is used to determine counting efficiency.

7.3 Two background samples are analyzed on the Liquid Scintillation Analyzer with each batch of samples. The background samples are prepared with de-ionized water and scintillation cocktail. One background sample is placed before the sample set and one is placed after the sample set. Results are used to subtract a background count from the sample count and calculate an MDA. Background samples were analyzed in 227 sample batches during this report period. No deficiencies were noted.

8.0 BLANK SAMPLE ANALYSIS

8.1 Sample Processing Facility and Laboratory Technicians prepare blank samples during the processing of regular samples in accordance with RP-060. The analysis of blank samples ensures that measurement error is not the result of contamination of sampling equipment or processing techniques. The acceptance criteria for blank sample results are no detectable PBRF related activity above the target Minimum Detectable Activity (MDA).

8.1.1 A total of 29 Gamma Spectroscopy Analyses were performed on 29 blank samples during this report period. No PBRF related gamma activity was detected in any blank sample above the analysis MDA.

8.1.2 A total of 227 tritium analyses were performed on 227 blank samples during this report period. No tritium activity was observed in any blank sample above the analysis MDA.

9.0 CROSS-CHECK PROGRAM

9.1 PBRF participates in the United States Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP). MAPEP Series 18 was issued in January 2008 and resulted in a Co-60 failure on the MaS (soil) sample and a Co-60 failure on the RdF (filter) sample. Co-60 was incorrectly identified in the MaS sample, when in fact it was not present above the analysis sensitivity. Co-60 was reported outside the acceptance range (> 30%) of the reference value and Cs-137 was > 20% for the RdF sample. A replicate analysis performed on these results was in agreement with the reference values. The remaining results were within the acceptance range for each sample matrix. Series 19 was issued in August 2008. All reported results were within the acceptance range for each sample matrix. MAPEP Series results are shown in Attachment B.

9.2 Tritium cross-check samples obtained from Eckert & Ziegler Analytics were analyzed in January and July. Each sample was analyzed multiple times to reduce the counting uncertainty. The average of these analysis and uncertainties are then reported to Eckert & Ziegler Analytics. The cross-check sample results were within the acceptable range of the standard for both series. Cross-check results are shown in Attachment B.

10.0 LABORATORY/SAMPLE DEVIATION REPORTS

10.1 A Laboratory/Sample Deviation Report (SDR) provides a method to document sampling or sample analysis conditions that are adverse to quality. The identification of the condition adverse to quality, the cause of the condition, and the corrective action taken are documented and reported to the appropriate levels of management.

10.2 Each SDR is completed in accordance with procedure RP-060, *PBRF Radiological Laboratory Quality Assurance/Quality Control Program.*

10.3 A total of 4 SDRs were completed during this report period. Each incident was investigated by the Laboratory Manager and corrective actions were addressed and all SDRs were closed. A copy of each SDR is provided in Attachment A. The SDRs consisted of the following:

- SDR-08-001 – MAPEP MaS-18 Co-60 failure
- SDR-08-002 – MAPEP RdF-18 Co-60 failure and Cs-137 warning
- SDR-08-003 – K-40 replicate not in agreement
- SDR-08-004 – K-40 replicate not in agreement

11.0 ATTACHMENTS

A. Sample Deviation Reports

B. Cross-Check Reports

Attachment A
Sample Deviation Reports

EXHIBIT 2

SAMPLE DEVIATION REPORT

SAMPLE LOCATION/DESCRIPTION	REPORT NUMBER
MAPEP MaS-18 Co-60 failure	SDR-08-001

INSTRUMENT (Check One)

Gross Alpha/Beta ☐ **Liq. Scint.** ☐ **Gamma Spec.** ☒ **Serial #** **Detector #1** **#2 #3**

SAMPLE TYPE (Check One)

Soil ☒ **Water/Liquid** ☐ **Planchet** ☐ **Concrete Debris** ☐ **Other** ☐

SAMPLE START DATE/TIME	SAMPLE STOP DATE/TIME
2/4/08 / 11:06	N/A

ANALYTICAL PROBLEM

MAPEP MaS-18 Soil sample results were in excess of the Co-60 reference value. The reported value was 14.3 Bq/kg and the reference value was 2.9 Bq/kg. As this was a sensitivity test for Co-60, no acceptance range is given.

