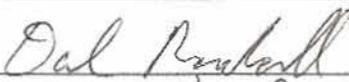
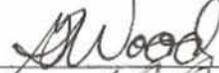


### Survey Unit Release Record

<b>Design #</b>	EP-CRT-9	<b>Revision #</b>	Original	<b>Page 1 of 3</b>
<b>Survey Unit #(s)</b>	CRT-9			
<b>Description</b>	<p>1) Embedded Pipe (EP) Survey Unit CRT-9 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP CRT-9 is a Class 1, Group 1 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004.</p> <p>3) Surveys in EP CRT-9 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.</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			11-12-07	
Technical Reviewer (FSS/Characterization Engineer)			11-14-07	
FSS/Characterization Manager	R. Case 		11/15/07	

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## Survey Unit: CRT-9

**1.0 History/Description**

- 1.1 The subject pipe system is a 2.5" diameter penetration located on the CRT plate within the Sub Pile Room. The system access point is located on the -34' el. of the Rx building.
- 1.2 EP CRT-9 consists of 2.5" diameter piping that is approximately 3 feet in length.

**2.0 Survey Design Information**

- 2.1 EP CRT-9 was surveyed IAW Procedure #BSI/LVS-002.
- 2.2 100% of the piping was accessible for survey. The accessible pipe was surveyed by static measurement at one foot increments, for a total of 3 survey measurements.
- 2.3 The total surface area for the piping system is approximately 1,824 cm<sup>2</sup> (0.2 m<sup>2</sup>) for the entire length of (3') of 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 CRT-9 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: CRT-9

### 5.5 Statistical Summary Table

Statistical Parameter	2.5" Pipe
Total Number of Survey Measurements	3
Number of Measurements >MDC	1
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0396
Median	0.0178
Standard Deviation	0.0539
Maximum	0.1011
Minimum	0.0000

**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 CRT-9 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.040 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 CRT-9 & Spreadsheet

**SECTION 7**  
**ATTACHMENT 1**  
2 **PAGE(S)**



### BSI EP/BP SURVEY REPORT

Pipe ID	EP CRT-9	Survey Location	Sub Pile Room Pen. -34 el.
Survey Date	24-Oct-07	2350-1 #	189094
Survey Time	16:57	Detector-Sled #	1MG1 LVS-1/ no sled
Pipe Size	2.5"	Detector Efficiency	0.00033
DCGL (dpm/100cm <sup>2</sup> )	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm <sup>2</sup> )	608
Pipe Area Incorporated by Survey Data (m <sup>2</sup> )	0.2	Field BKG (cpm)	3.4
Routine Survey	X	Field MDCR (cpm)	10
QA Survey		Nominal MDC (dpm/100cm <sup>2</sup> )	3,927

#### Survey Measurement Results

Total Number of Survey Measurements	3
Number of Measurements >MDC	1
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0396
Median	0.0178
Standard Deviation	0.0539
Maximum	0.1011
Minimum	0.0000

Survey Technician(s)	FOWLER
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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	<i>Paul Newhall</i> 11-12-07
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**EP CRT-9**  
**2.5" 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	6	6	18,182	2,990	119	2,837	754	87	21	0.018
2	0	0	-	-	-	-	-	-	-	0.000
3	34	34	103,030	16,944	672	16,074	4,273	494	118	0.101
									MEAN	0.040
									MEDIAN	0.018
									STD DEV	0.054
									MAX	0.101
									MIN	0.000

**SECTION 7**  
**ATTACHMENT 2**  
2 **PAGE(S)**

**Pipe Interior Radiological Survey Form**

Date: 10-24-07 Time: 1657  
 Pipe ID#: CRT-9 Pipe Diameter: 2.5" Access Point Area: Sub Pile Rm  
 Building: CV Elevation: -34' System: Penetration  
 Type of Survey Investigation \_\_\_\_\_ Characterization \_\_\_\_\_ Final Survey X Other ✓  
 Gross \_\_\_\_\_ Co60 ✓ Cs \_\_\_\_\_  
 Detector ID# / Sled ID# 1mg1/LVS-1 / No sled  
 Detector Cal Date: 1-11-07 Detector Cal Due Date: 1-11-08  
 Instrument: 2350-1 Instrument ID #: 189094  
 Instrument Cal Date: 1-11-07 Instrument Cal Due Date: 1-11-08

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

Background Value 3.4 cpm  
 MDCR<sub>static</sub> 10 cpm  
 Efficiency Factor for Pipe Diameter 0.00033 (from detector efficiency determination)  
 MDC<sub>static</sub> 3927 dpm/ 100 cm<sup>2</sup>  
 Is the MDC<sub>static</sub> acceptable? (Yes) No (if no, adjust sample count time and recalculate MDCR<sub>static</sub>)  
 Comments: Post Recon 100%, Complete

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	1	6	6	n/a	n/a
2	2	↓	0	0	↓	↓
3	3	↓	34	34	↓	↓
4						
5						
6						
7						
8						
9						
10						

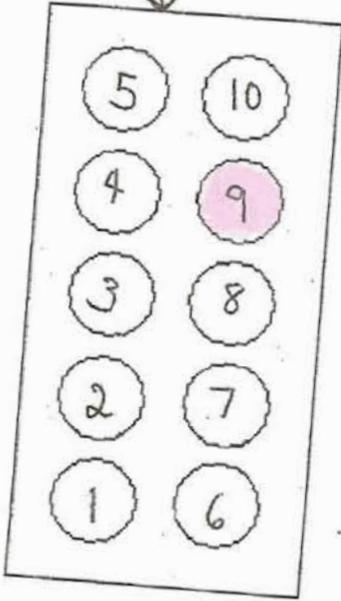
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Package Page 1 of \_\_\_\_\_

IT-12

North  
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CRT Plate  
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IT-14

IT-13

IT-11

**SECTION 7**  
**ATTACHMENT 3**  
**1   PAGE(S)**

**DQA Check Sheet**

Design #	EP CRT-9	Revision #	Original
Survey Unit #	EP-CRT-9		

**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 <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		

**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 <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 ( <i>S</i> + for Sign Test or <i>W</i> <sub>r</sub> for WRS Test) ≥ the critical value?			X

Comments:

FSS/Characterization Engineer (print/sign)	<i>Date Randall J. Paul</i>	Date	11-12-07
FSS/ Characterization Manager (print/sign)	R. Case <i>[Signature]</i>	Date	11/15/07

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**SECTION 7  
ATTACHMENT 4  
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