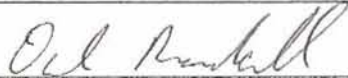

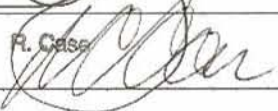


Survey Unit Release Record

Design #	EP-Rx 132	Revision #	Original	Page 1 of 3
Survey Unit #(s)	Rx 132			
Description	<p>1) Embedded Pipe (EP) Survey Unit Rx 132 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP Rx 132 is a Class 1, Group 2 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004.</p> <p>3) Surveys in EP Rx 132 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP2-5 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			10/31/07	

Form
CS-09/1
Rev 0

Survey Unit: Rx 132

1.0 History/Description

- 1.1 The subject pipe system is the 3" spare line running through Quad C to the Sub Pile Room.
- 1.2 EP Rx 132 consists of 3" diameter piping that is approximately 20 feet in length.

2.0 Survey Design Information

- 2.1 EP Rx 132 was surveyed IAW Procedure #BSI/LVS-002.
- 2.2 100% of the 3" ID pipe was accessible for survey. The accessible 3" ID pipe was surveyed by static measurement at one foot increments, for a total of 20 survey measurements.
- 2.3 Surface area for the 3" ID piping is 730 cm² for each foot of piping, corresponding to a total 3" ID piping surface area of 14,593 cm² (1.5 m²) for the entire length of (approximately 20') of 3" 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 Rx 132 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: Rx 132

5.5 Statistical Summary Table

Statistical Parameter	3" Pipe
Total Number of Survey Measurements	20
Number of Measurements >MDC	13
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0138
Median	0.0151
Standard Deviation	0.0050
Maximum	0.0242
Minimum	0.0046

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 Rx 132 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.014 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 Rx 132 & Spreadsheet

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



BSI EP/BP SURVEY REPORT

Pipe ID	EP Rx 132	Survey Location	QUAD C -25'el.
Survey Date	1/12/2006, 1/16/2006	2350-1 #	212223
Survey Time	10:15, 08:55	Detector-Sled #	44-62 212701/121
Pipe Size	3"	Detector Efficiency	0.00013
DCGL (dpm/100cm ²)	2.41E+05	Pipe Area Incorporated by Detector Efficiency (in cm ²)	730
Pipe Area Incorporated by Survey Data (m ²)	1.5	Field BKG (cpm)	5.2
Routine Survey	X	Field MDCR (cpm)	4.4
QA Survey		Nominal MDC (dpm/100cm ²)	2,779

Survey Measurement Results

Total Number of Survey Measurements	20
Number of Measurements >MDC	13
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0138
Median	0.0151
Standard Deviation	0.0050
Maximum	0.0242
Minimum	0.0046

Survey Technician(s)	ROSENHAGEN
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Survey Unit Classification	1
TBD 06-004 Piping Group	2
SR-13 Radionuclide Distribution Sample	EP 2-5
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 Rx 132
3" Pipe
TBD 06-004 Group 2

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm ²)	Cs-137 activity (dpm/100cm ²)	Eu-152 activity (dpm/100cm ²)	Eu-154 activity (dpm/100cm ²)	Nb-94 activity (dpm/100cm ²)	Ag-108m activity (dpm/100cm ²)	Unity
1	4	4	30,769	4,217	2,187	35	25	2	121	0.018
2	1.6	1.6	12,308	1,687	875	14	10	1	49	0.007
3	3	3	23,077	3,163	1,640	26	19	2	91	0.014
4	3.6	3.6	27,692	3,795	1,968	31	22	2	109	0.016
5	4	4	30,769	4,217	2,187	35	25	2	121	0.018
6	3.3	3.3	25,385	3,479	1,804	29	20	2	100	0.015
7	1	1	7,692	1,054	547	9	6	1	30	0.005
8	2.3	2.3	17,692	2,425	1,257	20	14	1	70	0.011
9	3.6	3.6	27,692	3,795	1,968	31	22	2	109	0.016
10	1.3	1.3	10,000	1,371	711	11	8	1	39	0.006
11	3.3	3.3	25,385	3,479	1,804	29	20	2	100	0.015
12	2.3	2.3	17,692	2,425	1,257	20	14	1	70	0.011
13	1.6	1.6	12,308	1,687	875	14	10	1	49	0.007
14	3.3	3.3	25,385	3,479	1,804	29	20	2	100	0.015
15	5.3	5.3	40,769	5,587	2,897	46	33	3	161	0.024
16	2.7	2.7	20,769	2,846	1,476	24	17	1	82	0.012
17	4	4	30,769	4,217	2,187	35	25	2	121	0.018
18	2.3	2.3	17,692	2,425	1,257	20	14	1	70	0.011
19	3.7	3.7	28,462	3,901	2,023	32	23	2	112	0.017
20	4	4	30,769	4,217	2,187	35	25	2	121	0.018
									MEAN	0.014
									MEDIAN	0.015
									STD DEV	0.005
									MAX	0.024
									MIN	0.005

