Survey Unit Release Record				
Design #	EP-1.45B	**Revision #**	Original	**Page 1 of 3**
Survey Unit #(s)	1.45B			
Description	1) Embedded Pipe (EP) Survey Unit 1.45B meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP 1.45B 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 1.45B were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP 3-8 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	[signature]	12-17-07
Technical Reviewer (FSS/Characterization Engineer)	[signature]	12.18.07
FSS/Characterization Manager	R. Case [signature]	12/19/07

1.0 History/Description

1.1 The subject pipe system is a 0.75" steel lined penetration in the "lily pad" area on the -4' elevation of the Reactor Building.

1.2 EP 1.45B is approximately 4 feet in length.

2.0 Survey Design Information

2.1 EP 1.45B was surveyed IAW Procedure #BSI/LVS-002.

2.2 100% of the 0.75" ID pipe was accessible for survey. The accessible 0.75" ID pipe was surveyed by static measurement at one foot increments, for a total of 4 survey measurements.

2.3 Surface area for the 0.75" ID piping is 182 cm^2 for each foot of piping, corresponding to a total 0.75" ID piping surface area of 730 cm^2 (0.1 m^2) for the entire accessible length of (4') of 0.75" 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 1.45B 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	0.75" Pipe
Total Number of Survey Measurements	4
Number of Measurements >MDC	0
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0235
Median	0.0223
Standard Deviation	0.0085
Maximum	0.0347
Minimum	0.0149

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 1.45B to be less than 1 mrem/yr. The dose contribution is estimated to be 0.024 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 1.45B & Spreadsheet

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ATTACHMENT 1
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BSI EP/BP SURVEY REPORT

Pipe ID	**EP 1.45B**	**Survey Location**	Lilly Pad -4'
Survey Date	11-Dec-07	**2350-1 #**	203468
Survey Time	14:00	**Detector-Sled #**	70006-0047/no sled
Pipe Size (in.)	0.75	**Detector Efficiency**	0.00066
DCGL (dpm/100cm2)	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm2)	182
Pipe Area Incorporated by Survey Data (m^2)	0.1	**Field BKG** (cpm)	7.9
Routine Survey	X	**Field MDCR** (cpm)	12.7
QA Survey		**Nominal MDC** (dpm/100cm2)	9,534

Survey Measurement Results	
Total Number of Survey Measurements	4
Number of Measurements >MDC	0
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0235
Median	0.0223
Standard Deviation	0.0085
Maximum	0.0347
Minimum	0.0149

Survey Technician(s)	JACOBS

Survey Unit Classification	1
TBD 06-004 Piping Group	1
SR-13 Radionuclide Distribution Sample	EP 3-8
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	Dal Rowell 12-17-07

EP 1.45B
0.75" 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	5	5	7,576	4,153	165	3,940	1,047	121	29	0.025
2	4	4	6,061	3,322	132	3,152	838	97	23	0.020
3	3	3	4,545	2,492	99	2,364	628	73	17	0.015
4	7	7	10,606	5,814	230	5,515	1,466	170	41	0.035
									MEAN	0.024
									MEDIAN	0.022
									STD DEV	0.008
									MAX	0.035
									MIN	0.015

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Pipe Interior Radiological Survey Form

Date: 12·11·07 Time: 1400

Pipe ID#: 1.45 B Pipe Diameter: .75" Access Point Area: Lilly PAD

Building: RX Elevation: -4' System: Pene

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

Gross ____ Co60 ✓ Cs ____

Detector ID# / Sled ID# FD/151-X / 0047 / N/A

Detector Cal Date: 9·14·07 Detector Cal Due Date: 9·14·~~07~~ 08

Instrument: 2350-1 Instrument ID #: 203468

Instrument Cal Date: 9·14·07 Instrument Cal Due Date: 9·14·~~07~~ 08

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

Background Value 7.9 cpm

$MDCR_{static}$ 12.7 cpm

Efficiency Factor for Pipe Diameter 0.000066 (from detector efficiency determination)

MDC_{static} 9534 dpm/ 100 cm^2

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

Comments: Det #3 Survey from Vessel out to Access Pit.