CORRECTIVE ACTIONS AND/OR COMMENTS

A review of the gamma spectroscopy analysis for this sample revealed that the Co-60 1332 peak was not present in the spectrum. Since the Gamma Vision library recognized the 1173 peak, it associated the region counts with Co-60 and reported an incorrect activity. This is not the library that is normally used to analyze PBRF soil samples, but was used for MAPEP since the results are reported in Becquerels. The library was corrected to require both peaks to be present to identify Co-60 in a sample.

Submitted By: (Print/Sign) R. Case	**DATE** 8/13/08
Radiological Laboratory Manager (Print/Sign) R. Case	**DATE** 8/13/08
NASA Project RSO (Print/Sign) W. Stoner	**DATE** 8/13/08

EXHIBIT 2

SAMPLE DEVIATION REPORT

SAMPLE LOCATION/DESCRIPTION	REPORT NUMBER
MAPEP RdF-18 Co-60 failure and Cs-137 warning	SDR-08-002

INSTRUMENT (Check One)

Gross Alpha/Beta ☐ **Liq. Scint.** ☐ **Gamma Spec.** ☒ **Serial #** **Detector #1 #2 #3**

SAMPLE TYPE (Check One)

Soil ☐ **Water/Liquid** ☐ **Planchet** ☐ **Concrete Debris** ☐ **Other** ☒ Air Filter

SAMPLE START DATE/TIME	SAMPLE STOP DATE/TIME
2/4/08 / 14:27	N/A

ANALYTICAL PROBLEM

MAPEP RdF-18 Air filter Co-60 sample result was > 30% (48.9%) of the reference value and Cs-137 was >20% (28.9%) of the reference value. The reported value for Co-60 was 1.95 ±0.33 Bq/sample and the reference value was 1.31Bq/sample. The reported value for Cs-137 was 3.48 ±0.5 Bq/sample and the reference value was 2.70 Bq/sample.

CORRECTIVE ACTIONS AND/OR COMMENTS

The reported values are the numerical average for each nuclide of 5 trials. The standard deviation in the trial set is 0.6 Bq for Co-60 and 0.7 Bq for Cs-137. A replicate analysis was performed on these results. Both the Co-60 and Cs-137 results were in agreement with the MAPEP reference values. The sample analysis process for this geometry was observed by the Laboratory Manager and no discrepancies were found. The samples were analyzed for 1000 seconds which is typical for this sample type. However, a significantly longer count time will improve the uncertainty and should result in a smaller variance between sample trials. Subsequent MAPEP filter samples will be given a 43,200 second count time.

Submitted By: (Print/Sign) R. Case	**DATE** 8/13/08
Radiological Laboratory Manager (Print/Sign) R. Case	**DATE** 8/13/08
NASA Project RSO (Print/Sign) W. Stoner	**DATE** 8/13/08

EXHIBIT 2

SAMPLE DEVIATION REPORT

SAMPLE LOCATION/DESCRIPTION	REPORT NUMBER
PB08-02340 K-40 not in agreement	SDR-08-003

INSTRUMENT (Check One)

Gross Alpha/Beta ☐ **Liq. Scint.** ☐ **Gamma Spec.** ☒ **Serial #** **Detector #3 & #1**

SAMPLE TYPE (Check One)

Soil ☐ **Water/Liquid** ☐ **Planchet** ☐ **Concrete Debris** ☐ **Other** ☒ Concrete Core

SAMPLE START DATE/TIME	SAMPLE STOP DATE/TIME
8/21/08 / 10:48	N/A

ANALYTICAL PROBLEM

PB08-02340 K-40 (12.6±3 pCi/g) replicate analysis not in agreement with PB08-02343 recount (6.5±2 pCi/g) on Detector #1.

CORRECTIVE ACTIONS AND/OR COMMENTS

Sample was recounted on Detectors #1 & #2 (PB08-02500 & PB08-02501). The K-40 results (pCi/g) were in agreement on both counts with the original result and with each other.

