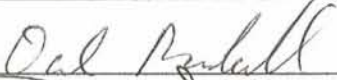
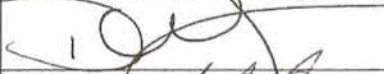
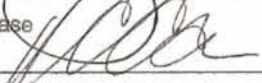


Survey Unit Release Record

Design #	EP-RPHD-1	Revision #	Original	Page 1 of 3
Survey Unit #(s)	RPHD-1			
Description	<p>1) Embedded Pipe (EP) Survey Unit RPHD-1 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP RPHD-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 RPHD-1 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP3-7 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			10-18-07	
Technical Reviewer (FSS/Characterization Engineer)			10/31/07	
FSS/Characterization Manager	R. Case 		10/31/07	

Form CS-09/1 Rev 0

Survey Unit: RPHD-1

1.0 History/Description

- 1.1 The subject pipe system is the 4" line running from the Resin Pit -10'.
- 1.2 EP RPHD-1 consists of 4" diameter piping that is approximately 17 feet in length.

2.0 Survey Design Information

- 2.1 EP RPHD-1 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 17 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 16,539 cm² (1.7 m²) for the entire length of (approximately 17') 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 RPHD-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: RPHD-1

5.5 Statistical Summary Table

Statistical Parameter	4" Pipe
Total Number of Survey Measurements	17
Number of Measurements >MDC	17
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.3251
Median	0.3464
Standard Deviation	0.1017
Maximum	0.4721
Minimum	0.1104

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 RPHD-1 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.325 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 RPHD-1 & Spreadsheet

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2 **PAGE(S)**



BSI EP/BP SURVEY REPORT

Pipe ID	EP RPHD-1	Survey Location	Resin Pit -10'el.
Survey Date	13-Jun-06	2350-1 #	203488
Survey Time	08:37	Detector-Sled #	238369 / 101
Pipe Size	4"	Detector Efficiency	0.0002
DCGL (dpm/100cm ²)	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm ²)	973
Pipe Area Incorporated by Survey Data (m ²)	1.7	Field BKG (cpm)	12.7
Routine Survey	X	Field MDCR (cpm)	15.2
QA Survey		Nominal MDC (dpm/100cm ²)	4,049
Survey Measurement Results			
Total Number of Survey Measurements			17
Number of Measurements >MDC			17
Number of Measurements Above 50% DCGL			0
Number of Measurements Above DCGL			0
Mean			0.3251
Median			0.3464
Standard Deviation			0.1017
Maximum			0.4721
Minimum			0.1104
Survey Technician(s)	STOCK		
Survey Unit Classification			1
TBD 06-004 Piping Group			1
SR-13 Radionuclide Distribution Sample			EP 3-7
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	10-18-07		

EP RPHD-1
4" 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	37	37	185,000	19,016	754	18,038	4,795	555	133	0.113
2	96	96	480,000	49,338	1,955	46,802	12,442	1,440	344	0.294
3	134	134	670,000	68,868	2,730	65,328	17,367	2,010	480	0.411
4	102	102	510,000	52,422	2,078	49,728	13,220	1,530	365	0.313
5	106	106	530,000	54,478	2,159	51,678	13,738	1,590	380	0.325
6	84	84	420,000	43,171	1,711	40,952	10,887	1,260	301	0.257
7	80	80	400,000	41,115	1,630	39,002	10,368	1,200	287	0.245
8	123	123	615,000	63,214	2,505	59,966	15,941	1,845	441	0.377
9	147	147	735,000	75,549	2,994	71,666	19,052	2,205	526	0.451
10	96	96	480,000	49,338	1,955	46,802	12,442	1,440	344	0.294
11	120	120	600,000	61,673	2,444	58,503	15,552	1,800	430	0.368
12	113	113	565,000	58,075	2,302	55,090	14,645	1,695	405	0.346
13	117	117	585,000	60,131	2,383	57,040	15,164	1,755	419	0.359
14	154	154	770,000	79,147	3,137	75,079	19,959	2,310	552	0.472
15	122	122	610,000	62,701	2,485	59,478	15,812	1,830	437	0.374
16	136	136	680,000	69,896	2,770	66,303	17,626	2,040	487	0.417
17	36	36	180,000	18,502	733	17,551	4,666	540	129	0.110
									MEAN	0.325
									MEDIAN	0.346
									STD DEV	0.102
									MAX	0.472
									MIN	0.110

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Pipe Interior Radiological Survey Form

Date: 6/13/06 Time: 0837
 Pipe ID#: RPHD-1 Pipe Diameter: 4" Access Point Area: RESIN PIT
 Building: RESIN PIT Elevation: -10' System: _____

Type of Survey Investigation _____ Characterization _____ Final Survey Other
 Gross _____ Co60 Cs _____

Detector ID# / Sled ID# 44759 2383691 101
 Detector Cal Date: 3/6/06 Detector Cal Due Date: 3/6/07
 Instrument: 2350-1 Instrument ID #: 203468
 Instrument Cal Date: 11/17/05 Instrument Cal Due Date: 11/17/06

From the Daily Pipe Survey Detector Control Form for the Selected Detector
 Background Value 12.7 cpm
 MDCR_{static} 15.2 cpm
 Efficiency Factor for Pipe Diameter 0.0002 (from detector efficiency determination)
 MDC_{static} 4049 dpm/ 100 cm²
 Is the MDC_{static} acceptable? Yes No (if no, adjust sample count time and recalculate MDCR_{static})
 Comments: FINAL SURVEY EP3-7 COMPLETE

