Survey Unit Release Record				
Design #	EP-RP-01	**Revision #**	Original	**Page 1 of 3**
Survey Unit #(s)	RP-01			
Description	1) Embedded Pipe (EP) Survey Unit RP-01 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP RP-01 is a Class 1, Group 1 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004. 3) Surveys in EP RP-01 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP 3-7 from Survey Request (SR)-13 was referenced for this decision. 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. 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.			

Approval Signatures		**Date:**
FSS/Characterization Engineer	Oak Ridge	12-12-07
Technical Reviewer (FSS/Characterization Engineer)	J. Wood	12-13-07
FSS/Characterization Manager	R. Case	12/18/07

Form CS-09/1 Rev 0

1.0 History/Description

1.1 The subject pipe system is a 2" drain line section located in Room 8 of the Primary Pump House (PPH). The system is accessed from the -6' el.

1.2 EP RP-01 consists of 2" diameter piping that is approximately 11 feet in length.

2.0 Survey Design Information

2.1 EP RP-01 was surveyed IAW Procedure #BSI/LVS-002.

2.2 100% of the 2" ID pipe was accessible for survey. The accessible 2" ID pipe was surveyed by static measurement at one foot increments, for a total of 11 survey measurements.

2.3 Surface area for the 2" ID piping is 486 cm^2 for each foot of piping, corresponding to a total 2" ID piping surface area of 5,351 cm^2 (0.5 m^2) for the entire length of (approximately 11') of 2" 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 RP-01 passes FSS.

5.4 Background was not subtracted from the survey measurements and the Elevated Measurement Comparison (EMC) was not employed for the accessible portion of this survey unit.

5.5 Statistical Summary Table

Statistical Parameter	2" Pipe
Total Number of Survey Measurements	11
Number of Measurements >MDC	11
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0884
Median	0.0735
Standard Deviation	0.0447
Maximum	0.1862
Minimum	0.0392

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 RP-01 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.088 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 RP-01 & Spreadsheet

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BSI EP/BP SURVEY REPORT

Pipe ID	RP-01	Survey Location	PPH Rm 8' -7' ft. el.
Survey Date	13-Jun-06	**2350-1 #**	203488
Survey Time	09:03, 10:35	**Detector-Sled #**	44-159 238369/no sled
Pipe Size	2"	**Detector Efficiency**	0.0005
DCGL (dpm/100cm2)	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm2)	486
Pipe Area Incorporated by Survey Data (m^2)	0.5	**Field BKG** (cpm)	12.7
Routine Survey	X	**Field MDCR** (cpm)	15.3
QA Survey		**Nominal MDC** (dpm/100cm2)	4,410

Survey Measurement Results

Total Number of Survey Measurements	11
Number of Measurements >MDC	11
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0884
Median	0.0735
Standard Deviation	0.0447
Maximum	0.1862
Minimum	0.0392

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	Del Rudall 12-12-07

EP RP-01
2" 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	40	40	80,000	16,446	652	15,601	4,147	480	-	0.098
2	76	76	152,000	31,247	1,238	29,642	7,880	912	-	0.186
3	47	47	94,000	19,324	766	18,331	4,873	564	-	0.115
4	58	58	116,000	23,847	945	22,621	6,014	696	-	0.142
5	28	28	56,000	11,512	456	10,921	2,903	336	-	0.069
6	21	21	42,000	8,634	342	8,190	2,177	252	-	0.051
7	30	30	60,000	12,335	489	11,701	3,110	360	-	0.074
8	28	28	56,000	11,512	456	10,921	2,903	336	-	0.069
9	16	16	32,000	6,578	261	6,240	1,659	192	-	0.039
10	18	18	36,000	7,401	293	7,020	1,866	216	-	0.044
11	35	35	70,000	14,390	570	13,651	3,629	420	-	0.086
									MEAN	0.088
									MEDIAN	0.074
									STD DEV	0.045
									MAX	0.186
									MIN	0.039

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Pipe Interior Radiological Survey Form

Date: 6/13/06 Time: 0903

Pipe ID#: ~~3-RPO-1 RP-01~~ Pipe Diameter: 2" Access Point Area: RESIN AT

Building: RESIN PIT Elevation: -6 System: _____

Type of Survey Investigation _____ Characterization _____ Final Survey X Other ~

Gross _____ Co60 ✓ Cs _____

Detector ID# / Sled ID# 44-159 238369 / NO SLED

Detector Cal Date: 3/6/06 Detector Cal Due Date: 3/6/07

Instrument: 2350-1 Instrument ID #: 203488

~~Instrument Cal Date:~~ 11/17/~~06~~ 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

$MDCR_{static}$ 15.29 cpm

Efficiency Factor for Pipe Diameter 0.0005 (from detector efficiency determination)

MDC_{static} 4410 dpm/ 100 cm^2

Is the MDC_{static} acceptable? (Yes) No (if no, adjust sample count time and recalculate $MDCR_{static}$)

Comments: INITIAL SURVEY ; EP3-M COMPLETE

Technician Signature _____

Pipe Interior Radiological Survey

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm²
1	1	1	40	40	n/a	n/a
2	2	↓	76	76	↓	↓
3	3		47	47		
4	4		58	58		
5	5		28	28		
6	6					
7	7			N		
8	8					
9	9				A	
10	10	↓				

