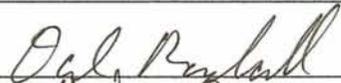
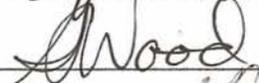
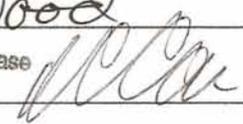


Survey Unit Release Record

Design #	EP-WHB-111-4	Revision #	Original	Page 1 of 3
Survey Unit #(s)	WHB-111-4			
Description	<p>1) Embedded Pipe (EP) Survey Unit WHB-111-4 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP WHB-111-4 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.</p> <p>3) Surveys in EP WHB-111-4 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.</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		10-30-07		
Technical Reviewer (FSS/Characterization Engineer)		11-6-07		
FSS/Characterization Manager	R. Case 	11/2/07		

Form CS-09/1 Rev 0

Survey Unit: WHB-111-4

1.0 History/Description

- 1.1 The subject pipe system is an evaporator pit drain line located on the Waste Handling Building (WHB) -5' el.
- 1.2 EP WHB-111-4 consists of 2" diameter piping that is approximately 30 feet in length.

2.0 Survey Design Information

- 2.1 EP WHB-111-4 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 cm² for each foot of piping, corresponding to a total 2" ID piping surface area of 14,593 cm² (1.5 m²) 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-111-4 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: WHB-111-4

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	0.0180
Median	0.0179
Standard Deviation	0.0052
Maximum	0.0353
Minimum	0.0112

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-111-4 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.018 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-111-4 & Spreadsheet

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



BSI EP/BP SURVEY REPORT

Pipe ID	EP WHB-111-4	Survey Location	Evap Pit -5' el.
Survey Date	28-Aug-06	2350-1 #	189094
Survey Time	08:46	Detector-Sled #	238367 / no sled
Pipe Size	2"	Detector Efficiency	0.00038
DCGL (dpm/100cm2)	3.79E+06	Pipe Area Incorporated by Detector Efficiency (in cm2)	486
Pipe Area Incorporated by Survey Data (m²)	1.5	Field BKG (cpm)	35.1
Routine Survey	X	Field MDCR (cpm)	23.4
QA Survey		Nominal MDC (dpm/100cm2)	5,314

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	0.0180
Median	0.0179
Standard Deviation	0.0052
Maximum	0.0353
Minimum	0.0112

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	<i>Ocl Penhall</i> 10-30-07
--------------------	-----------------------------

EP WHB-111-4
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	47	47	123,684	25,426	1,254	-	-	-	-	0.012
2	53	53	139,474	28,672	1,414	-	-	-	-	0.013
3	54	54	142,105	29,213	1,441	-	-	-	-	0.014
4	74	74	194,737	40,033	1,974	-	-	-	-	0.019
5	89	89	234,211	48,148	2,374	-	-	-	-	0.023
6	74	74	194,737	40,033	1,974	-	-	-	-	0.019
7	62	62	163,158	33,541	1,654	-	-	-	-	0.016
8	78	78	205,263	42,197	2,081	-	-	-	-	0.020
9	139	139	365,789	75,197	3,708	-	-	-	-	0.035
10	123	123	323,684	66,542	3,281	-	-	-	-	0.031
11	80	80	210,526	43,279	2,134	-	-	-	-	0.020
12	75	75	197,368	40,574	2,001	-	-	-	-	0.019
13	83	83	218,421	44,902	2,214	-	-	-	-	0.021
14	70	70	184,211	37,869	1,867	-	-	-	-	0.018
15	81	81	213,158	43,820	2,161	-	-	-	-	0.021
16	66	66	173,684	35,705	1,761	-	-	-	-	0.017
17	71	71	186,842	38,410	1,894	-	-	-	-	0.018
18	86	86	226,316	46,525	2,294	-	-	-	-	0.022
19	70	70	184,211	37,869	1,867	-	-	-	-	0.018
20	71	71	186,842	38,410	1,894	-	-	-	-	0.018
21	80	80	210,526	43,279	2,134	-	-	-	-	0.020
22	65	65	171,053	35,164	1,734	-	-	-	-	0.016
23	68	68	178,947	36,787	1,814	-	-	-	-	0.017
24	50	50	131,579	27,049	1,334	-	-	-	-	0.013
25	54	54	142,105	29,213	1,441	-	-	-	-	0.014
26	58	58	152,632	31,377	1,547	-	-	-	-	0.015
27	51	51	134,211	27,590	1,361	-	-	-	-	0.013
28	44	44	115,789	23,803	1,174	-	-	-	-	0.011
29	46	46	121,053	24,885	1,227	-	-	-	-	0.012
30	72	72	189,474	38,951	1,921	-	-	-	-	0.018

EP WHB-111-4
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	0.018
									MEDIAN	0.018
									STD DEV	0.005
									MAX	0.035
									MIN	0.011