Detector	Original	Replicate	2 Sigma	Resolution	Ratio	Agreement
Original	1.26E+01	6.50E+00	3.00E+00	8.0	1.94	No
Det#1 & #2	8.40E+00	9.40E+00	2.20E+00	8.0	0.89	Yes
Det#1 & #3	8.40E+00	1.26E+01	2.20E+00	8.0	0.67	Yes
Det#1 & Det#1	8.40E+00	6.50E+00	2.20E+00	8.0	1.29	Yes
Det#2 & Det#1	1.26E+01	9.40E+00	3.00E+00	8.0	1.34	Yes

The differences in the results are not statistically significant within the variability of the time of measurement uncertainty. No further action is required.

Submitted By: (Print/Sign) R. Case	**DATE** 9/9/08
Radiological Laboratory Manager (Print/Sign) R. Case	**DATE** 9/9/08
NASA Project RSO (Print/Sign) W. Stoner	**DATE** 9/9/08

EXHIBIT 2

SAMPLE DEVIATION REPORT

SAMPLE LOCATION/DESCRIPTION	REPORT NUMBER
PB08-02960 K-40 not in agreement	SDR-08-004

INSTRUMENT (Check One)

Gross Alpha/Beta ☐ **Liq. Scint.** ☐ **Gamma Spec.** ☒ **Serial #** **Detector #2 & #1**

SAMPLE TYPE (Check One)

Soil ☒ **Water/Liquid** ☐ **Planchet** ☐ **Concrete Debris** ☐ **Other** ☐ Concrete Core

SAMPLE START DATE/TIME	SAMPLE STOP DATE/TIME
12/11/08 / 12:54	N/A

ANALYTICAL PROBLEM

PB08-02960 K-40 (1.7±0.72 pCi/g) replicate analysis count on Detector #2 not in agreement with PB08-02961 recount (10.0±2 pCi/g) on Detector #1.

CORRECTIVE ACTIONS AND/OR COMMENTS

The sample was re-analyzed on Detectors 1,2, and 3 with the following K-40 results:

Detector 1	Detector 2	Detector 3
10.1±1.7	10.1±1.9	9.99±1.8

Agreement was obtained between all three detectors. No further action is required.

Submitted By: (Print/Sign) R. Case	**DATE:** 1/7/09
Radiological Laboratory Manager (Print/Sign) R. Case	**DATE:** 1/7/09
NASA Project RSO (Print/Sign) W. Stoner	**DATE:** 1/7/09

Attachment B
Cross-Check Reports

MAPEP Mixed Analyte Performance Evaluation Program

Department of Energy RESL - 1955 Fremont Ave, MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP Series 18

NASA Plum Brook Reactor Facility Lab (PBRF01)
6100 Columbus Ave
Sandusky, OH 44870

MAPEP-07-MaS18: Radiological, inorganic and semi-volatile organics combined soil standard

Inorganic — Units: (mg/kg)

Analyte	Result	Ref Value	Flag	Notes	Bias	Acceptance Range	Unc Value	Unc Flag
Antimony	NR	23.5				16.5 - 30.6		
Arsenic	NR	20.2				14.1 - 26.3		
Barium	NR	244				171 - 317		
Beryllium	NR	13.8				9.7 - 17.9		
Cadmium	NR	9.49				6.64 - 12.34		
Chromium	NR	70.7				49.5 - 91.9		
Cobalt	NR	41.5				29.1 - 54.0		
Copper	NR	87.0				60.9 - 113.1		
Lead	NR	79				55 - 103		
Mercury	NR	<0.04						
Nickel	NR	145				102 - 189		
Selenium	NR	4.44				3.11 - 5.77		
Silver	NR	92.4				64.7 - 120.1		
Thallium	NR	<1.0						
Vanadium	NR	161				113 - 209		
Zinc	NR	319				223 - 415		
Uranium-Total	NR	12.0				8.4 - 15.6		
Uranium-238	NR	11.9				8.3 - 15.5		
Uranium-235	NR	0.075				0.053 - 0.098		

Organic — Units: (ug/kg)