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

Pipe Interior Radiological Survey Form

Date: 1-12-06 Time: 1015
 Building: REACTOR Elevation -25 Access Point QUAD C
 System: SPARE TO SPR Pipe Diameter: 3" Area: _____ Pipe ID RX-132
 Type of Survey Investigation Characterization Final Survey # Other X
 Sled Size 3" VINYL PULLER inch
 Detector: 44-62 Detector ID #: 212701
 Cal Date: 11-17-05 Cal Due Date: 11-17-06
 Instrument: 2350-1 Instrument ID #: 212223
 Cal Date: 11-17-05 Cal Due Date: 11-17-06

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

Background Value 5.2 cpm
 MDCR_{static} 4.4 cpm
 Efficiency Factor for Pipe 0.00013 (taken from detector *efficiency determination* calibration certificate)
 MDC_{static} 2779 dpm/100cm²
 Is the MDC_{static} Yes No (if no, adjust sample count time and recalculate MDC_{static})
 Comments: INITIAL SURVEY

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 1-12-06 Time: 1015

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm ²
1	1	3	12	4	n/a	n/a
2	2	3	5	1.6	↓	↓
3	3	3	9	3		
4	4	3	11	3.6		
5	5	3	12	4		
6	6	3	10	3.3		
7	7	3	3	1		
8	8	3	7	2.3		
9	9	3	8	3.6		
10	10	3	4	1.3		

Pipe Interior Radiological Survey Form (Continuation Form)

