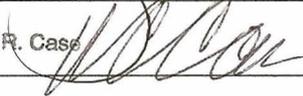


## Survey Unit Release Record

<b>Design #</b>	EP-1.63	<b>Revision #</b>	Original	<b>Page 1 of 3</b>
<b>Survey Unit #(s)</b>	1.63			
<b>Description</b>	<p>1) Embedded Pipe (EP) Survey Unit 1.63 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP 1.63 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 1.63 were performed using a scintillation detector optimized to measure gamma energies representative of Cs-137. 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>			
<b>Approval Signatures</b>			<b>Date:</b>	
FSS/Characterization Engineer			10-23-07	
Technical Reviewer (FSS/Characterization Engineer)			10/30/07	
FSS/Characterization Manager	 <small>R. Case</small>		10/31/07	

Form CS-09/1 Rev 0
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## Survey Unit: 1.63

**1.0 History/Description**

- 1.1 The subject pipe system is the 6" drain for canal "H".
- 1.2 EP 1.63 consists of 6" diameter piping that is approximately 10 feet in length.

**2.0 Survey Design Information**

- 2.1 EP 1.63 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 10 survey measurements.
- 2.3 Surface area for the 6" ID piping is 1,459 cm<sup>2</sup> for each foot of piping, corresponding to a total 6" ID piping surface area of 14,590 cm<sup>2</sup> (1.5 m<sup>2</sup>) for the entire length of (approximately 10') 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 1.63 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 Co-60 is designated as the primary nuclide of concern for Piping Group 2 per Technical Basis Document TBD-06-004, which would typically lead to a survey design based on the direct measurement of Co-60. The field measurements were acquired using a detector windowed for Cs-137 versus Co-60. The survey results documented in this release record are valid as Cs-137 was present in the nuclide distribution for this pipe group in sufficient abundance and the correct nuclide distribution was used to calculate total activity.

Survey Unit: 1.63

## 5.6 Statistical Summary Table

Statistical Parameter	6" Pipe
Total Number of Survey Measurements	10
Number of Measurements >MDC	10
Number of Measurements Above 50% of DCGL	1
Number of Measurements Above DCGL	0
Mean	0.2774
Median	0.2664
Standard Deviation	0.2015
Maximum	0.7829
Minimum	0.1088

**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 1.63 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.277 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 1.63 & Spreadsheet

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



## BSI EP/BP SURVEY REPORT

<b>Pipe ID</b>	EP 1.63	<b>Survey Location</b>	Hot Lab J- Canal Drains
<b>Survey Date</b>	12-Jul-07	<b>2350-1 #</b>	189094
<b>Survey Time</b>	10:20	<b>Detector-Sled #</b>	1MG1 LVS-1 / 101
<b>Pipe Size</b>	6"	<b>Detector Efficiency</b>	0.0003
<b>DCGL (dpm/100cm<sup>2</sup>)</b>	3.79E+06	<small>Pipe Area Incorporated by Detector Efficiency (in cm<sup>2</sup>)</small>	1,459
<small>Pipe Area Incorporated by Survey Data (m<sup>2</sup>)</small>	1.5	<b>Field BKG (cpm)</b>	10.5
<b>Routine Survey</b>	X	<b>Field MDCR (cpm)</b>	14.2
<b>QA Survey</b>		<b>Nominal MDC (dpm/100cm<sup>2</sup>)</b>	3,200
<b>Survey Measurement Results</b>			
Total Number of Survey Measurements		10	
Number of Measurements >MDC		10	
Number of Measurements Above 50% DCGL		1	
Number of Measurements Above DCGL		0	
Mean		0.2774	
Median		0.2664	
Standard Deviation		0.2015	
Maximum		0.7829	
Minimum		0.1088	
<b>Survey Technician(s)</b>	FOWLER		
Survey Unit Classification		1	
TBD 06-004 Piping Group		2	
SR-13 Radionuclide Distribution Sample		EP 2-5	
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			

