Survey Unit Release Record				
Design #	EP-WHB-111-2	**Revision #**	Original	**Page 1 of 3**
Survey Unit #(s)	WHB-111-2			
Description	1) Embedded Pipe (EP) Survey Unit WHB-111-2 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP WHB-111-2 is a Class 1, Group 3.3 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004. 3) Surveys in EP WHB-111-2 were performed using a scintillation detector optimized to measure gamma energies representative of Cs-137. Sample #EP 3-3 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	Ord Marshall	10-30-07
Technical Reviewer (FSS/Characterization Engineer)	J.W. Wood	11-6-07
FSS/Characterization Manager	R. Case	11/6/07

Form CS-09/1 Rev 0

1.0 History/Description

1.1 The subject pipe system is the evaporator pit sump discharge line located on the Waste Handling Building (WHB) -5' el.

1.2 EP WHB-111-2 consists of 2" diameter piping that is approximately 30 feet in length.

2.0 Survey Design Information

2.1 EP WHB-111-2 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 30 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 14,593 cm^2 (1.5 m^2) for the entire length of (approximately 30') 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 WHB-111-2 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	2" 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	0.0157
Median	0.0153
Standard Deviation	0.0037
Maximum	0.0264
Minimum	0.0102

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 WHB-111-2 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.016 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 WHB-111-2 & Spreadsheet

SECTION 7
ATTACHMENT 1
3 PAGE(S)

BSI EP/BP SURVEY REPORT

Pipe ID	EP WHB-111-2	Survey Location	Evap Pit -5' el.
Survey Date	25-Aug-06	2350-1 #	189094
Survey Time	13:21	Detector-Sled #	238369 / no sled
Pipe Size	2"	Detector Efficiency	0.00073
DCGL (dpm/100cm2)	3.79E+06	Pipe Area Incorporated by Detector Efficiency (in cm2)	486
Pipe Area Incorporated by Survey Data (m^2)	1.5	Field BKG (cpm)	41.5
Routine Survey	X	Field MDCR (cpm)	25.2
QA Survey		Nominal MDC (dpm/100cm2)	4,215

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	0.0157
Median	0.0153
Standard Deviation	0.0037
Maximum	0.0264
Minimum	0.0102

Survey Technician(s)	STOCK

Survey Unit Classification	1
TBD 06-004 Piping Group	3.3
SR-13 Radionuclide Distribution Sample	EP 3-3
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	Orl Marshall 10-30-07

EP WHB-111-2
2" Pipe
TBD 06-004 Group 3.3

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	95	95	130,137	26,753	1,319	-	-	-	-	0.013
2	81	81	110,959	22,810	1,125	-	-	-	-	0.011
3	81	81	110,959	22,810	1,125	-	-	-	-	0.011
4	138	138	189,041	38,862	1,916	-	-	-	-	0.018
5	171	171	234,247	48,155	2,375	-	-	-	-	0.023
6	127	127	173,973	35,765	1,764	-	-	-	-	0.017
7	99	99	135,616	27,879	1,375	-	-	-	-	0.013
8	118	118	161,644	33,230	1,639	-	-	-	-	0.016
9	200	200	273,973	56,322	2,777	-	-	-	-	0.026
10	179	179	245,205	50,408	2,486	-	-	-	-	0.024
11	151	151	206,849	42,523	2,097	-	-	-	-	0.020
12	143	143	195,890	40,270	1,986	-	-	-	-	0.019
13	117	117	160,274	32,948	1,625	-	-	-	-	0.015
14	116	116	158,904	32,667	1,611	-	-	-	-	0.015
15	112	112	153,425	31,540	1,555	-	-	-	-	0.015
16	119	119	163,014	33,512	1,653	-	-	-	-	0.016
17	125	125	171,233	35,201	1,736	-	-	-	-	0.017
18	108	108	147,945	30,414	1,500	-	-	-	-	0.014
19	123	123	168,493	34,638	1,708	-	-	-	-	0.016
20	121	121	165,753	34,075	1,680	-	-	-	-	0.016
21	126	126	172,603	35,483	1,750	-	-	-	-	0.017
22	103	103	141,096	29,006	1,430	-	-	-	-	0.014
23	108	108	147,945	30,414	1,500	-	-	-	-	0.014
24	110	110	150,685	30,977	1,528	-	-	-	-	0.015
25	113	113	154,795	31,822	1,569	-	-	-	-	0.015
26	101	101	138,356	28,443	1,403	-	-	-	-	0.013
27	106	106	145,205	29,851	1,472	-	-	-	-	0.014
28	88	88	120,548	24,782	1,222	-	-	-	-	0.012
29	77	77	105,479	21,684	1,069	-	-	-	-	0.010
30	116	116	158,904	32,667	1,611	-	-	-	-	0.015

