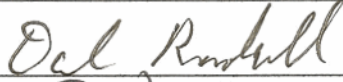




Survey Unit Release Record

Design #	EP-B3	Revision #	Original	Page 1 of 3
Survey Unit #(s)	B3			
Description	<p>1) Embedded Pipe (EP) Survey Unit B3 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP B3 is a Class 1, Group 2 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004.</p> <p>3) Surveys in EP B3 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP2-5 from Survey Request (SR)-13 was referenced for this decision.</p> <p>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.</p> <p>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.</p>			
Approval Signatures			Date:	
FSS/Characterization Engineer			10-9-07	
Technical Reviewer (FSS/Characterization Engineer)			10-11-07	
FSS/Characterization Manager	 <small>R. Case</small>		10/11/07	

Form CS-09/1 Rev 0

Survey Unit: B3

1.0 History/Description

- 1.1 The subject pipe system is a 1.25" conduit line located on the -25 elevation of the Rx annulus. The pipe section is approximately 29 feet in length.

2.0 Survey Design Information

- 2.1 EP B3 was surveyed IAW Procedure #BSI/LVS-002.
- 2.2 100% of the 1.25" ID pipe was accessible for survey. The accessible 1.25" ID pipe was surveyed by static measurement at one foot increments, for a total of 29 survey measurements.
- 2.3 Surface area for the 1.25" ID piping is 304 cm² for each foot of piping, corresponding to a total 1.25" ID piping surface area of 8,817 cm² (0.9 m²) for the entire length of (approximately 29') of 1.25" 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 B3 passes FSS.
- 5.4 Background was not subtracted from the survey measurements and the Elevated Measurement Comparison (EMC) was not employed for this survey unit.

Survey Unit: B3

5.5 Statistical Summary Table

Statistical Parameter	1.25" Pipe
Total Number of Survey Measurements	29
Number of Measurements >MDC	9
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0157
Median	0.0171
Standard Deviation	0.0072
Maximum	0.0285
Minimum	0.0057

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 EP B3 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.016 mrem/yr based on the average of the actual gross counts measured.

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 B3 & Spreadsheet

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BSI EP/BP SURVEY REPORT

Pipe ID	B3	Survey Location	Rx Annulus -25 el.
Survey Date	22-Mar-06	2350-1 #	203488
Survey Time	13:30	Detector-Sled #	44-159/238367-no sled
Pipe Size	1.25"	Detector Efficiency	0.0005
DCGL (dpm/100cm²)	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm²)	304
Pipe Area Incorporated by Survey Data (m²)	0.9	Field BKG (cpm)	10.4
Routine Survey	X	Field MDCR (cpm)	14.2
QA Survey		Nominal MDC (dpm/100cm²)	4,318
Survey Measurement Results			
Total Number of Survey Measurements			29
Number of Measurements >MDC			9
Number of Measurements Above 50% DCGL			0
Number of Measurements Above DCGL			0
Mean			0.0157
Median			0.0171
Standard Deviation			0.0072
Maximum			0.0285
Minimum			0.0057
Survey Technician(s)	ROSENHAGEN		
Survey Unit Classification			1
TBD 06-004 Piping Group			2
SR-13 Radionuclide Distribution Sample			EP2-5
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		<i>Dal Prudall 10-9-07</i>	