**EP 1.63**  
**6" Pipe**  
**TBD 06-004 Group 2**

Measurement #	gcpm	ncpm	Cs-137 activity (total dpm)	Cs-137 activity (dpm/100cm <sup>2</sup> )	Co-60 activity (dpm/100cm <sup>2</sup> )	Eu-152 activity (dpm/100cm <sup>2</sup> )	Eu-154 activity (dpm/100cm <sup>2</sup> )	Nb-94 activity (dpm/100cm <sup>2</sup> )	Ag-108m activity (dpm/100cm <sup>2</sup> )	Unity
1	59	59	196,667	13,477	25,990	216	152	13	748	0.113
2	68	68	226,667	15,532	29,954	248	175	15	862	0.130
3	151	151	503,333	34,491	66,516	552	389	32	1,914	0.288
4	195	195	650,000	44,541	85,898	712	503	42	2,472	0.372
5	139	139	463,333	31,750	61,230	508	358	30	1,762	0.265
6	140	140	466,667	31,978	61,671	511	361	30	1,775	0.267
7	410	410	1,366,667	93,651	180,607	1,498	1,057	88	5,198	0.783
8	57	57	190,000	13,020	25,109	208	147	12	723	0.109
9	68	68	226,667	15,532	29,954	248	175	15	862	0.130
10	166	166	553,333	37,917	73,124	606	428	36	2,105	0.317
									MEAN	0.277
									MEDIAN	0.266
									STD DEV	0.202
									MAX	0.783
									MIN	0.109

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

**Pipe Interior Radiological Survey Form**

Date: 7-12-07 Time: 1020  
 Pipe ID#: 1.63 Pipe Diameter: 6" Access Point Area: J Canal  
 Building: Hot Lab Elevation: -25' System: Drains  
 Type of Survey Investigation \_\_\_\_\_ Characterization \_\_\_\_\_ Final Survey X Other ✓  
 Gross \_\_\_\_\_ Co60 \_\_\_\_\_ Cs ✓  
 Detector ID# / Sled ID# 1m61 / LUS-1 / 101  
 Detector Cal Date: 1-11-07 Detector Cal Due Date: 1-11-08  
 Instrument: 2350-1 Instrument ID #: 189094  
 Instrument Cal Date: 1-11-07 Instrument Cal Due Date: 1-11-08

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

Background Value 10.5 cpm  
 MDCR<sub>static</sub> 14.2 cpm  
 Efficiency Factor for Pipe Diameter 0.0002 (from detector efficiency determination)  
 MDC<sub>static</sub> 3143 dpm/ 100 cm<sup>2</sup>  
 Is the MDC<sub>static</sub> acceptable? Yes No (if no, adjust sample count time and recalculate MDCR<sub>static</sub>)  
 Comments: Post Decon Survey EP2-5 100% Complete

Technician Signature R Fisher

**Pipe Interior Radiological Survey**

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm <sup>2</sup>
1	1	1	59	59	n/a	n/a
2	2	↓	68	68	↓	↓
3	3		151	151		
4	4		195	195		
5	5		139	139		
6	6		140	140		
7	7		410	410		
8	8		57	57		
9	9		68	68		
10	10		166	166		

Package Page 1 of 2



PIPE SURVEYED

DRY HOT STORAGE CELL  
FL. ELEV. -25'-0"

CANAL "K"

FLOOR DRAIN  
"JOSAM" #558  
WITH CHROME PLATE  
SEAL GRATE WITH  
BLANK PLATE & SILVER  
SOLDER AL 83 AROUND

FLOOR DRAIN  
"JOSAM" #384-J

WET HOT  
STORAGE  
FL. ELEV. -25'-0"

PAGE  
2 of 2

3" RISER  
SEE DET. 13

4" RISER  
SEE DET. 13

FOR CONTINUATION  
SEE PF-04730

4" RISERS

2 1/2" SCH. 40 ST. ST. L.  
PIPE - DRAIN LINE  
FROM OFF-GAS  
WATER SEPARATORS

HOT TRANSPORT CANAL "J"  
FL. EL. -25'-0"