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

Pipe Interior Radiological Survey Form

Date: 8/28/06 Time: 0846
 Pipe ID#: WHB-111-4 Pipe Diameter: 2" Access Point Area: EVAP PIT
 Building: WHB Elevation: -5' System: DRAINS

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

Gross _____ Co60 _____ Cs ✓

Detector ID# / Sled ID# 44-159 # 238367 / 1 NO SLED

Detector Cal Date: 6/21/06 Detector Cal Due Date: 6/21/07

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 35.1 cpm

MDCR_{static} 23.4 cpm

Efficiency Factor for Pipe Diameter 0.00038 (from detector efficiency determination)

MDC_{static} 5314 dpm/ 100 cm²

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 [Signature]

Pipe Interior Radiological Survey

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm ²
1	1	1	47	47	n/a	n/a
2	2	↓	53	53	↓	↓
3	3		54	54		
4	4		74	74		
5	5		89	89		
6	6		74	74		
7	7		62	62		
8	8		78	78		
9	9		139	139		
10	10		123	123		

REFERENCE COPY

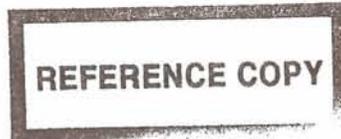
Package Page 1 of 3

Attachment 3, Page 1

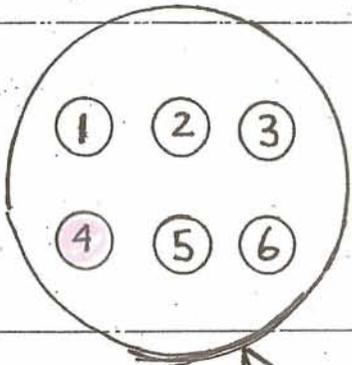
Pipe Interior Radiological Survey Form (Continuation Form)

Date: 8/28/06
 Pipe ID#: W4B-111-4 Pipe Diameter: 2" Access Point Area: EVAP PIT
 Building: W4B Elevation: -5' System: DRAINS

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm ²
11	11	1	80	80	N/A	N/A
12	12	↓	75	75	↓	↓
13	13		83	83		
14	14		70	70		
15	15		81	81		
16	16		66	66		
17	17		71	71		
18	18		86	86		
19	19		70	70		
20	20		71	71		
21	21		80	80		
22	22		65	65		
23	23		68	68		
24	24		50	50		
25	25		54	54		
26	26		58	58		
27	27		51	51		
28	28		44	44		
29	29		46	46		
30	30		72	72		
N						
A.						



WHB-111-4



FOR CONT. PE-00855

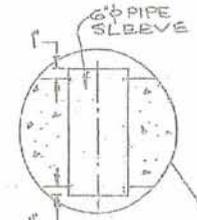
PAGE 3 of 3

Evaporator Room floor drain

OUTLINE OF EXISTING CONCRETE RETENTION TANK WALL

15'-0" TO PIPE SUPPORT

PIPE SHEATH - 1/2" SCH. 40 STEEL PIPE - SEE DWG. PF-04396



4" FORCED VE BOTT. EL. (+5'-7")

4" VENT FROM CONDENSER DET. EL. (+5'-7")

REFERENCE COPY

INSIDE OF SUMP

WHB-HS-4D

HOT SUMP

FIN. FLR. EL. (+14'-6")
4" CONDENSER VENT Z.
F.D. 20 EL. (+15'-2 3/4")
WHB-HS-4

EXHAUST BLOWER
WHB-HS-1C EL. (+13'-8 3/4")

SANITARY SUMP - SEE DWGS. PF-04313 & PF-04396

LAUNDRY SUMP 4" DIA. x 5" DEEP

WHB-LD-1

4" LAUNDRY ROOM DRAIN EL. (+9'-8") FOR CONTINUATION SEE PF-04395

F.D. 21 4" SLOPE

F.D. 23 EL. (+13'-8 3/4")

10'-0" HARD LIG. 40

EL. (+14'-7 3/8")

1

2

B

C

D

E

F

15'-0"

15'-5"

4'-2"

1'-0"

2" VENT EL. (+2'-2")

4" DRAIN EL. (+2'-8")

2" PUMPED DRAIN EL. (+3'-2")

4" FORCED VENT EL. (+4'-0")

2" EL. (+2'-2")

EL. (+13'-8 3/4")

A

SECTION 7
ATTACHMENT 3
1 PAGE(S)

DQA Check Sheet

Design #	WHB-111-4	Revision #	Original			
Survey Unit #	WHB-111-4					
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)				Date		10-30-07
FSS/ Characterization Manager (print/sign)				Date		11/7/07

Form
CS-09/2
Rev 0

**SECTION 7
ATTACHMENT 4
1 DISC**