Analyte	Result	Ref Value	Flag	Notes	Z-	Acceptance Range	Unc Value	Unc Flag
delta-BHC	NR	110.6				25.6 - 195.7		
beta-BHC	NR	18.33				1.83 - 43.94		
gamma-BHC (Lindane)	NR	18.00				1.80 - 46.56		
4,4'-DDT	NR	101.7				25.3 - 178.1		
Dieldrin	NR	35.86				3.59 - 72.57		
Heptachlor	NR	7.51				0.75 - 15.83		
Naphthalene	NR	3524				1010 - 6038		
Acenaphthene	NR	2319				724 - 3914		
Anthracene	NR	2270				664 - 3877		
Benzo(a)anthracene	NR	707				177 - 1237		
Benzo(k)fluoranthene	NR	3330				1150 - 5511		
2-Chloronaphthalene	NR	2795				815 - 4774		

Radiological — Units: (Bq/kg)

Analyte	Result	Ref Value	Flag	Notes	Bias	Acceptance Range	Unc Value	Unc Flag
Americium-241	124	127.2	A		-2.5	89.0 - 165.4	7.7	
Cesium-134	NR	854				598 - 1110		
Cesium-137	548	545	A		0.6	382 - 709	13.4	L
Cobalt-57	426	421	A		1.2	295 - 547	8.2	L
Cobalt-60	14.3	2.9	N	(4)			2.78	
Iron-55	NR	390				273 - 507		
Manganese-54	NR	570				399 - 741		
Nickel-63	NR	640				448 - 832		
Plutonium-238	NR	72.8				51.0 - 94.6		
Plutonium-239/240	NR	90.1				63.1 - 117.1		
Potassium-40	NR	571				400 - 742		
Strontium-90	NR	493				345 - 641		
Technetium-99	NR	273				191 - 355		
Uranium-234/233	NR	142				99 - 185		
Uranium-238	NR	148				104 - 192		
Zinc-65	NR							

MAPEP-07-MaW18: Radiological, inorganic combined water standard

Inorganic — Units: (mg/L)

Radiological — Units: (Bq/L)

Analyte	Result	Ref Value	Flag	Notes	Bias	Acceptance Range	Unc Value	Unc Flag
Americium-241	NR	1.23				0.86 - 1.60		
Cesium-134	NR							
Cesium-137	NR		RW	(11)				
Cobalt-57	24	22.8	A		5.3	16.0 - 29.6	0.97	
Cobalt-60	8.9	8.40	A		6.0	5.88 - 10.92	0.74	
Hydrogen-3	NR	472				330 - 614		
Iron-55	NR	36.5				25.6 - 47.5		
Manganese-54	NR	12.1				8.5 - 15.7		
Nickel-63	NR	30.7				21.5 - 39.9		
Plutonium-238	NR	0.73				0.51 - 0.95		
Plutonium-239/240	NR	0.0141						
Strontium-90	NR	11.40				7.98 - 14.82		
Technetium-99	NR	11.2				7.8 - 14.6		
Uranium-234/233	NR	3.63				2.54 - 4.72		
Uranium-238	NR	3.74				2.62 - 4.86		
Zinc-65	NR	16.3				11.4 - 21.2		

MAPEP-07-RdF18: Radiological air filter

Radiological — Units: (Bq/sample)

Analyte	Result	Ref Value	Flag	Notes	Bias	Acceptance Range	Unc Value	Unc Flag
Americium-241	NR	0.158				0.111 - 0.205		
Cesium-134	NR	2.52				1.76 - 3.28		
Cesium-137	3.48	2.70	W		28.9	1.89 - 3.51	0.50	
Cobalt-57	3.76	3.55	A		5.9	2.49 - 4.62	0.34	
Cobalt-60	1.95	1.31	N		48.9	0.92 - 1.70	0.33	
Manganese-54	NR							
Plutonium-238	NR	0.1053				0.0737 - 0.1369		
Plutonium-239/240	NR	0.1141				0.0799 - 0.1483		
Strontium-90	NR	1.548				1.084 - 2.012		
Uranium-234/233	NR	0.218				0.153 - 0.283		
Uranium-238	NR	0.225				0.158 - 0.293		
Zinc-65	NR	2.04				1.43 - 2.65		

MAPEP Mixed Analyte Performance Evaluation Program
Department of Energy RESL - 1955 Fremont Ave. MS4149 - Idaho Falls, ID 83415

