Survey Unit Release Record				
Design #	EP-S1	**Revision #**	Original	**Page 1 of 3**
Survey Unit #(s)	S1			
Description	1) Embedded Pipe (EP) Survey Unit S1 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP S1 is a Class 1, Group 1 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004. 3) Surveys in EP S1 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP 3-9 from Survey Request (SR)-13 was referenced for this decision. 4) Survey Instructions for this survey unit are incorporated into and performed in accordance with (IAW) the Babcock Services Incorporated (BSI)/LVS-002, Work Execution Package (WEP) 05-006. Survey instructions described in this document constitute "Special Methods" and the survey design used in the acquisition of survey measurements. 5) Instrument efficiency determinations are developed in accordance with the BSI/LVS-002, WEP 05-006, these determinations are appropriate for the types of radiation involved and the media being surveyed.			

Approval Signatures		**Date:**
FSS/Characterization Engineer	Wood	3/4/08
FSS/Characterization Manager	R. Case	3/5/08

1.0 History/Description

1.1 The subject pipe system is a 2" service conduit adjacent to the 1.51 drain system access box in the annulus on the -25' elevation of the Reactor Building.

1.2 EP S1 is approximately 16 feet in length.

1.3 Any contamination of this service conduit is expected to be cross contamination from the remediation efforts of RX1.51 which is adjacent to this service conduit in a valve box on the RB -25' annulus. Service conduit S1 was open to cross contamination during those remediation efforts.

2.0 Survey Design Information

2.1 EP S1 was surveyed IAW Procedure #BSI/LVS-002.

2.2 100% of the 2" ID pipe was accessible for survey. The accessible 2" ID pipe was surveyed by static measurement at one foot increments, for a total of 16 survey measurements.

2.3 Surface area for the 2" ID piping is 486 cm^2 for each foot of piping, corresponding to a total 2" ID piping surface area of 7776 cm^2 (0.8 m^2) for the entire accessible length of (16') of 2" piping.

3.0 Survey Unit Measurement Locations/Data

3.1 Pipe interior radiological survey forms are provided in Attachment 2 of this release record.

4.0 Survey Unit Investigations/Results

4.1 None

5.0 Data Assessment Results

5.1 Data assessment results are provided in the EP/Buried Pipe (BP) Survey Report provided in Attachment 1.

5.2 All measurement results are less than the Derived Concentration Guideline Level (DCGL) for radionuclide specific EP that corresponds to the 1 mrem/yr dose goal established in Table 3-3 of the FSSP.

5.3 When implementing the Unity Rule, provided in Section 3.6.3 of the FSSP, and applying the Nuclide Fraction (NF), provided in TBD-06-004, the survey unit that is constituted by EP S1 passes FSS.

5.4 Background was not subtracted from the survey measurements and the Elevated Measurement Comparison (EMC) was not employed for the accessible portion of this survey unit.

Statistical Summary Table

Statistical Parameter	2" Pipe
Total Number of Survey Measurements	16
Number of Measurements >MDC	9
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.023
Median	0.024
Standard Deviation	0.008
Maximum	0.036
Minimum	0.012

6.0 Documentation of evaluations pertaining to compliance with the unrestricted use limit of 25 mrem/yr and dose contributions from Embedded Pipe and radionuclides contributing 10% in aggregate of the total dose for both structural scenarios and soils.

6.1 A review of the survey results has shown that the dose contribution for the accessible portion of EP S1 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.023 mrem/yr based on the average of the actual gross counts.

7.0 Attachments

Attachment 1 – BSI EP/BP Survey Report
Attachment 2 -Pipe Interior Radiological Survey Form
Attachment 3 – DQA Worksheet
Attachment 4 –Disc containing RR for EP S1 & Spreadsheet

SECTION 7
ATTACHMENT 1
2 PAGES

BSI EP/BP SURVEY REPORT

Pipe ID	**EP S1**	**Survey Location**	Service Conduit RB -25'
Survey Date	16-Jan-08	**2350-1 #**	203438
Survey Time	1340	**Detector-Sled #**	247697-NO SLED
Pipe Size (in.)	2	**Detector Efficiency**	0.00041
DCGL (dpm/100cm2)	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm2)	486
Pipe Area Incorporated by Survey Data (m^2)	0.8	**Field BKG** (cpm)	1.8
Routine Survey	X	**Field MDCR** (cpm)	7.6
QA Survey		**Nominal MDC** (dpm/100cm2)	3,955

Survey Measurement Results	
Total Number of Survey Measurements	16
Number of Measurements >MDC	9
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.023
Median	0.024
Standard Deviation	0.008
Maximum	0.036
Minimum	0.012

Survey Technician(s)	WOOD

Survey Unit Classification	1
TBD 06-004 Piping Group	1
SR-13 Radionuclide Distribution Sample	EP 3-9
Measured Nuclide	Co-60
Area Factor/EMC Used	No
Pass/Fail FSS	Pass
MREM/YR Contribution	<1