Technician Signature 

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	37	37	n/a	n/a
2	2	↓	96	96	↓	↓
3	3		134	134		
4	4		102	102		
5	5		106	106		
6	6		84	84		
7	7		80	80		
8	8		123	123		
9	9		147	147		
10	10		96	96		

REFERENCE COPY



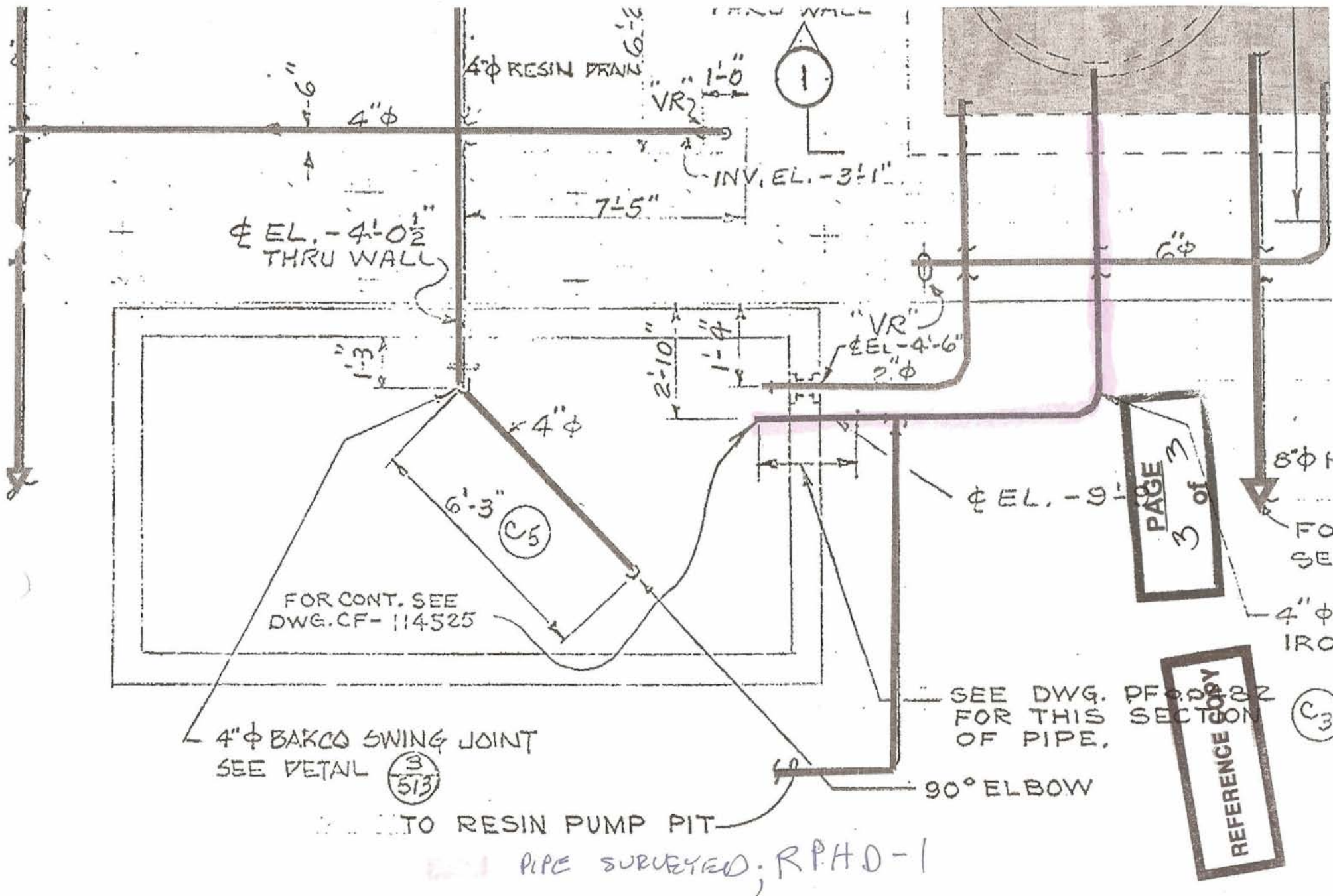
Pipe Interior Radiological Survey Form (Continuation Form)

Date: 6/13/06
 Pipe ID#: RP4D-1 Pipe Diameter: 4' Access Point Area: RESIN PIT
 Building: RESIN PIT Elevation: -10' System: _____

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm ²
11	11	1	120	120	n/a	n/a
12	12	↓	113	113	↓	↓
13	13		117	117		
14	14		154	154		
15	15		122	122		
16	16		136	136		
17	17		36	36		

REFERENCE COPY

Package Page 2 of 3



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ATTACHMENT 3
 / **PAGE(S)**

DQA Check Sheet

Design #	EP RPHD-1	Revision #	Original	
Survey Unit #	EP RPHD-1			

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		
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>Date Randolph D. L. Marshall</i>	Date	10-18-07
FSS/ Characterization Manager (print/sign)	<i>W. A. Case</i>	Date	10/31/07

Form
CS-09/2
Rev 0

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ATTACHMENT 4
1 DISC**