RX 132 QUADC

1-12-06

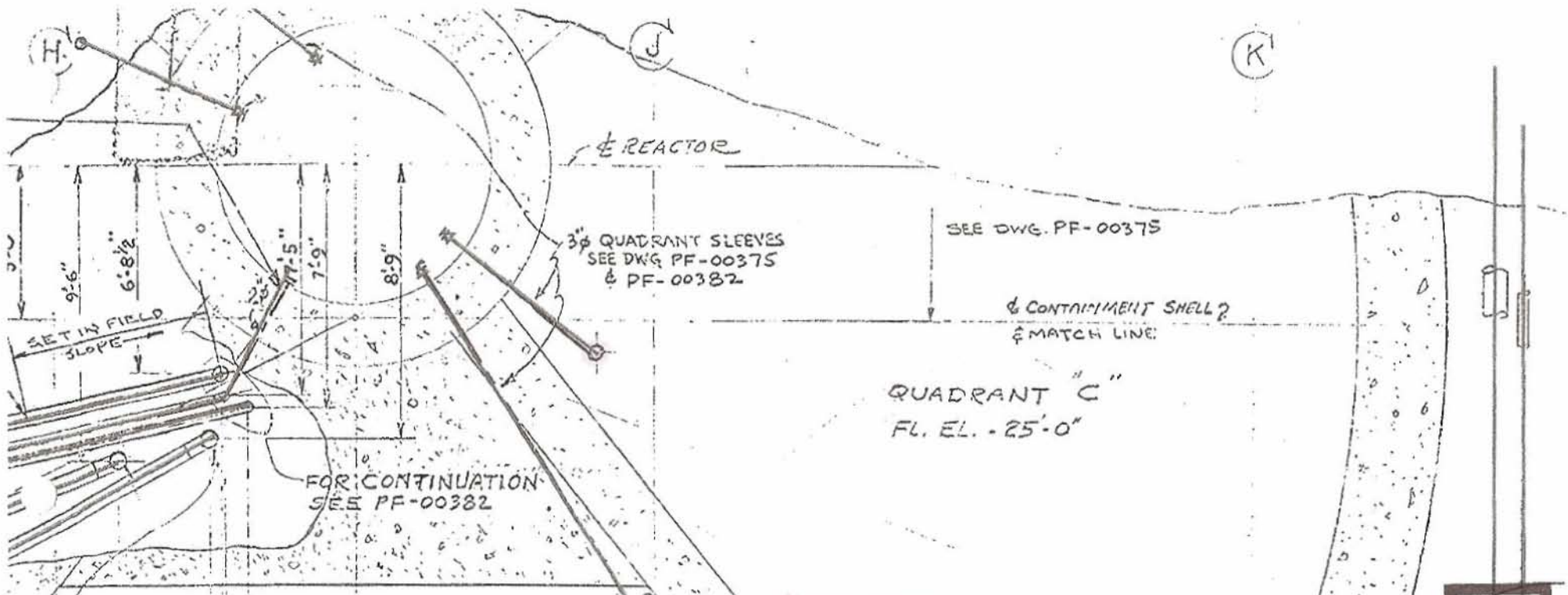
Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm ²
11	11	3	10	3.3	n/a	n/a
12	12	3	7	2.3	↓	↓
13	13	3	5	1.4	↓	↓
14	14	3	10	3.3	↓	↓

Package Page 2 of 2



REFERENCE COPY

Attachment 3, Page 2



QUADRANT "C"
 FL. EL. - 25'-0"

= PIPE SURVEYED

14'

I DRY 1.32

1-12-06

REFERENCE COPY

Pipe Interior Radiological Survey Form

Date: 1-16-03-06 Time: 0855
 Building: RX Elevation: -39 Access Point: SPR
 System: SPARE TO SPR Pipe Diameter: 3" Area: Pipe ID: RX 1.32 QUAD C
 Type of Survey: Investigation Characterization: Final Survey # Other: X
 Sled Size: 3" VINYL PULLER inch
 Detector: 44-62 Detector ID #: 212701 - SIN 121
 Cal Date: 11-17-05 Cal Due Date: 11-17-06
 Instrument: 2350-1 Instrument ID #: 212223
 Cal Date: 11-17-05 Cal Due Date: 11-17-06

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

Background Value: 5.2 cpm
 MDCR_{static}: 4.7 cpm
 Efficiency Factor for Pipe: 0.00013 (taken from detector ^{efficiency determination} calibration certificate)
 Diameter: 2.779 dpm/100cm²
 MDC_{static}: 2279

Is the MDC_{static} acceptable? Yes No (if no, adjust sample count time and recalculate MDCR_{static})
 Comments: CONTINUATION SURVEY
POS # 1-86 TAKEN FROM SPR (SUB PILE ROOM)
complete

