Survey Unit Release Record				
Design #	EP-1.91	**Revision #**	Original	**Page 1 of 3**
Survey Unit #(s)	1.91			
Description	1) Embedded Pipe (EP) Survey Unit 1.91 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP 1.91 is a Class 1, Group 3.1 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004. 3) Surveys in EP 1.91 were performed using a scintillation detector optimized to measure gamma energies representative of Cs-137. Sample #EP 3-12 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		10-30-07
Technical Reviewer (FSS/Characterization Engineer)		11-5-07
FSS/Characterization Manager	R. Case	11/7/07

Form CS-09/1 Rev 0

1.0 History/Description

1.1 The subject pipe system is a 6" floor drain line located on the -27' el. valve pit of the Rx building.

1.2 EP 1.91 consists of 6" diameter piping that is approximately 30 feet in length.

2.0 Survey Design Information

2.1 EP 1.91 was surveyed IAW Procedure #BSI/LVS-002.

2.2 100% of the 6" ID pipe was accessible for survey. The accessible 6" ID pipe was surveyed by static measurement at one foot increments, for a total of 30 survey measurements.

2.3 Surface area for the 6" ID piping is 1,459 cm^2 for each foot of piping, corresponding to a total 6" ID piping surface area of 43,780 cm^2 (4.4 m^2) for the entire length of (approximately 30') of 6" 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 1.91 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.

5.5 Statistical Summary Table

Statistical Parameter	6" Pipe
Total Number of Survey Measurements	30
Number of Measurements >MDC	30
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0056
Median	0.0040
Standard Deviation	0.0054
Maximum	0.0314
Minimum	0.0027

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 1.91 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.006 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 1.91 & Spreadsheet

SECTION 7
ATTACHMENT 1
__3__ PAGE(S)

BSI EP/BP SURVEY REPORT

Pipe ID	EP 1.91	Survey Location	Valve Pit drain -27 el.
Survey Date	13-Nov-06	2350-1 #	203488
Survey Time	14:17	Detector-Sled #	Bicron 1MG1/LVS-1/107
Pipe Size	6"	Detector Efficiency	0.00033
DCGL (dpm/100cm2)	3.79E+06	Pipe Area Incorporated by Detector Efficiency (in cm2)	1,459
Pipe Area Incorporated by Survey Data (m^2)	4.4	Field BKG (cpm)	8.7
Routine Survey	X	Field MDCR (cpm)	13.2
QA Survey		Nominal MDC (dpm/100cm2)	3,106

Survey Measurement Results	
Total Number of Survey Measurements	30
Number of Measurements >MDC	30
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0056
Median	0.0040
Standard Deviation	0.0054
Maximum	0.0314
Minimum	0.0027

Survey Technician(s)	STOCK

Survey Unit Classification	1
TBD 06-004 Piping Group	3.1
SR-13 Radionuclide Distribution Sample	EP 3-12
Measured Nuclide	Cs-137
Area Factor/EMC Used	No
Pass/Fail FSS	Pass
MREM/YR Contribution	<1

COMMENTS:
ACTIVITY VALUES NOT BACKGROUND CORRECTED

RP Engineer | Date	Dal Rowell /10-30-07

EP 1.91
6" Pipe
TBD 06-004 Group 3.1

Measurement #	gcpm	ncpm	Cs-137 activity (total dpm)	Cs-137 activity (dpm/100cm2)	Co-60 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	28	28	84,848	5,814	356	-	24	-	-	0.003
2	40	40	121,212	8,306	509	-	34	-	-	0.004
3	39	39	118,182	8,098	496	-	33	-	-	0.004
4	32	32	96,970	6,645	407	-	27	-	-	0.003
5	48	48	145,455	9,967	611	-	41	-	-	0.005
6	36	36	109,091	7,475	458	-	31	-	-	0.004
7	41	41	124,242	8,514	522	-	35	-	-	0.004
8	32	32	96,970	6,645	407	-	27	-	-	0.003
9	32	32	96,970	6,645	407	-	27	-	-	0.003
10	45	45	136,364	9,344	573	-	38	-	-	0.005
11	31	31	93,939	6,437	395	-	26	-	-	0.003
12	36	36	109,091	7,475	458	-	31	-	-	0.004
13	47	47	142,424	9,760	598	-	40	-	-	0.005
14	25	25	75,758	5,191	318	-	21	-	-	0.003
15	37	37	112,121	7,683	471	-	31	-	-	0.004
16	30	30	90,909	6,230	382	-	26	-	-	0.003
17	29	29	87,879	6,022	369	-	25	-	-	0.003
18	29	29	87,879	6,022	369	-	25	-	-	0.003
19	44	44	133,333	9,137	560	-	37	-	-	0.005
20	29	29	87,879	6,022	369	-	25	-	-	0.003
21	30	30	90,909	6,230	382	-	26	-	-	0.003
22	32	32	96,970	6,645	407	-	27	-	-	0.003
23	45	45	136,364	9,344	573	-	38	-	-	0.005
24	126	126	381,818	26,164	1,604	-	107	-	-	0.014
25	287	287	869,697	59,596	3,654	-	244	-	-	0.031
26	105	105	318,182	21,803	1,337	-	89	-	-	0.011
27	71	71	215,152	14,743	904	-	60	-	-	0.008
28	49	49	148,485	10,175	624	-	42	-	-	0.005
29	37	37	112,121	7,683	471	-	31	-	-	0.004
30	31	31	93,939	6,437	395	-	26	-	-	0.003

