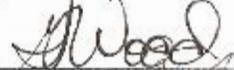


### Survey Unit Release Record

<b>Design #</b>	EP-CRT-7	<b>Revision #</b>	Original	<b>Page 1 of 3</b>
<b>Survey Unit #(s)</b>	CRT-7			
<b>Description</b>	<p>1) Embedded Pipe (EP) Survey Unit CRT-7 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP CRT-7 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-7 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-7

**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-7 consists of 2.5" diameter piping that is approximately 3 feet in length.

**2.0 Survey Design Information**

- 2.1 EP CRT-7 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-7 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-7

### 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	0.0614
Median	0.0178
Standard Deviation	0.0887
Maximum	0.1635
Minimum	0.0030

**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-7 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.061 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-7 & Spreadsheet

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**ATTACHMENT 1**  
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### BSI EP/BP SURVEY REPORT

<b>Pipe ID</b>	<b>EP CRT-7</b>	<b>Survey Location</b>	<b>Sub Pile Room Pen. -34 el.</b>
<b>Survey Date</b>	24-Oct-07	<b>2350-1 #</b>	189094
<b>Survey Time</b>	16.50	<b>Detector-Sled #</b>	1MG1 LVS-1/ no sled
<b>Pipe Size</b>	2.5"	<b>Detector Efficiency</b>	0.00033
<b>DCGL (dpm/100cm<sup>2</sup>)</b>	2.41E+05	<b>Pipe Area Incorporated by Detector Efficiency (in cm<sup>2</sup>)</b>	608
<b>Pipe Area Incorporated by Survey Data (m<sup>2</sup>)</b>	0.2	<b>Field BKG (cpm)</b>	3.4
<b>Routine Survey</b>	X	<b>Field MDCR (cpm)</b>	10
<b>QA Survey</b>		<b>Nominal MDC (dpm/100cm<sup>2</sup>)</b>	3,927
<b>Survey Measurement Results</b>			
<b>Total Number of Survey Measurements</b>		3	
<b>Number of Measurements &gt;MDC</b>		1	
<b>Number of Measurements Above 50% DCGL</b>		0	
<b>Number of Measurements Above DCGL</b>		0	
<b>Mean</b>		0.0614	
<b>Median</b>		0.0178	
<b>Standard Deviation</b>		0.0887	
<b>Maximum</b>		0.1635	
<b>Minimum</b>		0.0030	
<b>Survey Technician(s)</b>	FOWLER		
<b>Survey Unit Classification</b>		1	
<b>TBD 06-004 Piping Group</b>		1	
<b>SR-13 Radionuclide Distribution Sample</b>		EP 3-9	
<b>Measured Nuclide</b>		Co-60	
<b>Area Factor/EMC Used</b>		No	
<b>Pass/Fail FSS</b>		Pass	
<b>MREM/YR Contribution</b>		<1	
<b>COMMENTS:</b>			
ACTIVITY VALUES NOT BACKGROUND CORRECTED			
<b>RP Engineer   Date</b>	<i>Paul Rumball 11-12-07</i>		

**EP CRT-7**  
**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	1	1	3,030	498	20	473	126	15	3	0.003
3	55	55	166,667	27,410	1,086	26,001	6,912	800	191	0.163
									MEAN	0.061
									MEDIAN	0.018
									STD DEV	0.089
									MAX	0.163
									MIN	0.003

**SECTION 7**  
**ATTACHMENT 2**  
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**Pipe Interior Radiological Survey Form**

Date: 10-24-07 Time: 1650  
 Pipe ID#: CRT-7 Pipe Diameter: 2.5" Access Point Area: Sub Pipe Rm  
 Building: CV Elevation: -34' System: Penetration  
 Type of Survey Investigation  Characterization  Final Survey  Other   
 Gross  Co60  Cs   
 Detector ID# / Sled ID# Ima1 / 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 0.0003 (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 Devon 100% Complete

Technician Signature R. F. [Signature]

**Pipe Interior Radiological Survey**

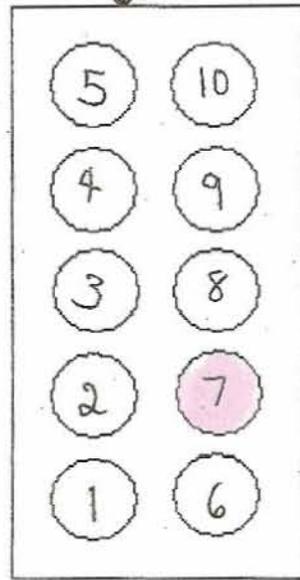
Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm <sup>2</sup>
1	1	1	6	6	n/a	n/a
2	2	↓	1	1	↓	↓
3	3	↓	55	55	↓	↓
4						
5						
6						
7						
8						
9						
10						



North  
↓

IT-12

CRT Plate  
↓



IT-14

IT-13

IT-11

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**SECTION 7**  
**ATTACHMENT 3**  
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**DQA Check Sheet**

Design #	EP CRT-7	Revision #	Original	
Survey Unit #	EP-CRT-7			

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

Comments:

FSS/Characterization Engineer (print/sign)	<i>Dale Randall</i>	Date	11-12-07
FSS/ Characterization Manager (print/sign)	R. Case	Date	11/15/07

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