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 1-16-06 Time: 0855

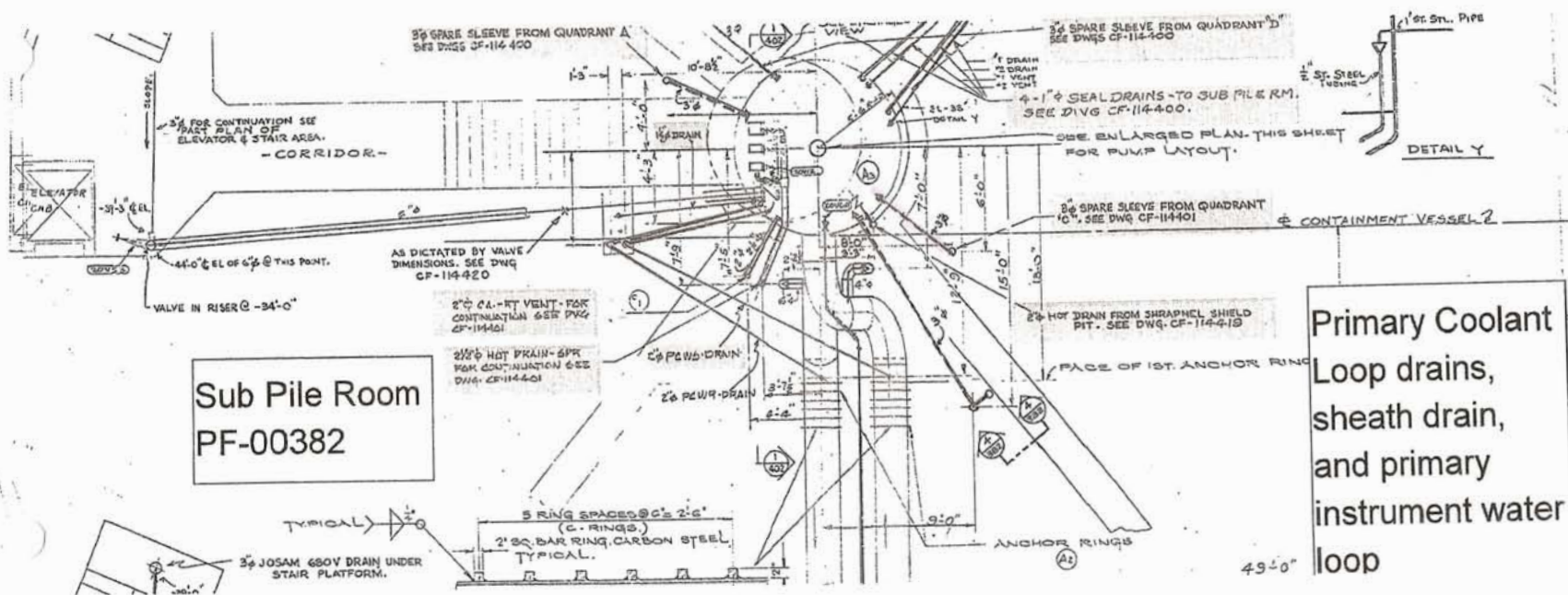
Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm ²
1	1	3	16	5.3	n/a	n/a
2	2	3	8	2.7	↓	↓
3	3	3	12	4		
4	4	3	7	2.3		
5	5	3	11	3.7		
6	6	3	12	4		
7			n/a			
8			n/a			
9			n/a			
10			n/a			

Package Page 1 of 1

Attachment 3, Page 1

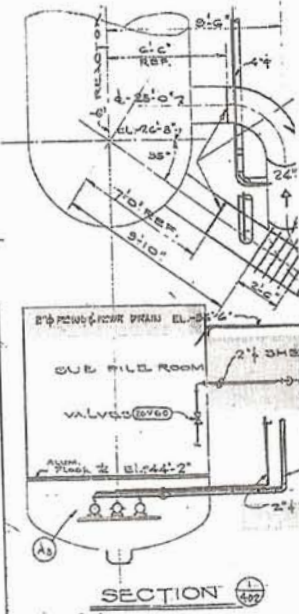


REFERENCE COPY



Sub Pile Room
PF-00382

Primary Coolant
Loop drains,
sheath drain,
and primary
instrument water
loop



= PIPE SURVEYED

6'
ID RX 1.32
1-16-06

REFERENCE COPY

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

DQA Check Sheet

Design #	Rx 132	Revision #	Original	
Survey Unit #	Rx 132			

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>Dale Randall</i>	Date	10-18-07
FSS/ Characterization Manager (print/sign)	<i>R. Cass</i>	Date	10/31/07

Form
CS-09/2
Rev 0

**SECTION 7
ATTACHMENT 4
1 DISC**