

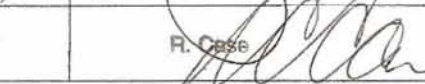


## Survey Unit Release Record

<b>Design #</b>	EP-Rx 151D	<b>Revision #</b>	Original	<b>Page 1 of 3</b>
<b>Survey Unit #(s)</b>	Rx 151D			
<b>Description</b>	<p>1) Embedded Pipe (EP) Survey Unit RX 151D meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP RX 151D 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 RX 151D were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP 2-1 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>			
<b>Approval Signatures</b>			<b>Date:</b>	
FSS/Characterization Engineer			10-31-07	
Technical Reviewer (FSS/Characterization Engineer)			10/31/07	
FSS/Characterization Manager			10/31/07	

Form CS-09/1 Rev 0
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## Survey Unit: Rx 151D

**1.0** History/Description

- 1.1 The subject pipe system is a 0.75" spare drain line for Quad "B".
- 1.2 EP RX 151D is 15 feet in length.

**2.0** Survey Design Information

- 2.1 EP RX 151D was surveyed IAW Procedure #BSI/LVS-002.
- 2.2 100% of the 0.75" pipe was accessible for survey. This accessible 0.75" pipe was surveyed by static measurement in one foot increments, for a total of 15 survey measurements.
- 2.3 Surface area for the 0.75" piping is 182 cm<sup>2</sup> for each foot of piping, corresponding to 2,73 cm<sup>2</sup> for the 15' of 0.75" piping.
- 2.4 Total surface area for EP RX 151D is 0.27 m<sup>2</sup>.

**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 RX 151D 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: Rx 151D

### 5.5 Statistical Summary Table

Statistical Parameter	0.75" Pipe
Total Number of Survey Measurements	15
Number of Measurements >MDC	12
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.042
Median	0.040
Standard Deviation	0.009
Maximum	0.058
Minimum	0.025

**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 Rx 151D to be less than 1 mrem/yr. The dose contribution is estimated to be 0.042 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 Rx 1.51D & Spreadsheet

**SECTION 7  
ATTACHMENT 1  
2 PAGES**



### BSI EP/BP SURVEY REPORT

Pipe ID	RX 151D	Survey Location	-27' Trench Spare Drain
Survey Date	29-Oct-07	2350-1 #	203468
Survey Time	1558	Detector-Sled #	0047-no sled
Pipe Size	0.75"	Detector Efficiency	0.00066
DCGL (dpm/100cm <sup>2</sup> )	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm <sup>2</sup> )	182
Pipe Area Incorporated by Survey Data (in <sup>2</sup> )	0.3	Field BKG (cpm)	8.8
Routine Survey	X	Field MDCR (cpm)	13.2
QA Survey		Nominal MDC (dpm/100cm <sup>2</sup> )	8,442
Survey Measurement Results			
Total Number of Survey Measurements			15
Number of Measurements >MDC			12
Number of Measurements Above 50% DCGL			0
Number of Measurements Above DCGL			0
Mean			0.042
Median			0.040
Standard Deviation			0.009
Maximum			0.058
Minimum			0.025
Survey Technician(s)	FOWLER		
Survey Unit Classification			
Survey Unit Classification			1
TBD 06-004 Piping Group			2
SR-13 Radionuclide Distribution Sample			EP 2-1
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>[Signature]</i> / 10-31-07		

**EP RX 151D**  
**0.75" 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	10	10	15,152	8,306	4,307	69	49	4	239	0.036
2	7	7	10,606	5,814	3,015	48	34	3	167	0.025
3	14	14	21,212	11,629	6,030	96	68	6	335	0.050
4	16	16	24,242	13,290	6,891	110	78	6	382	0.058
5	14	14	21,212	11,629	6,030	96	68	6	335	0.050
6	13	13	19,697	10,798	5,599	90	63	5	311	0.047
7	13	13	19,697	10,798	5,599	90	63	5	311	0.047
8	15	15	22,727	12,459	6,461	103	73	6	359	0.054
9	11	11	16,667	9,137	4,738	76	53	4	263	0.040
10	10	10	15,152	8,306	4,307	69	49	4	239	0.036
11	14	14	21,212	11,629	6,030	96	68	6	335	0.050
12	11	11	16,667	9,137	4,738	76	53	4	263	0.040
13	9	9	13,636	7,476	3,876	62	44	4	215	0.032
14	10	10	15,152	8,306	4,307	69	49	4	239	0.036
15	9	9	13,636	7,476	3,876	62	44	4	215	0.032
									MEAN	0.042
									MEDIAN	0.040
									STD DEV	0.009
									MAX	0.058
									MIN	0.025