EP B3
1.25" Pipe
TBD 06-004 Group 2

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	7	7	14,000	4,605	2,388	38	27	2	133	0.020
2	9	9	18,000	5,921	3,070	49	35	3	170	0.026
3	9	9	18,000	5,921	3,070	49	35	3	170	0.026
4	6	6	12,000	3,947	2,047	33	23	2	114	0.017
5	7	7	14,000	4,605	2,388	38	27	2	133	0.020
6	3	3	6,000	1,974	1,023	16	12	1	57	0.009
7	6	6	12,000	3,947	2,047	33	23	2	114	0.017
8	10	10	20,000	6,578	3,411	55	39	3	189	0.029
9	6	6	12,000	3,947	2,047	33	23	2	114	0.017
10	9	9	18,000	5,921	3,070	49	35	3	170	0.026
11	4	4	8,000	2,631	1,364	22	15	1	76	0.011
12	3	3	6,000	1,974	1,023	16	12	1	57	0.009
13	10	10	20,000	6,578	3,411	55	39	3	189	0.029
14	4	4	8,000	2,631	1,364	22	15	1	76	0.011
15	2	2	4,000	1,316	682	11	8	1	38	0.006
16	2	2	4,000	1,316	682	11	8	1	38	0.006
17	5	5	10,000	3,289	1,706	27	19	2	95	0.014
18	6	6	12,000	3,947	2,047	33	23	2	114	0.017
19	3	3	6,000	1,974	1,023	16	12	1	57	0.009
20	5	5	10,000	3,289	1,706	27	19	2	95	0.014
21	2	2	4,000	1,316	682	11	8	1	38	0.006
22	5	5	10,000	3,289	1,706	27	19	2	95	0.014
23	4	4	8,000	2,631	1,364	22	15	1	76	0.011
24	6	6	12,000	3,947	2,047	33	23	2	114	0.017
25	9	9	18,000	5,921	3,070	49	35	3	170	0.026
26	2	2	4,000	1,316	682	11	8	1	38	0.006
27	6	6	12,000	3,947	2,047	33	23	2	114	0.017
28	7	7	14,000	4,605	2,388	38	27	2	133	0.020
29	3	3	6,000	1,974	1,023	16	12	1	57	0.009

EP B3
1.25" Pipe
TBD 06-004 Group 2

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm ²)	Cs-137 activity (dpm/100cm ²)	Eu-152 activity (dpm/100cm ²)	Eu-154 activity (dpm/100cm ²)	Nb-94 activity (dpm/100cm ²)	Ag-108m activity (dpm/100cm ²)	Unity
									MEAN	0.016
									MEDIAN	0.017
									STD DEV	0.007
									MAX	0.029
									MIN	0.006

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Pipe Interior Radiological Survey Form

Date: 3-22-06 Time: 1330
 Pipe ID#: B3 Pipe Diameter: 1.25" Access Point Area: DRAIN PIT 1.51A
 Building: RX Elevation: -25 System: -25 ANNUALS RX CONDUIT

Type of Survey Investigation Characterization Final Survey Other
 Gross Co60 Cs

Detector ID# / Sled ID# 44-1591 2383691 NO SLED

Detector Cal Date: 10-MAR-06 Detector Cal Due Date: 6-MAR-07

Instrument: 2350-1 Instrument ID #: 203488

Instrument Cal Date: 17-NOV-05 Instrument Cal Due Date: 17-NOV-06

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

Background Value 10.4 cpm

MDCR_{static} 14.1 cpm

Efficiency Factor for Pipe Diameter 0.0005 (from detector efficiency determination)

MDC_{static} 4318 dpm / 100 cm²

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

Comments: INITIAL SURVEY

NO MAP AVAILABLE

COMPLETE

Technician Signature



Pipe Interior Radiological Survey

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm ²
1	1	7	7	7	N/A	N/A
2	2	↓	9	9	↓	↓
3	3		9	9		
4	4		6	6		
5	5		7	7		
6	6		3	3		
7	7		6	6		
8	8		10	10		
9	9		6	6		
10	10		9	9		

Package Page 1 of 2

REFERENCE COPY

Pipe Interior Radiological Survey Form (Continuation Form)

Date: 3-22-06
 Pipe ID#: B3 Pipe Diameter: 1.25" Access Point Area: DRAIN PIT 1.51A
 Building: RX Elevation: -25 System: -25 ANNUALS
RX CONDUIT

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm ²
11	11	1	4	4	n/a	n/a
12	12	↓	3	3	↓	↓
13	13		10	10		
14	14		4	4		
15	15		2	2		
16	16		2	2		
17	17		5	5		
18	18		6	6		
19	19		3	3		
20	20		5	5		
21	21		2	2		
22	22		5	5		
23	23		4	4		
24	24		6	6		
25	25		9	9		
26	26		2	2		
27	27		6	6		
28	28		7	7		
29	29		1	3		
n/a						

REFERENCE COPY

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DQA Check Sheet

Design #	EP B3	Revision #	Original			
Survey Unit #	EP B3					
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)			<i>Dale Randolph / Jeff Pentall</i>		Date	10-9-07
FSS/ Characterization Manager (print/sign)			R. Case <i>[Signature]</i>		Date	10/11/07

Form
CS-09/2
Rev 0

**SECTION 7
ATTACHMENT 4
1 DISC**