Laboratory Results For MAPEP Series 19
(PBRF01) NASA Plum Brook Reactor Facility Lab
6100 Columbus Ave
Sandusky, OH 44870

MAPEP-08-MaS19: Radiological, inorganic and semi-volatile organics combined soil standard

Inorganic — Units: (mg/kg)

Radiological — Units: (Bq/kg)

Analyte	Result	Ref Value	Flag	Notes	Bias	Acceptance Range	Unc Value	Unc Flag
Americium-241	72.0	69.1	A		4.2	48.4 - 89.8	1.35	L
Antimony-125	NR	22.8				16.0 - 29.6		
Cesium-134	NR	581				407 - 755		
Cesium-137	3.67	2.8	A				0.54	
Cobalt-57	NR	333				233 - 433		
Cobalt-60	148.0	145	A		2.1	102 - 189	2.42	L
Iron-55	NR	676				473 - 879		
Manganese-54	NR	415				291 - 540		
Nickel-63	NR	760				532 - 988		
Plutonium-238	NR							
Plutonium-239/240	NR	55.6				38.9 - 72.3		
Potassium-40	NR	570				399 - 741		
Strontium-90	NR							
Technetium-99	NR	335				235 - 436		
Uranium-234/233	NR	292				204 - 380		
Uranium-238	NR	303				212 - 394		
Zinc-65	NR		RW	(11)				

Radiological Reference Date: August 1, 2008

MAPEP-08-MaW19: Radiological, inorganic combined water standard

Inorganic — Units: (mg/L)

Radiological — Units: (Bq/L)

Analyte	Result	Ref Value	Flag	Notes	Bias	Acceptance Range	Unc Value	Unc Flag
Americium-241	NR							
Cesium-134	NR	19.5				13.7 - 25.4		
Cesium-137	24.1	23.6	A		2.1	16.5 - 30.7	0.46	L
Cobalt-57	NR		RW	(11)				
Cobalt-60	11.2	11.6	A		-3.4	8.1 - 15.1	0.23	L
Hydrogen-3	NR	341				239 - 443		
Iron-55	NR	46.2				32.3 - 60.1		
Manganese-54	NR	13.7				9.6 - 17.8		
Nickel-63	NR							
Plutonium-238	NR	0.5				0.4 - 0.7		
Plutonium-239/240	NR							
Strontium-90	NR	6.45				4.52 - 8.39		
Technetium-99	NR	3.76				2.63 - 4.89		
Uranium-234/233	NR	3.44				2.41 - 4.47		
Uranium-238	NR	3.55				2.49 - 4.62		
Zinc-65	NR	17.1				12.0 - 22.2		

Radiological Reference Date: August 1, 2008

Eckert & Ziegler
Analytics

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

Tel 404•352•8677
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RESULTS OF ENVIRONMENTAL

CROSS CHECK PROGRAM

NASA

Plum Brook Reactor Facility

Fourth Quarter 2007
(Ref. Date 12/06/2007)

1-22-08
Daniel M. Montgomery, QA Manager

ANA Form002 Rev. —

SAMPLE	ANALYSIS	NASA PBRF VALUE	UNCERTAINTY (1 Sigma)	ANALYTICS VALUE	UNCERTAINTY (1 Sigma)	RATIO NASA PBRF: ANALYTICS
E5549-792 H-3 Water	H-3	8.85E+03 pCi/L	1.63E+03	9.02E+03 pCi/L	1.51E+02	0.98

Analysis performed 1/9/2008

Eckert & Ziegler
Analytics

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

Tel: 404-352-8677
Fax: 404-352-2837

RESULTS OF ENVIRONMENTAL

CROSS CHECK PROGRAM

NASA

Plum Brook Reactor Facility

Second Quarter 2008
(Ref. Date 06-19-2008)

7-25-08
Daniel M. Montgomery, QA Manager

SAMPLE	ANALYSIS	NASA PBRF VALUE	UNCERTAINTY (2 Sigma)	ANALYTICS VALUE	UNCERTAINTY (1 Sigma)	RATIO NASA PBRF: ANALYTICS
E6056-792 H-3 Water	H-3	1.38E+04 pCi/L	1.78E+03	1.30E+04 pCi/L	2.17E+02	1.06

Analysis performed 7/18/2008