EP WHB-111-2
2" Pipe
TBD 06-004 Group 3.3

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	0.016
									MEDIAN	0.015
									STD DEV	0.004
									MAX	0.026
									MIN	0.010

SECTION 7
ATTACHMENT 2
__3__ PAGE(S)

Pipe Interior Radiological Survey Form

Date: 8/25/06 Time: 1321

Pipe ID#: WHB 111-2 Pipe Diameter: 2" Access Point Area: EVAP PIT

Building: WHB Elevation: -5' System: SUMP DSCHG

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 #: 189094

Instrument Cal Date: 3/15/06 Instrument Cal Due Date: 3/15/07

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

Background Value 41.5 cpm

$MDCR_{static}$ 25.2 cpm

Efficiency Factor for Pipe Diameter 0.00073 (from detector efficiency determination)

MDC_{static} 4215 dpm/ 100 cm^2

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

Comments: INITIAL SURVEY EP3-3 COMPLETE

Technician Signature

Pipe Interior Radiological Survey

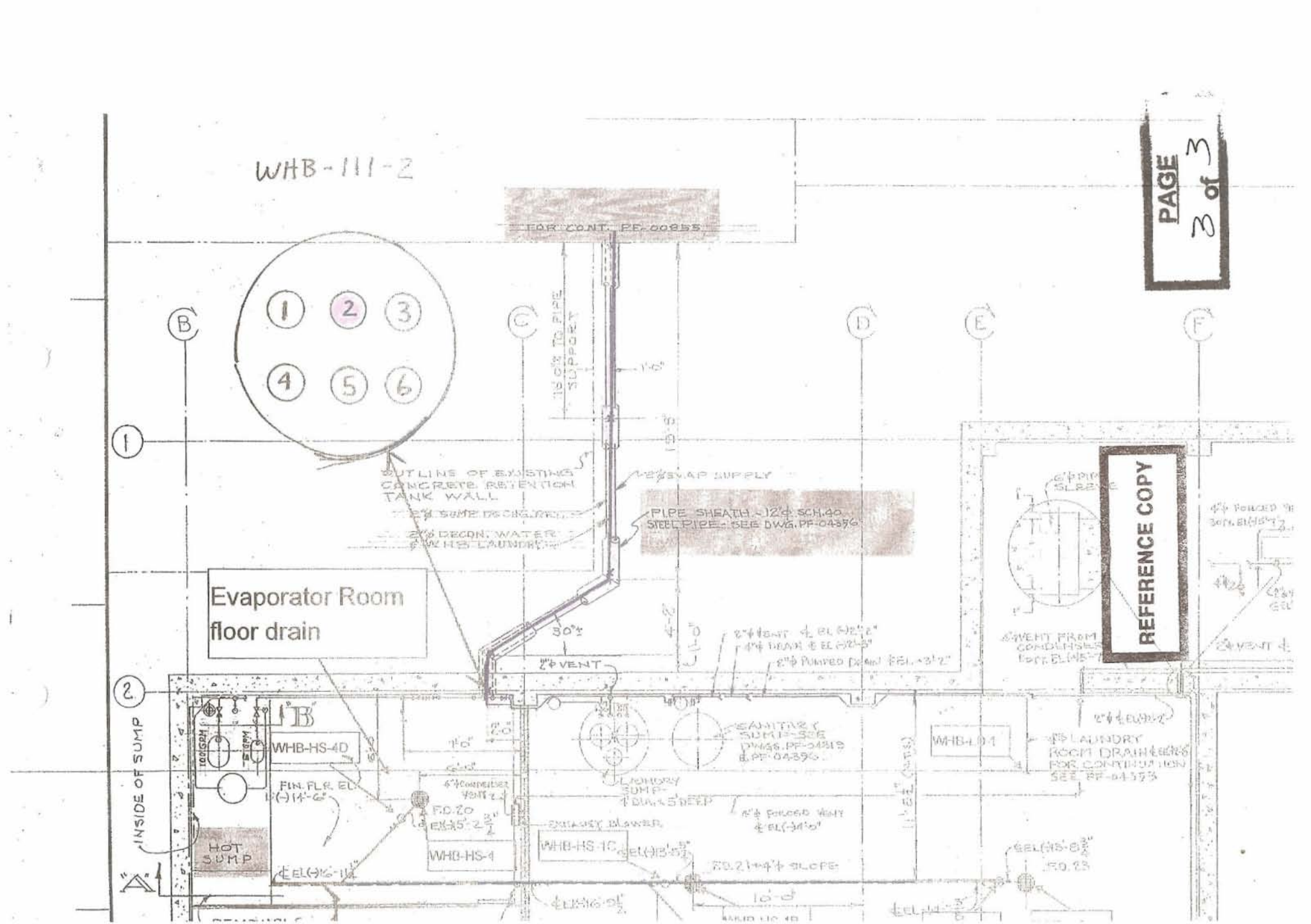
Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm²
1	1	1	95	95	n/a	n/a
2	2	↓	81	81	↓	↓
3	3	↓	81	81	↓	↓
4	4	↓	138	138	↓	↓
5	5	↓	171	171	↓	↓
6	6	↓	127	127	↓	↓
7	7	↓	99	99	↓	↓
8	8	↓	118	118	↓	↓
9	9	↓	200	200	↓	↓
10	10	↓	179	179	↓	↓

