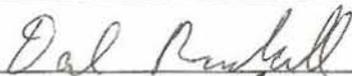
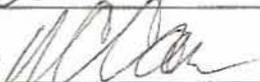


### Survey Unit Release Record

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

Form  
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## Survey Unit: VD-1

**1.0 History/Description**

- 1.1 The subject pipe system is a 1" I/S hot leg drain below the cavity vessel. The system access point is located on the -31' el. of the Rx building.
- 1.2 EP VD-1 consists of 1" diameter piping that is approximately 6 feet in length.

**2.0 Survey Design Information**

- 2.1 EP VD-1 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 6 survey measurements.
- 2.3 The total surface area for the piping system is approximately 730 cm<sup>2</sup> (0.1 m<sup>2</sup>) for the entire length of (6') 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 VD-1 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: VD-1

### 5.5 Statistical Summary Table

Statistical Parameter	1" Pipe
Total Number of Survey Measurements	6
Number of Measurements >MDC	6
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.1618
Median	0.1623
Standard Deviation	0.0595
Maximum	0.2591
Minimum	0.0794

**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 VD-1 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.162 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 VD-1 & Spreadsheet

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



### BSI EP/BP SURVEY REPORT

Pipe ID	EP VD-1	Survey Location	Cavity Vessel I/S hot leg drain. -31 el.
Survey Date	29-Oct-07	2350-1 #	203468
Survey Time	13:43	Detector-Sled #	FD 1.5LX 0047/no sled
Pipe Size	1"	Detector Efficiency	0.00071
DCGL (dpm/100cm <sup>2</sup> )	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm <sup>2</sup> )	243
Pipe Area Incorporated by Survey Data (m <sup>2</sup> )	0.1	Field BKG (cpm)	8.8
Routine Survey	X	Field MDCR (cpm)	13.2
QA Survey		Nominal MDC (dpm/100cm <sup>2</sup> )	6,638
Survey Measurement Results			
Total Number of Survey Measurements			6
Number of Measurements >MDC			6
Number of Measurements Above 50% DCGL			0
Number of Measurements Above DCGL			0
Mean			0.1618
Median			0.1623
Standard Deviation			0.0595
Maximum			0.2591
Minimum			0.0794
Survey Technician(s)	FOWLER		
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 Ruskell</i> 11-12-07	

**EP VD-1**  
**1" Pipe**  
**TBD 06-004 Group 1**

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm <sup>2</sup> )	Cs-137 activity (dpm/100cm <sup>2</sup> )	Eu-162 activity (dpm/100cm <sup>2</sup> )	Eu-154 activity (dpm/100cm <sup>2</sup> )	Nb-94 activity (dpm/100cm <sup>2</sup> )	Ag-108m activity (dpm/100cm <sup>2</sup> )	Unity
1	47	47	66,197	27,217	1,079	25,818	6,864	794	190	0.162
2	52	52	73,239	30,112	1,193	28,565	7,594	879	210	0.180
3	75	75	105,634	43,431	1,721	41,199	10,952	1,267	303	0.259
4	37	37	52,113	21,426	849	20,325	5,403	625	149	0.128
5	23	23	32,394	13,319	528	12,634	3,359	389	93	0.079
6	47	47	66,197	27,217	1,079	25,818	6,864	794	190	0.162
									MEAN	0.162
									MEDIAN	0.162
									STD DEV	0.060
									MAX	0.259
									MIN	0.094

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

Pipe Interior Radiological Survey Form

Date: 10-29-07 Time: 1343  
 Pipe ID#: VD-1 Pipe Diameter: 1" Access Point Area: I/s Hot bag  
 Building: CV Elevation: -31' System: Drain  
 Type of Survey Investigation \_\_\_\_\_ Characterization \_\_\_\_\_ Final Survey X Other V  
 Gross \_\_\_\_\_ Co60 V Cs \_\_\_\_\_  
 Detector ID# / Sled ID# FV/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  
 MDCR<sub>static</sub> 13.2 cpm  
 Efficiency Factor for Pipe Diameter 0.00071 (from detector efficiency determination)  
 MDC<sub>static</sub> 6638 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 locon Survey 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	47	47	n/a	n/a
2	2	↓	52	52	↓	↓
3	3		75	75		
4	4		37	37		
5	5		23	23		
6	6		47	47		
7						
8	N A					
9	N A					
10	N A					