**SECTION 7  
ATTACHMENT 2  
3 PAGES**

**Pipe Interior Radiological Survey Form**

Date: 10-29-07 Time: 1558  
 Pipe ID#: R 151 D Pipe Diameter: 0.75" Access Point Area: Pump Room Trench  
 Building: R Bldg Elevation: -27' System: Penetration  
 Type of Survey Investigation \_\_\_\_\_ Characterization \_\_\_\_\_ Final Survey X Other ✓  
 Gross \_\_\_\_\_ Co60 ✓ Cs \_\_\_\_\_  
 Detector ID# / Sled ID# F0/1.5LX / 0047 / No Sled  
 Detector Cal Date: 9-14-07 Detector Cal Due Date: 9-14-08  
 Instrument: 2350-1 Instrument ID #: 203468  
 Instrument Cal Date: 9-14-07 Instrument Cal Due Date: 9-14-08

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

Background Value 8.8 cpm  
 MDC<sub>static</sub> 13.2 cpm  
 Efficiency Factor for Pipe Diameter 0.00066 (from detector efficiency determination)  
 MDC<sub>static</sub> 8442 dpm/ 100 cm<sup>2</sup>  
 Is the MDC<sub>static</sub> acceptable? Yes No (if no, adjust sample count time and recalculate MDC<sub>static</sub>)  
 Comments: Post Down

EP 2-1

Technician Signature R Fisher

**Pipe Interior Radiological Survey**

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm <sup>2</sup>
1	1	↓	10	10	n/a	n/a
2	2		7	7		
3	3		14	14		
4	4		16	16		
5	5		14	14		
6	6		13	13		
7	7		13	13		
8	8		15	15		
9	9		11	11		
10	10		10	10		

