
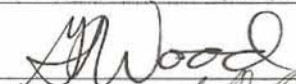



## Survey Unit Release Record

<b>Design #</b>	EP-1.51-2	<b>Revision #</b>	Original	<b>Page 1 of 3</b>
<b>Survey Unit #(s)</b>	1.51-2			
<b>Description</b>	<p>1) Embedded Pipe (EP) Survey Unit 1.51-2 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP 1.51-2 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 1.51-2 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			12-3-07	
Technical Reviewer (FSS/Characterization Engineer)			12-5-07	
FSS/Characterization Manager	R. Case 		12/10/07	

## Survey Unit: 1.51-2

**1.0** History/Description

- 1.1 The subject pipe system is a 2" drain stem located on the drain system for the annulus on the -25' elevation of the Reactor Building.
- 1.2 EP 1.51-2 is approximately 3 feet in length.

**2.0** Survey Design Information

- 2.1 EP 1.51-2 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 3 survey measurements.
- 2.3 Surface area for the 2" ID piping is 486 cm<sup>2</sup> for each foot of piping, corresponding to a total 2" ID piping surface area of 1,459 cm<sup>2</sup> (0.1 m<sup>2</sup>) for the entire accessible length of (3') 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 1.51-2 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.

Survey Unit: 1.51-2

## Statistical Summary Table

Statistical Parameter	2" Pipe
Total Number of Survey Measurements	3
Number of Measurements >MDC	0
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0102
Median	0.0094
Standard Deviation	0.0014
Maximum	0.0118
Minimum	0.0094

**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 the accessible portion of EP 1.51-2 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.010 mrem/yr based on the average of the actual gross counts.

**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 1.51-2 & Spreadsheet

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



### BSI EP/BP SURVEY REPORT

Pipe ID	EP 1.51-2	Survey Location	Drain Stem - Annulus Floor Drain -25'
Survey Date	09-Feb-06	2350-1 #	203488
Survey Time	10:40	Detector-Sled #	44-62 204402 / 121
Pipe Size (in.)	2	Detector Efficiency	0.00026
DCGL (dpm/100cm <sup>2</sup> )	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm <sup>2</sup> )	486
Pipe Area Incorporated by Survey Data (m <sup>2</sup> )	0.1	Field BKG (cpm)	5.1
Routine Survey	X	Field MDCR (cpm)	10.7
QA Survey		Nominal MDC (dpm/100cm <sup>2</sup> )	7,836
Survey Measurement Results			
Total Number of Survey Measurements		3	
Number of Measurements >MDC		0	
Number of Measurements Above 50% DCGL		0	
Number of Measurements Above DCGL		0	
Mean		0.0102	
Median		0.0094	
Standard Deviation		0.0014	
Maximum		0.0118	
Minimum		0.0094	
Survey Technician(s)	ROSENHAGEN		
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>Del Ruston 12-3-07</i>		

**EP 1.51-2**  
**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	2.5	2.5	9,615	1,977	78	1,875	498	58	14	0.012
2	2	2	7,692	1,581	63	1,500	399	46	11	0.009
3	2	2	7,692	1,581	63	1,500	399	46	11	0.009
									MEAN	0.010
									MEDIAN	0.009
									STD DEV	0.001
									MAX	0.012
									MIN	0.009

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

**Pipe Interior Radiological Survey Form**

Date: 2-9-06 Time: 10:40  
 Pipe ID#: 1.51 DEAD LEG Pipe Diameter: 2" Access Point Area: -25 Annulus  
 Building: REACTOR Elevation: -25 System: Annulus A.D.A.  
 Type of Survey Investigation  Characterization  Final Survey  Other   
 Gross  Co60  Cs   
 Detector ID# / Sled ID# 44-62 204402 1 121  
 Detector Cal Date: 17-Nov-05 Detector Cal Due Date: 17-Nov-06  
 Instrument: 2350-1 Instrument ID #: 203488  
 Instrument Cal Date: 17-Nov-05 Instrument Cal Due Date: 17-Nov-06

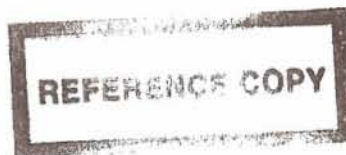
From the Daily Pipe Survey Detector Control Form for the Selected Detector

Background Value 5.1 cpm  
 MDCR<sub>static</sub> 10.7 cpm  
 Efficiency Factor for Pipe Diameter 0.00026 (from detector efficiency determination)  
 MDC<sub>static</sub> 7836 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: CONTINUATION SURVEY  
NOTE: #1 READING TOWARDS INNER WALL  
#2 READING TOWARDS OUTER WALL  
#3 READING TOWARDS OUTER WALL  
 Technician Signature Jui Salinger

**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	2	5	2.5	n/a	n/a
2	2	2	4	2		
3	3	2	934	2		
4						
5						
6						
7						
8						
9						
10						