Package Page 1 of 2

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VD-1

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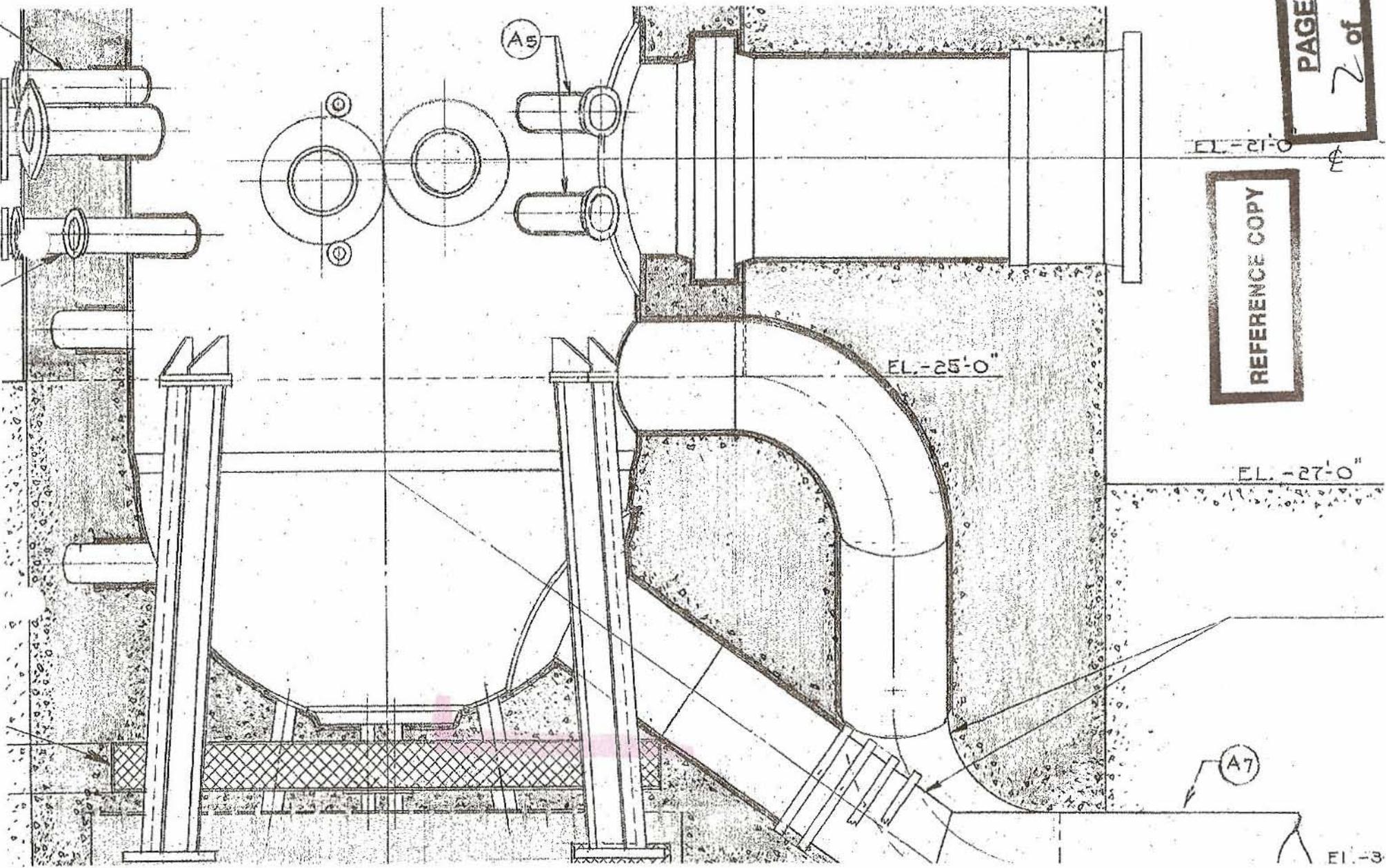
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EL.-3



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

### DQA Check Sheet

Design #	EP VD-1	Revision #	Original			
Survey Unit #	EP VD-1					
<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)			<i>Dale Randall</i>		Date	11-12-07
FSS/ Characterization Manager (print/sign)			R. Case		Date	11/15/07

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**SECTION 7  
ATTACHMENT 4  
1 DISC**