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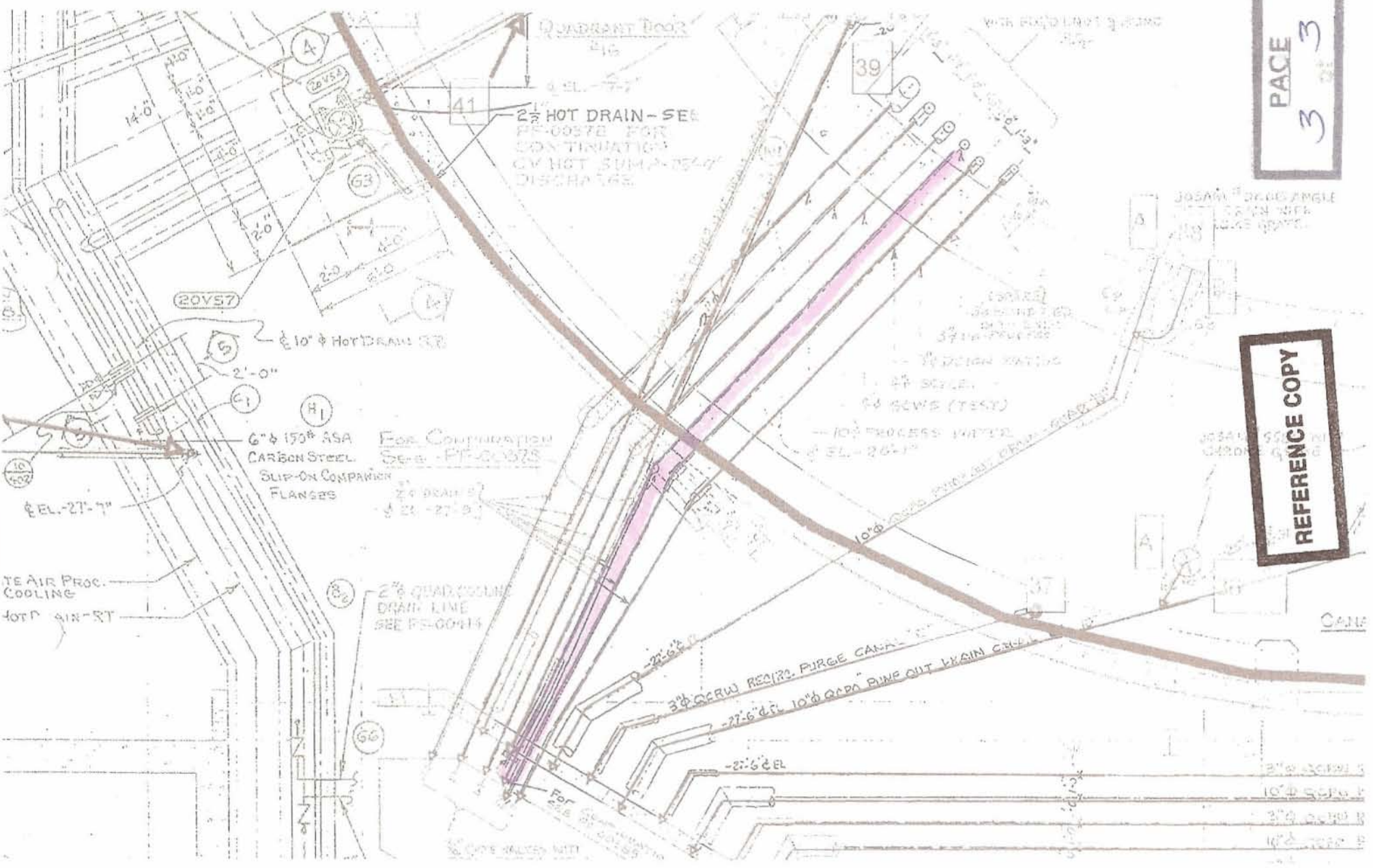




R 151 D


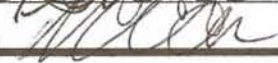
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**SECTION 7  
ATTACHMENT 3  
1 PAGE**

**DQA Check Sheet**

Design #	EP RX 151D	Revision #	Original				
Survey Unit #	EP RX 151D						
<b>Preliminary Data Review</b>							
<b>Answers to the following questions should be fully documented in the Survey Unit Release Record</b>				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 <sub>w</sub> for Class 1 and 2 survey units, or below 0.5 DCGL <sub>w</sub> for Class 3 survey units?					X	
3.	Is the instrumentation MDC for embedded/buried piping static measurements below the DCGL <sub>w</sub> ?			X			
4.	Was the instrumentation MDC for structure scan measurements, soil scan measurements, and embedded/buried piping scan measurements below the DCGL <sub>w</sub> , 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 <sub>w</sub> ?					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			
<b>Graphical Data Review</b>							
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	
<b>Data Analysis</b>							
1.	Are all sample measurements below the DCGL <sub>w</sub> (Class 1 & 2), or 0.5 DCGL <sub>w</sub> (Class 3)?			X			
2.	Is the mean of the sample data < DCGL <sub>w</sub> ?			X			
3.	If elevated areas have been identified by scans and/or sampling, is the average activity in each elevated area < DCGL <sub>EMC</sub> (Class 1), < DCGL <sub>w</sub> (Class 2), or <0.5 DCGL <sub>w</sub> (Class 3)?					X	
4.	Is the result of the Elevated Measurements Test < 1.0?					X	
5.	Is the result of the statistical test ( <b>S+</b> for Sign Test or <b>W<sub>r</sub></b> for WRS Test) ≥ the critical value?					X	
Comments:							
FSS/Characterization Engineer (print/sign)				 G. Wood		Date	10.31.07
FSS/ Characterization Manager (print/sign)				 R. Case		Date	10/31/07

Form  
CS-09/2  
Rev 0

**SECTION 7  
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1 DISC**