COMMENTS:
ACTIVITY VALUES NOT BACKGROUND CORRECTED

RP Engineer | Date	Wood / 3-4-08

EP S1
2" Pipe
TBD 06-004 Group 1

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm2)	Cs-137 activity (dpm/100cm2)	Eu-152 activity (dpm/100cm2)	Eu-154 activity (dpm/100cm2)	Nb-94 activity (dpm/100cm2)	Ag-108m activity (dpm/100cm2)	Unity
1	12	12	29,268	6,017	238	5,708	1,517	176	42	0.036
2	9	9	21,951	4,513	179	4,281	1,138	132	31	0.027
3	8	8	19,512	4,011	159	3,805	1,012	117	28	0.024
4	11	11	26,829	5,515	219	5,232	1,391	161	38	0.033
5	6	6	14,634	3,008	119	2,854	759	88	21	0.018
6	7	7	17,073	3,510	139	3,329	885	102	24	0.021
7	10	10	24,390	5,014	199	4,756	1,264	146	35	0.030
8	9	9	21,951	4,513	179	4,281	1,138	132	31	0.027
9	8	8	19,512	4,011	159	3,805	1,012	117	28	0.024
10	5	5	12,195	2,507	99	2,378	632	73	17	0.015
11	4	4	9,756	2,006	79	1,903	506	59	14	0.012
12	6	6	14,634	3,008	119	2,854	759	88	21	0.018
13	4	4	9,756	2,006	79	1,903	506	59	14	0.012
14	8	8	19,512	4,011	159	3,805	1,012	117	28	0.024
15	4	4	9,756	2,006	79	1,903	506	59	14	0.012
16	11	11	26,829	5,515	219	5,232	1,391	161	38	0.033
									MEAN	0.023
									MEDIAN	0.024
									STD DEV	0.008
									MAX	0.036
									MIN	0.012

SECTION 7
ATTACHMENT 2
2 PAGES

Pipe Interior Radiological Survey Form

Date: 1-16-08 Time: 1340

Pipe ID#: S1 Pipe Diameter: 2" Access Point Area: RB ANNULUS

Building: RB Elevation: ~~+5'~~ -25' System: CONDUIT

Type of Survey Investigation ____ Characterization ____ Final Survey X Other X

Gross ____ Co60 X Cs ____

Detector ID# / Sled ID# 247697 / NO SLED

Detector Cal Date: 10-16-07 Detector Cal Due Date: 10-16-08

Instrument: 2350-1 Instrument ID #: 203438

Instrument Cal Date: 10-16-07 Instrument Cal Due Date: 10-16-08

From the Daily Pipe Survey Detector Control Form for the Selected Detector

Background Value 1.8 cpm

$MDCR_{static}$ 7.6 cpm

Efficiency Factor for Pipe Diameter 0.00041 (from detector efficiency determination)

MDC_{static} 3955 dpm/ 100 cm^2

Is the MDC_{static} acceptable? (Yes) No (if no, adjust sample count time and recalculate $MDCR_{static}$)

Comments: No map available.
Pipe runs from 1.5' access pit on RB-25 to SPR access landing ceiling

Technician Signature [signature]