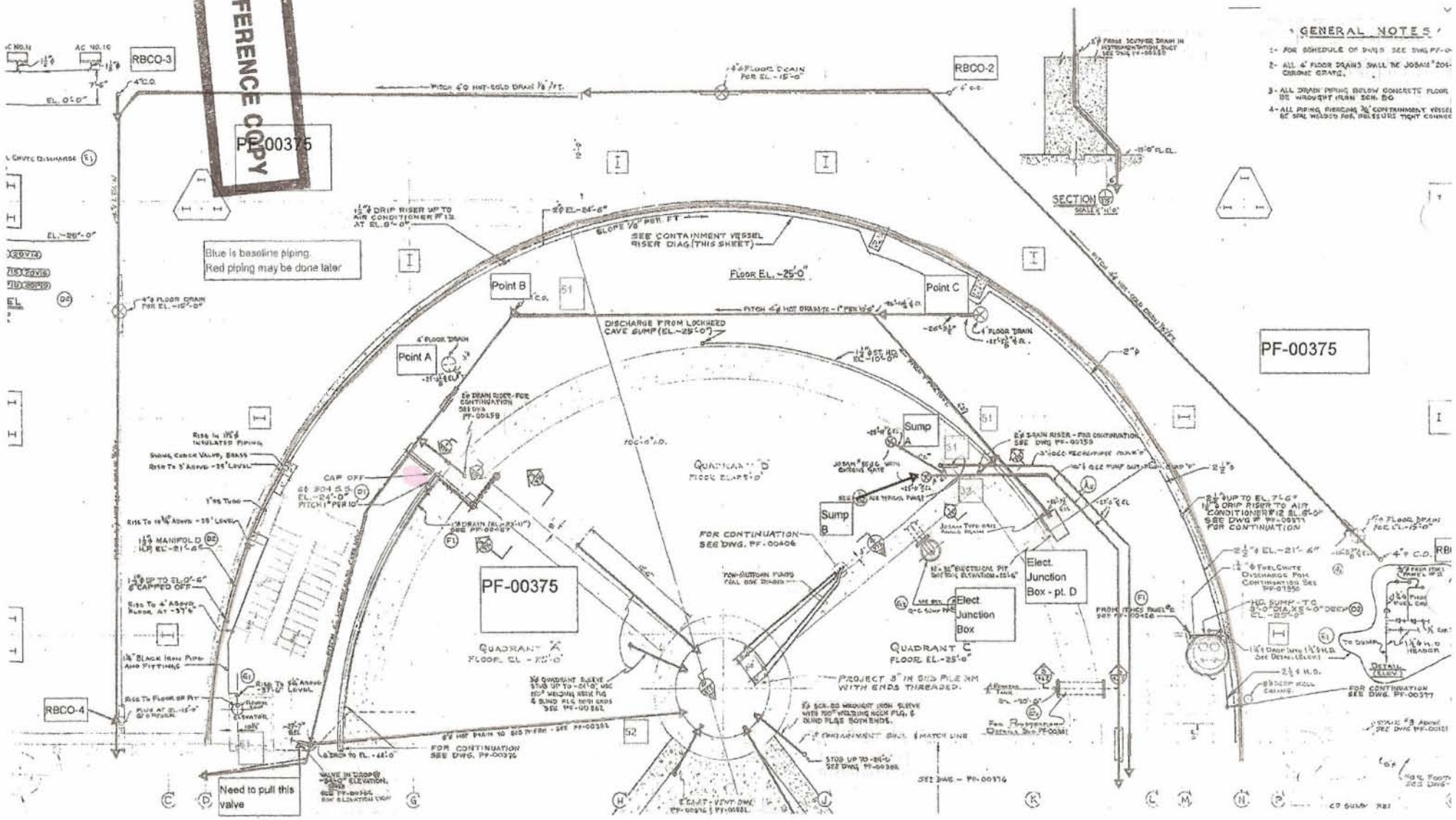


REFERENCE COPY

PF-00375

GENERAL NOTES

- 1- FOR SCHEDULE OF DWGS SEE DWG PF-0
- 2- ALL 4" FLOOR DRAINS SHALL BE JOHNSON 204- CORNICE GRATE.
- 3- ALL DRAIN PIPING BELOW CONCRETE FLOOR BE WROUGHT IRON SCH. 80.
- 4- ALL PIPING PIERCING TO CONTAINMENT VESSEL BE SMC WELDED PER DR-15 USE TIGHT CORNER



Blue is baseline piping. Red piping may be done later

Need to pull this valve

PF-00375

PF-00375

pages  
2 of 2

1-51  
DRAIN LEG  
CHECK  
THRU  
SURVEY  
SIDE

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

**DQA Check Sheet**

Design #	EP 1.51-2	Revision #	Original	
Survey Unit #	EP 1.51-2			

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

Comments:

FSS/Characterization Engineer (print/sign)	<i>Dale Randall / Dale Randall</i>	Date	12-3-07
FSS/ Characterization Manager (print/sign)	R. Case <i>[Signature]</i>	Date	12/10/07

Form  
CS-09/2  
Rev 0

**SECTION 7  
ATTACHMENT 4  
1 DISC**