Survey Unit Release Record				
Design #	EP-FH-103	**Revision #**	Original	**Page 1 of 3**
Survey Unit #(s)	FH-103			
Description	1) Embedded Pipe (EP) Survey Unit FH-103 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP FH-103 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 FH-103 were performed using a scintillation detector optimized to measure gamma energies representative of Cs-137. Sample #EP 3-5 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	Ocl Randall	12-12-07
Technical Reviewer (FSS/Characterization Engineer)	G Wood	12-13-07
FSS/Characterization Manager	R. Case	12/18/07

Form CS-09/1 Rev 0

1.0 History/Description

1.1 The subject pipe system is a 4" drain line section located on the -12' el. of the Fan House building.

1.2 EP FH-103 consists of 4" diameter piping that is approximately 15 feet in length.

2.0 Survey Design Information

2.1 EP FH-103 was surveyed IAW Procedure #BSI/LVS-002.

2.2 100% of the 4" ID pipe was accessible for survey. The accessible 4" ID pipe was surveyed by static measurement at one foot increments, for a total of 15 survey measurements.

2.3 Surface area for the 4" ID piping is 973 cm^2 for each foot of piping, corresponding to a total 4" ID piping surface area of 14,593 cm^2 (1.5 m^2) for the entire length of (approximately 15') of 4" 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 FH-103 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.

5.5 Statistical Summary Table

Statistical Parameter	4" Pipe
Total Number of Survey Measurements	15
Number of Measurements >MDC	2
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0033
Median	0.0031
Standard Deviation	0.0012
Maximum	0.0054
Minimum	0.0011

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 FH-103 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.003 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 FH-103 & Spreadsheet

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ATTACHMENT 1
2 PAGE(S)

BSI EP/BP SURVEY REPORT

Pipe ID	EP FH-103	Survey Location	Sump Rm #7 -12' el.
Survey Date	06-Sep-06	**2350-1 #**	189094
Survey Time	08:16	**Detector-Sled #**	44-159 238367/101
Pipe Size	4"	**Detector Efficiency**	0.00019
DCGL (dpm/100cm2)	3.79E+06	Pipe Area Incorporated by Detector Efficiency (in cm2)	973
Pipe Area Incorporated by Survey Data (m^2)	1.5	**Field BKG** (cpm)	36.8
Routine Survey	X	**Field MDCR** (cpm)	23.9
QA Survey		**Nominal MDC** (dpm/100cm2)	9,453

Survey Measurement Results	
Total Number of Survey Measurements	15
Number of Measurements >MDC	2
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0033
Median	0.0031
Standard Deviation	0.0012
Maximum	0.0054
Minimum	0.0011

Survey Technician(s)	STOCK

Survey Unit Classification	1
TBD 06-004 Piping Group	3.1
SR-13 Radionuclide Distribution Sample	EP 3-5
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	Dick Rudall 12-12-07

EP FH-103
4" 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	19	19	100,000	10,279	630	-	42	-	-	0.005
2	12	12	63,158	6,492	398	-	27	-	-	0.003
3	17	17	89,474	9,197	564	-	38	-	-	0.005
4	7	7	36,842	3,787	232	-	16	-	-	0.002
5	9	9	47,368	4,869	298	-	20	-	-	0.003
6	10	10	52,632	5,410	332	-	22	-	-	0.003
7	4	4	21,053	2,164	133	-	9	-	-	0.001
8	7	7	36,842	3,787	232	-	16	-	-	0.002
9	12	12	63,158	6,492	398	-	27	-	-	0.003
10	13	13	68,421	7,033	431	-	29	-	-	0.004
11	11	11	57,895	5,951	365	-	24	-	-	0.003
12	15	15	78,947	8,115	497	-	33	-	-	0.004
13	9	9	47,368	4,869	298	-	20	-	-	0.003
14	11	11	57,895	5,951	365	-	24	-	-	0.003
15	18	18	94,737	9,738	597	-	40	-	-	0.005
									MEAN	0.003
									MEDIAN	0.003
									STD DEV	0.001
									MAX	0.005
									MIN	0.001

SECTION 7
ATTACHMENT 2
__3__ PAGE(S)

Pipe Interior Radiological Survey Form

Date: 9/6/06 Time: 0816

Pipe ID#: FH-103 Pipe Diameter: 4" Access Point Area: Sump Rm #7

Building: FAN HOUSE Elevation: -12' System: DRAIN

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

Gross _____ Co60 _____ Cs ✓

Detector ID# / Sled ID# 44-159 H 238367 / 101

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 36.8 cpm

$MDCR_{static}$ 23.9 cpm

Efficiency Factor for Pipe Diameter 0.00019 (from detector efficiency determination)

MDC_{static} 9453 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	19	19	n/a	n/a
2	2	↓	12	12	↓	↓
3	3		17	17		
4	4		7	7		
5	5		9	9		
6	6		10	10		
7	7		4	4		
8	8		7	7		
9	9		12	12		
10	10	↓	13	13	↓	↓

REFERENCE COPY

Babcock SERVICES INC.