EP 1.91
6" Pipe
TBD 06-004 Group 3.1

Measurement #	gcpm	ncpm	Cs-137 activity (total dpm)	Cs-137 activity (dpm/100cm2)	Co-60 activity (dpm/100cm2)	Eu-152 activity (dpm/100cm2)	Eu-154 activity (dpm/100cm2)	Nb-94 activity (dpm/100cm2)	Ag-108m activity (dpm/100cm2)	Unity
									MEAN	0.006
									MEDIAN	0.004
									STD DEV	0.005
									MAX	0.031
									MIN	0.003

SECTION 7
ATTACHMENT 2
__3__ PAGE(S)

Pipe Interior Radiological Survey Form

Date: 11/13/06 Time: 1417

Pipe ID#: 1.91 Pipe Diameter: 6" Access Point Area: VALVE PIT

Building: HOT LAB Elevation: -27' System: FLR DRN

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

Gross _____ Co60 _____ Cs ✓

Detector ID# / Sled ID# IMG1 LVS-1 / 107

Detector Cal Date: 12/20/~~06~~ 05 Detector Cal Due Date: 12/20/06

Instrument: 2350-1 Instrument ID #: 203488

Instrument Cal Date: 7/5/06 Instrument Cal Due Date: 7/5/07

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

Background Value 8.7 cpm

$MDCR_{static}$ 13.2 cpm

Efficiency Factor for Pipe Diameter 0.00033 (from detector efficiency determination)

MDC_{static} 3106 dpm/ 100 cm^2

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

Comments: SECOND POST DECON SURVEY EP3-12 COMPLETE

POSITION #24 - ELBOW

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	28	28	n/a	n/a
2	2		40	40		
3	3		39	39		
4	4		32	32		
5	5		48	48		
6	6		36	36		
7	7		41	41		
8	8		32	32		
9	9		32	32		
10	10		45	45		

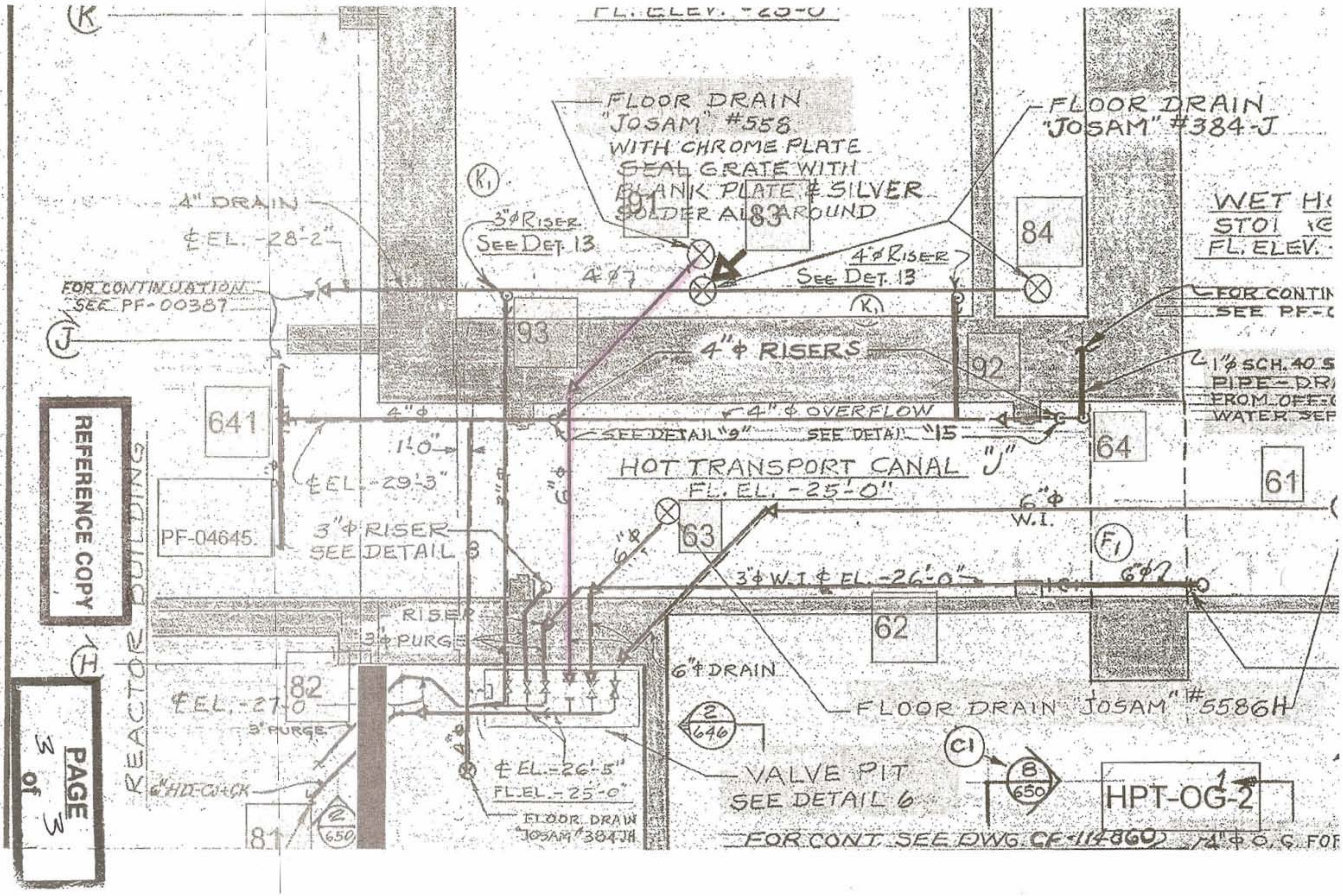
Pipe Interior Radiological Survey Form (Continuation Form)

