




Survey Unit Release Record

Design #	EP-203B	Revision #	Original	Page 1 of 3
Survey Unit #(s)	203B			
Description	<p>1) Embedded Pipe (EP) Survey Unit 203B meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP 203B 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 203B 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			10-7-07	
Technical Reviewer (FSS/Characterization Engineer)			10-9-07	
FSS/Characterization Manager	 <small>F. Case</small>		10/10/07	

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Survey Unit: 203B

1.0 History/Description

- 1.1 The subject pipe system is the 4" line located in the Rx cavity. The pipe was a hot drain sleeve running into Quad B. The pipe section is approximately 7 feet in length.

2.0 Survey Design Information

- 2.1 EP 203B was surveyed IAW Procedure #BSI/LVS-002.
- 2.2 100% of the 4" ID pipe was accessible for survey. The accessible 4" ID pipe was surveyed by static measurement at one foot increments, for a total of 7 survey measurements.
- 2.3 Surface area for the 4" ID piping is 973 cm² for each foot of piping, corresponding to a total 4" ID piping surface area of 6,810 cm² (0.7 m²) for the entire length of (approximately 7') of 4" 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 203B 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: 203B

5.5 Statistical Summary Table

Statistical Parameter	4" Pipe
Total Number of Survey Measurements	7
Number of Measurements >MDC	2
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0160
Median	0.0043
Standard Deviation	0.0208
Maximum	0.0548
Minimum	0.0034

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 203B 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 203B & Spreadsheet

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BSI EP/BP SURVEY REPORT

Pipe ID	203B	Survey Location	Rx Cavity 0 el.
Survey Date	09-Mar-06	2350-1 #	203488
Survey Time	13:20	Detector-Sled #	Bicron 1MG1/LVS-101
Pipe Size	4"	Detector Efficiency	0.00052
DCGL (dpm/100cm2)	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm2)	973
Pipe Area Incorporated by Survey Data (m²)	0.6810	Field BKG (cpm)	19.5
Routine Survey	X	Field MDCR (cpm)	18.2
QA Survey		Nominal MDC (dpm/100cm2)	1,557
Survey Measurement Results			
Total Number of Survey Measurements		7	
Number of Measurements >MDC		2	
Number of Measurements Above 50% DCGL		0	
Number of Measurements Above DCGL		0	
Mean		0.0160	
Median		0.0043	
Standard Deviation		0.0208	
Maximum		0.0548	
Minimum		0.0034	
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>Paul Marshall 10-7-07</i>	

EP 203A
4" 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	64	64	123,077	12,651	6,560	105	74	6	364	0.055
2	5	5	9,615	988	512	8	6	0	28	0.004
3	4	4	7,692	791	410	7	5	0	23	0.003
4	4	4	7,692	791	410	7	5	0	23	0.003
5	5	5	9,615	988	512	8	6	0	28	0.004
6	7	7	13,462	1,384	717	11	8	1	40	0.006
7	42	42	80,769	8,302	4,305	69	49	4	239	0.036
									MEAN	0.016
									MEDIAN	0.004
									STD DEV	0.021
									MAX	0.055
									MIN	0.003

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Pipe Interior Radiological Survey Form

Date: 3-9-08^{AM}-06 Time: 1320
 Pipe ID#: 203 B Pipe Diameter: 4" Access Point Area: -0 CAVITY VESSEL
 Building: RX Elevation: -0 System: HOT DRAIN SLEEVE
 Type of Survey Investigation _____ Characterization _____ Final Survey Other QUAD B
 Gross _____ Co60 Cs _____
 Detector ID# / Sled ID# BICRON 1461/LVS-1 1 101
 Detector Cal Date: 20-DEC-05 Detector Cal Due Date: 20-DEC-06
 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 19.5 cpm
 MDCR_{static} 18.2 cpm
 Efficiency Factor for Pipe Diameter 0.00052 (from detector efficiency determination)
 MDC_{static} 1557 dpm/ 100 cm²
 Is the MDC_{static} acceptable? Yes No (if no, adjust sample count time and recalculate MDCR_{static})
 Comments: INITIAL

NO MAPS AVAILABLE

Technician Signature Jim [Signature] COMPLETE

Pipe Interior Radiological Survey

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm ²
1	1	1	64	64	n/a	n/a
2	2	1	5	5		
3	3	1	4	4		
4	4	1	4	4		
5	5	1	5	5		
6	6	1	7	7		
7	7	1	42	42		
8	n/a	n/a	n/a	n/a		
9	↓	↓	↓	↓	↓	↓
10	↓	↓	↓	↓	↓	↓

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DQA Check Sheet

Design #	EP 203B	Revision #	Original			
Survey Unit #	EP 203B					
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	<i>xg</i>	
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 Randall</i>		Date	10-7-07
FSS/ Characterization Manager (print/sign)			<i>R. Case</i>		Date	10/10/07

Form
 CS-09/2
 Rev 0

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1 DISC**