REFERENCE COPY

Pipe Interior Radiological Survey Form

Date: 6/13/06 Time: 1035

Pipe ID#: 2RPO-1RP-01 Pipe Diameter: 2" Access Point Area: PPH Rm # 8 Sump

Building: PPH Elevation: -7' System: _____

Type of Survey Investigation _____ Characterization _____ Final Survey X Other ✓

Gross _____ Co60 ✓ Cs _____

Detector ID# / Sled ID# 44-159 238369 / NO SLED

Detector Cal Date: 3/6/06 Detector Cal Due Date: 3/6/07

Instrument: 2350-1 Instrument ID #: 203488

~~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

$MDCR_{static}$ 15.29 cpm

Efficiency Factor for Pipe Diameter 0.0005 (from detector efficiency determination)

MDC_{static} 4410 dpm/ 100 cm^2

Is the MDC_{static} acceptable? (Yes) No (if no, adjust sample count time and recalculate $MDCR_{static}$)

Comments: ~~INITIAL SURVEY~~ EP3-7 CONTINUATION SURVEY

Technician Signature _____

Pipe Interior Radiological Survey

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm²
1	1	1	21	21	n/a	n/a
2	2	↓	30	30	↓	↓
3	3		28	28		
4	4		16	16		
5	5		18	18		
6	6	↓	35	35	↓	↓
7						
8			N			
9			A			
10						

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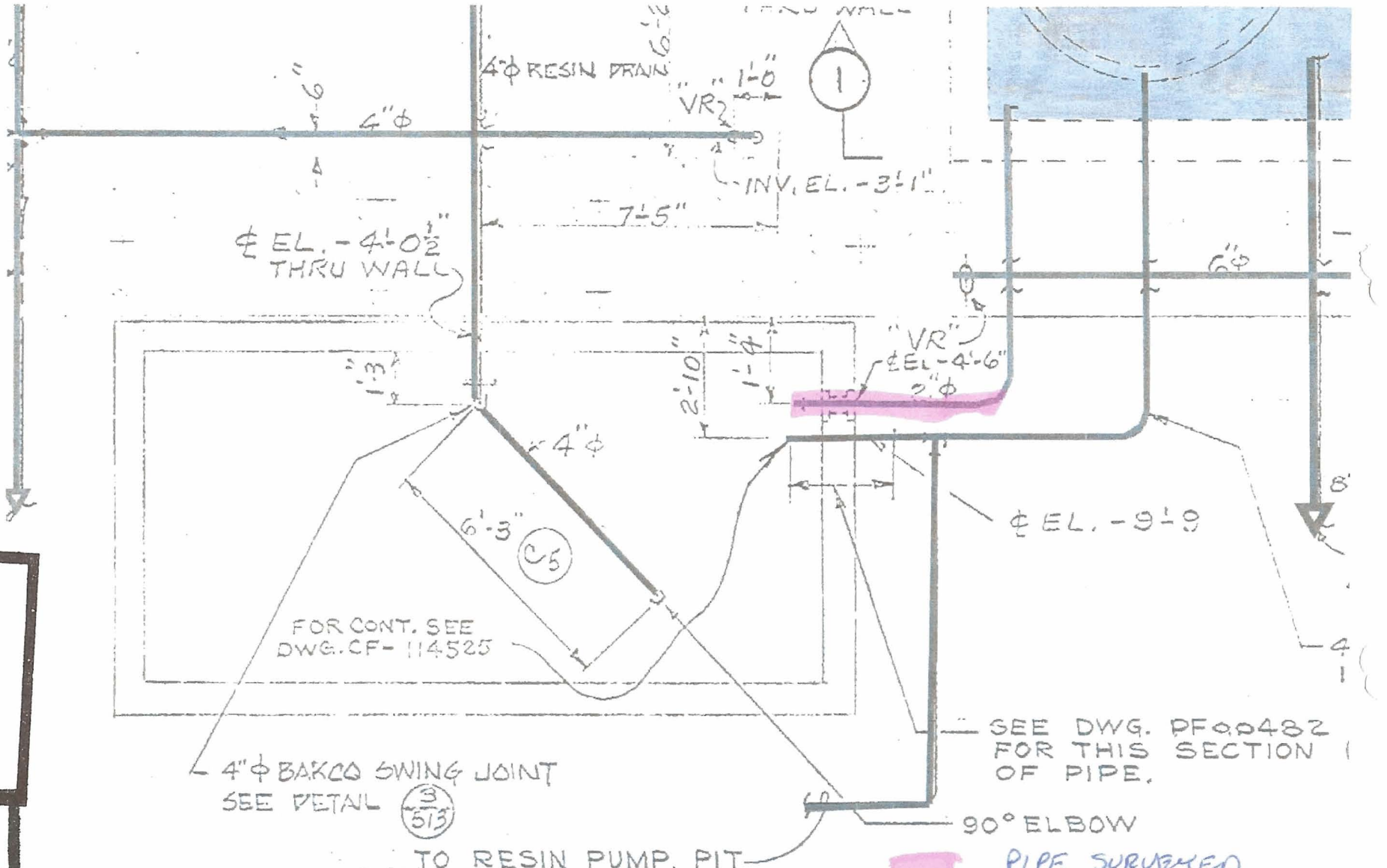

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DQA Check Sheet				
Design #	EP RP-01	Revision #	Original	
Survey Unit #	EP RP-01			

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)	GL Wood / GL Wood	Date	12-13-07
FSS/ Characterization Manager (print/sign)	R. Case / R. Case	Date	12/18/07

Form
CS-09/2
Rev 0

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ATTACHMENT 4
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