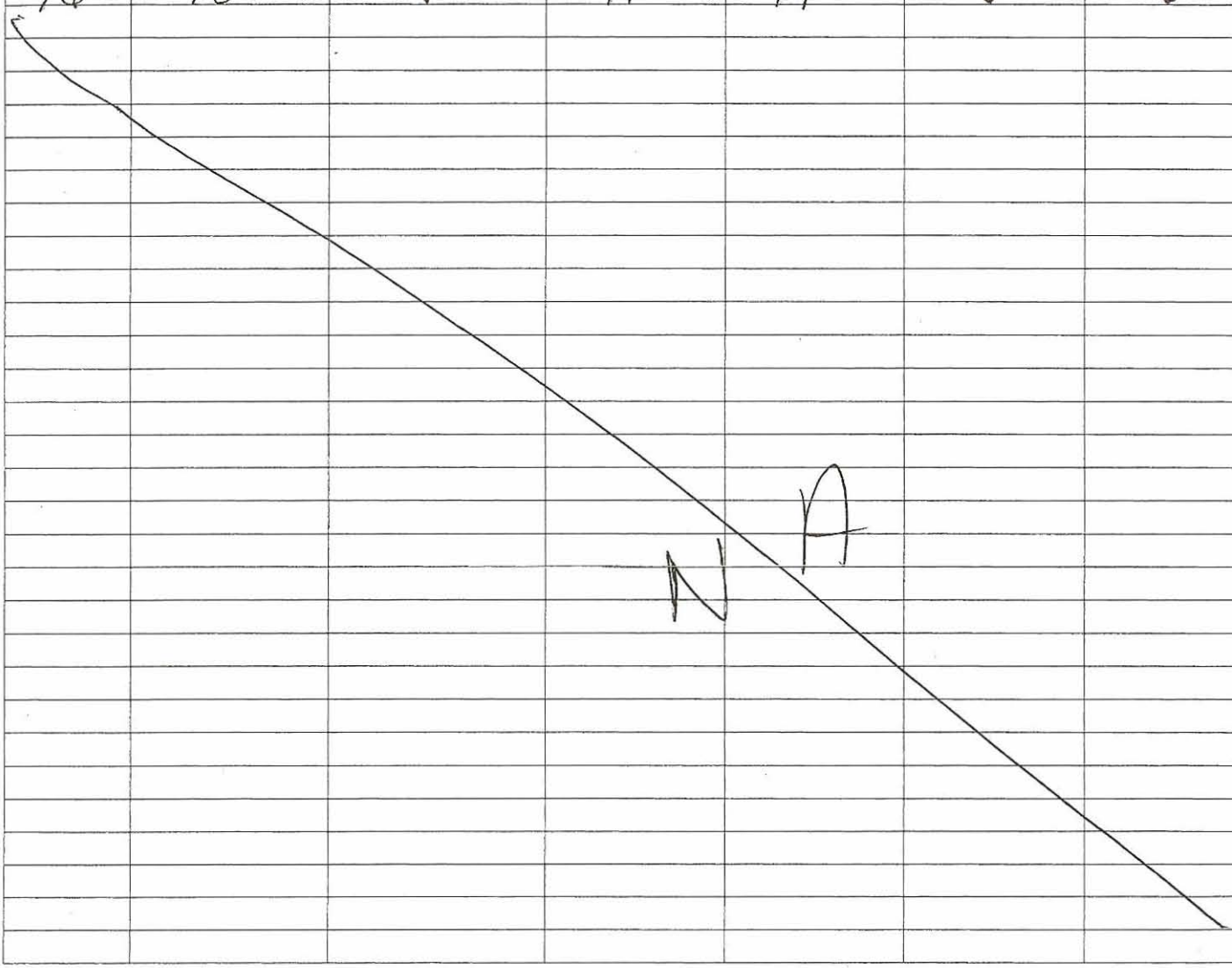
Pipe Interior Radiological Survey

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm²
1	1	1.0	12	12	n/a	n/a
2	2	↓	9	9	↓	↓
3	3	↓	8	8	↓	↓
4	4	↓	11	11	↓	↓
5	5	↓	6	6	↓	↓
6	6	↓	7	7	↓	↓
7	7	↓	10	10	↓	↓
8	8	↓	9	9	↓	↓
9	9	↓	8	8	↓	↓
10	10	↓	5	5	↓	↓

Pipe Interior Radiological Survey Form (Continuation Form)

Date: 1-16-08
Pipe ID#: S1 Pipe Diameter: 2" Access Point Area: RB ANNULUS
Building: RB Elevation: -25' System: CONDUIT

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
11	11	1.0	4	4	n/a	n/a
12	12	↓	6	6	↓	↓
13	13		4	4		
14	14		8	8		
15	15		4	4		
16	16		11	11		



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SECTION 7
ATTACHMENT 3
1 PAGE

DQA Check Sheet

Design #	EP S1	Revision #	Original	
Survey Unit #	EP S1			

Preliminary Data Review`

Answers to the following questions should be fully documented in the Survey Unit Release Record	Yes	No	N/A
1. Have surveys been performed in accordance with survey instructions in the Survey Design?	X		
2. Is the instrumentation MDC for structure static measurements below the $DCGL_W$ for Class 1 and 2 survey units, or below 0.5 $DCGL_W$ for Class 3 survey units?			X
3. Is the instrumentation MDC for embedded/buried piping static measurements below the $DCGL_W$?	X		
4. Was the instrumentation MDC for structure scan measurements, soil scan measurements, and embedded/buried piping scan measurements below the $DCGL_W$, or, if not, was the need for additional static measurements or soil samples addressed in the survey design?			X
5. Was the instrumentation MDC for volumetric measurements and smear analysis < 10% $DCGL_W$?			X
6. Were the MDCs and assumptions used to develop them appropriate for the instruments and techniques used to perform the survey?	X		
7. Were the survey methods used to collect data proper for the types of radiation involved and for the media being surveyed?	X		
8. Were "Special Methods" for data collection properly applied for the survey unit under review?	X		
9. Is the data set comprised of qualified measurement results collected in accordance with the survey design, which accurately reflects the radiological status of the facility?	x		
Graphical Data Review			
1. Has a posting plot been created?			X
2. Has a histogram (or other frequency plot) been created?			X
3. Have other graphical data tools been created to assist in analyzing the data?			X
Data Analysis			
1. Are all sample measurements below the $DCGL_W$ (Class 1 & 2), or 0.5 $DCGL_W$ (Class 3)?	X		
2. Is the mean of the sample data < $DCGL_W$?	X		
3. If elevated areas have been identified by scans and/or sampling, is the average activity in each elevated area < $DCGL_{EMC}$ (Class 1), < $DCGL_W$ (Class 2), or <0.5 $DCGL_W$ (Class 3)?			X
4. Is the result of the Elevated Measurements Test < 1.0?			X
5. Is the result of the statistical test ($S+$ for Sign Test or W_r for WRS Test) ≥ the critical value?			X

Comments:

FSS/Characterization Engineer (print/sign)	G. Wood / G. Wood	Date	3/4/08
FSS/ Characterization Manager (print/sign)	R. Case	Date	3/5/08

Form CS-09/2 Rev 0

SECTION 7
ATTACHMENT 4
1 DISC