Pipe Interior Radiological Survey Form (Continuation Form)

Date: 8/25/06
Pipe ID#: WHB 111-2 Pipe Diameter: 2" Access Point Area: E1/AP PIT
Building: WHB Elevation: -5' System: SUMP, DSCHG

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
11	11	1	151	151	n/a	n/a
12	12		143	143		
13	13		117	117		
14	14		116	116		
15	15		112	112		
16	16		119	119		
17	17		125	125		
18	18		108	108		
19	19		123	123		
20	20		121	121		
21	21		126	126		
22	22		103	103		
23	23		108	108		
24	24		110	110		
25	25		113	113		
26	26		101	101		
27	27		106	106		
28	28		88	88		
29	29		77	77		
30	30		116	116		

N/A


WHB-111-2
PAGE 3 of 3
REFERENCE COPY
FOR CONT. PF-00855
OUTLINE OF EXISTING CONCRETE RETENTION TANK WALL
PIPE SHEATH - 12"ϕ SCH.40 STEEL PIPE - SEE DWG. PF-04396
Evaporator Room floor drain
2"ϕ VENT
WHB-HS-4D
WHB-HS-4
WHB-HS-1C
WHB-L01
HOT SUMP
INSIDE OF SUMP
LAUNDRY ROOM DRAIN
SANITARY SUMP - SEE DWGS. PF-04319 & PF-04396
EXHAUST BLOWER
FIN. FLR. EL (-)14'-6"

SECTION 7
ATTACHMENT 3
___1___ PAGE(S)

DQA Check Sheet				
Design #	WHB-111-2	Revision #	Original	
Survey Unit #	WHB-111-2			

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 $DCGL_W$ 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) $\geq$ the critical value?			X

Comments:

FSS/Characterization Engineer (print/sign)	Dale Randall	Date	10-30-07
FSS/ Characterization Manager (print/sign)	R. Case	Date	11/6/07

Form
CS-09/2
Rev 0

SECTION 7
ATTACHMENT 4
1 DISC