Pipe Interior Radiological Survey Form (Continuation Form)

Date: 9/6/06
Pipe ID#: FH 103 Pipe Diameter: 4" Access Point Area: Sump Rm #7
Building: FAN HOUSE Elevation: -12' System: DRAIN

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
11	11	1	11	11	N/A	N/A
12	12	↓	15	15	↓	↓
13	13		9	9		
14	14		11	11		
15	15	↓	18	18	↓	↓

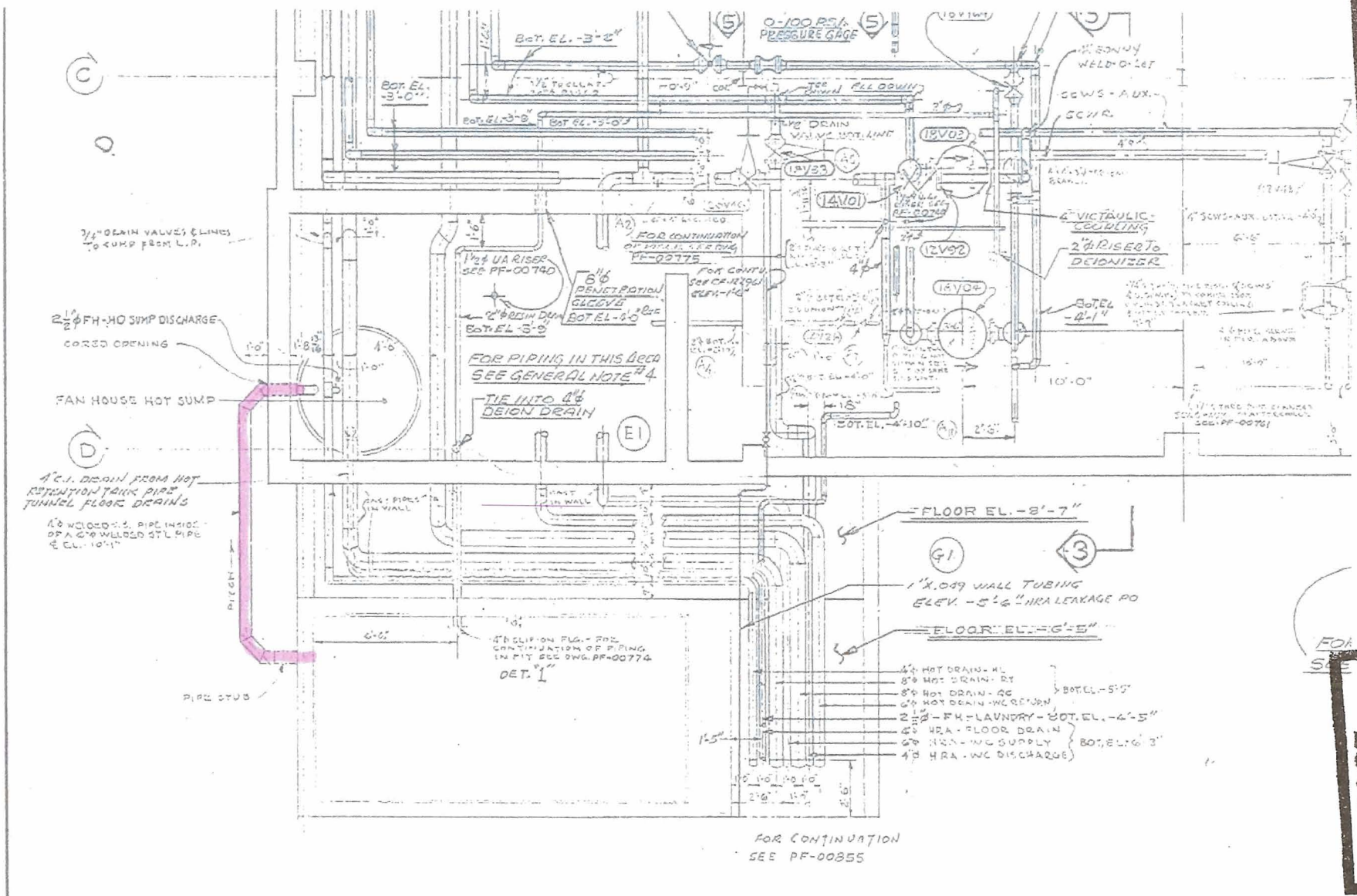
N

A

REFERENCE COPY

DRAWING PF00770

FH 105



REFERENCE COPY

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ATTACHMENT 3
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DQA Check Sheet				
Design #	EP FH-103	Revision #	Original	
Survey Unit #	EP FH-103			

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)	CL Wood / CL Wood	Date	12.13.07
FSS/ Characterization Manager (print/sign)	R. Case	Date	12/18/07

Form
CS-09/2
Rev 0

SECTION 7
ATTACHMENT 4
1 DISC