Date: 11/13/06
Pipe ID#: 1.91 Pipe Diameter: 6" Access Point Area: VALVE PIT
Building: HOT LAB Elevation: -27' System: FLOOR DRN.

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
11	11	1	31	31	n/a	n/a
12	12		36	36		
13	13		47	47		
14	14		25	25		
15	15		37	37		
16	16		30	30		
17	17		29	29		
18	18		29	29		
19	19		44	44		
20	20		29	29		
21	21		30	30		
22	22		32	32		
23	23		45	45		
24	24		126	126		
25	25		287	287		
26	26		105	105		
27	27		71	71		
28	28		49	49		
29	29		37	37		
30	30		31	31		

N/A

PF-04645 1.91



FL. ELEV. -25'-0"
FLOOR DRAIN "JOSAM" #558 WITH CHROME PLATE SEAL GRATE WITH BLANK PLATE & SILVER SOLDER ALL AROUND
FLOOR DRAIN "JOSAM" #384-J
WET H
FL. ELEV.
4" DRAIN
℄ EL. -28'-2"
3"ϕ RISER SEE DET. 13
4"ϕ RISER SEE DET. 13
FOR CONTINUATION SEE PF-00387
FOR CONTIN SEE PF-
91
83
84
93
92
641
64
61
63
62
82
81
4"ϕ RISERS
1½"ϕ SCH. 40 S PIPE - DR FROM OFF- WATER SEP
4"ϕ
4"ϕ OVERFLOW
SEE DETAIL "9"
SEE DETAIL "15"
1'-0"
℄ EL. -29'-3"
HOT TRANSPORT CANAL "J"
FL. EL. -25'-0"
6"ϕ W.I.
3"ϕ RISER SEE DETAIL 8
PF-04645
3"ϕ W.I. ℄ EL. -26'-0"
6"ϕ
REFERENCE COPY
REACTOR BUILDING
RISER
3"ϕ PURGE
6"ϕ DRAIN
℄ EL. -27'-0"
3" PURGE
FLOOR DRAIN "JOSAM" #5586H
VALVE PIT SEE DETAIL 6
℄ EL. -26'-5"
FL. EL. -25'-0"
FLOOR DRAIN "JOSAM" #384JH
6" HDE-CO+CK
2 646
2 650
8 650
C1
HPT-OG-2
FOR CONT. SEE DWG. CF-114860
4"ϕ O.C. FOR
PAGE 3 of 3

SECTION 7
ATTACHMENT 3
___1___ PAGE(S)

DQA Check Sheet				
Design #	EP 1.91	Revision #	Original	
Survey Unit #	EP 1.91			

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)	Dale Randall Dale Randall	Date	10-30-07
FSS/ Characterization Manager (print/sign)	R. Case	Date	11/7/07

Form CS-09/2 Rev 0

SECTION 7
ATTACHMENT 4
1 DISC