Technician 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	5	5	n/a	n/a
2	2	1	4	4	↓	↓
3	3	1	3	3		
4	4	1	7	7		
5						
6						
7			N			
8						
9			A			
10						

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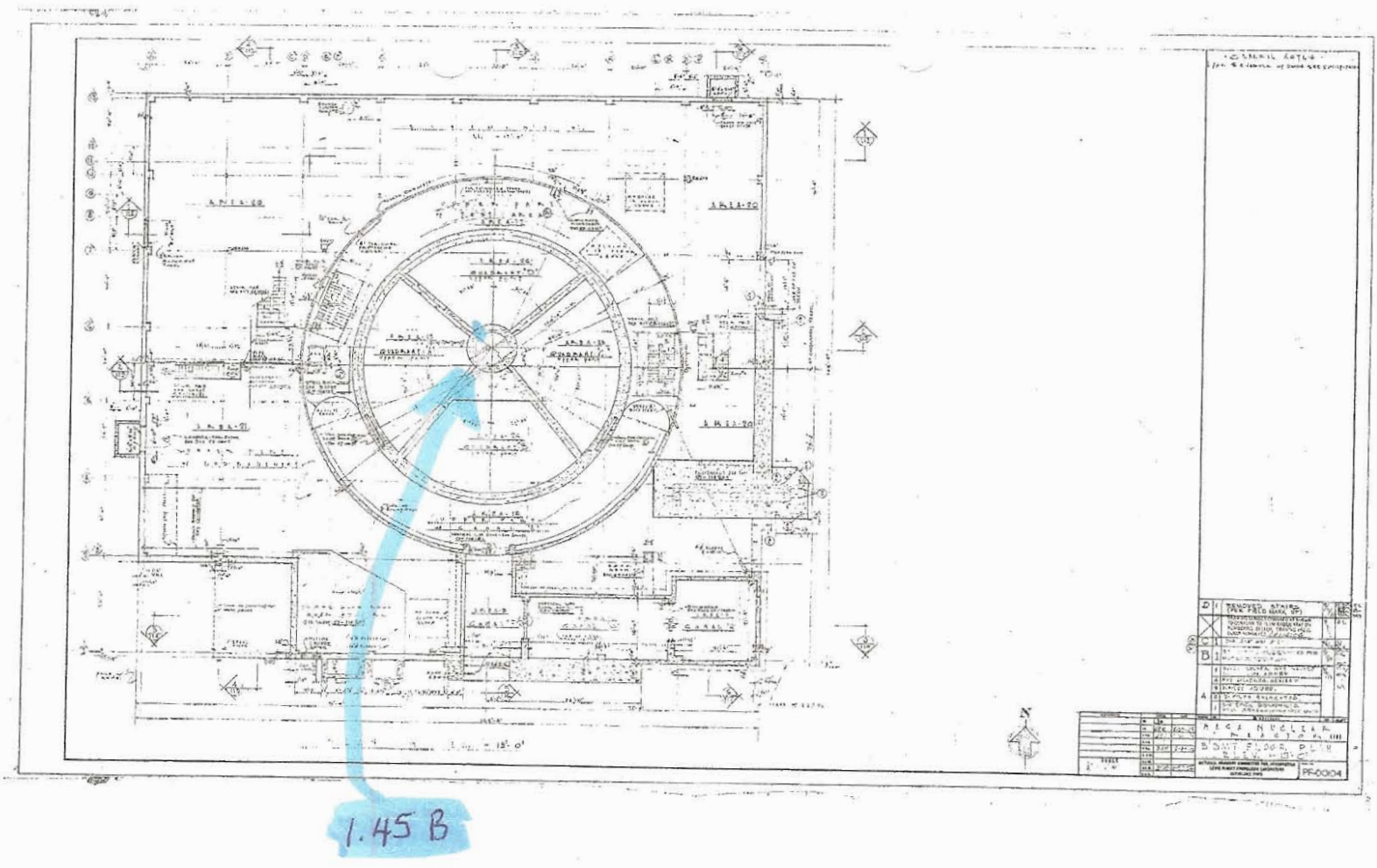

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DQA Check Sheet				
Design #	EP 1.45B	Revision #	Original	
Survey Unit #	EP 1.45B			

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)	Dale Randall / Dale Randall	Date	12-17-07
FSS/ Characterization Manager (print/sign)	R. Case	Date	12/19/07

Form CS-09/2 Rev 0

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