REFERENCE COPY

RISE  
DETAIL 8

RISE  
3" RISER

FL. EL. -26'-5"  
FL. EL. -25'-0"  
FLOOR DRAIN  
"JOSAM" #384JH

VALVE PIT  
SEE DETAIL 6

HPT-OG-2

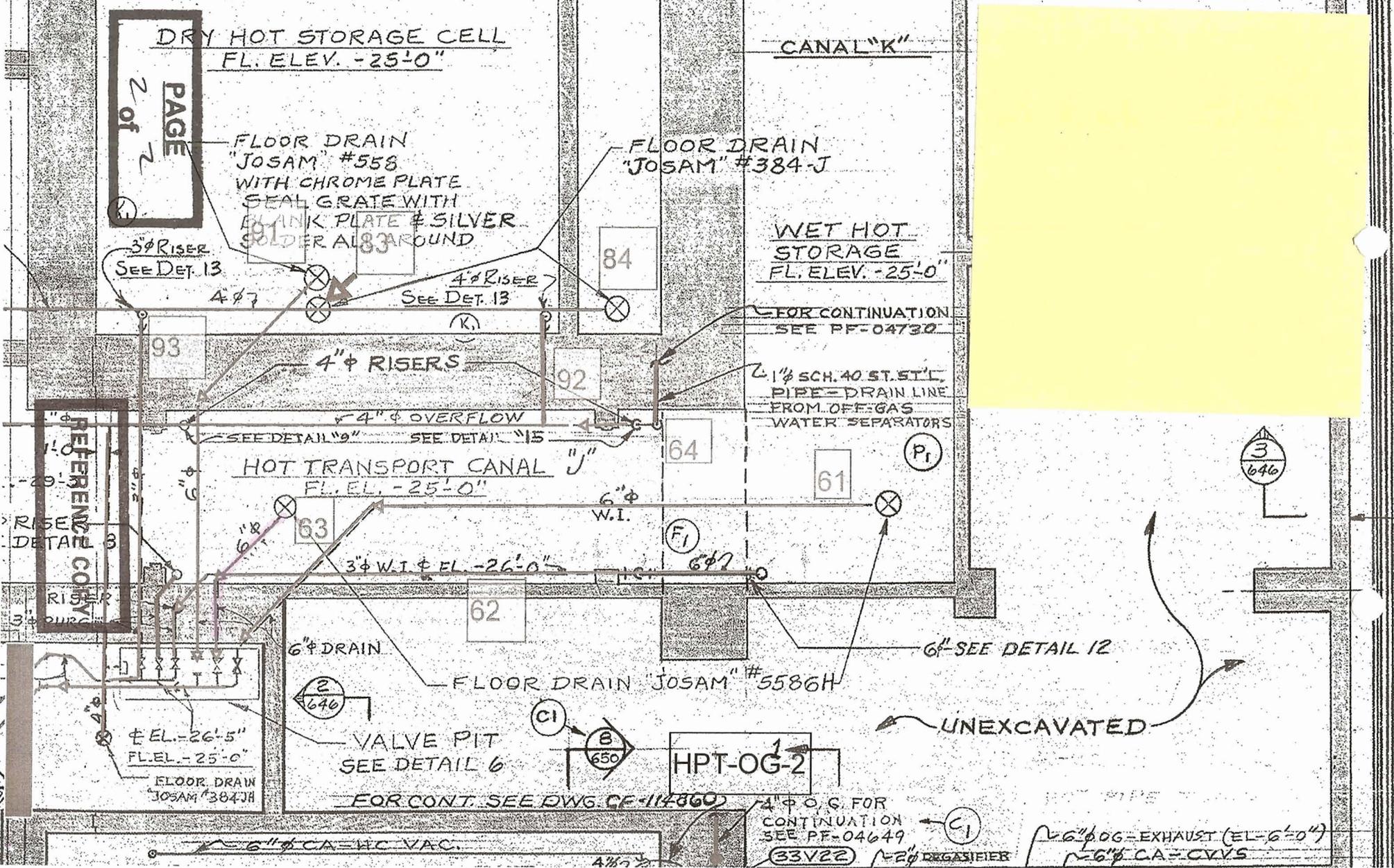
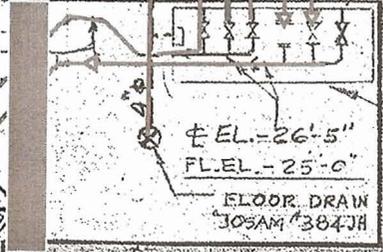
FOR CONT. SEE DWG. CF-114860

4" O.G. FOR  
CONTINUATION  
SEE PF-04649  
(33V22)

UNEXCAVATED

6" O.G. - EXHAUST (EL. -6'-0")  
6" CA - CVVS

6" CA - WC - VAC



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

**DQA Check Sheet**

Design #	EP 1.63	Revision #	Original	
Survey Unit #	EP 1.63			

**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 <sub>w</sub> for Class 1 and 2 survey units, or below 0.5 DCGL <sub>w</sub> for Class 3 survey units?			X
3. Is the instrumentation MDC for embedded/buried piping static measurements below the DCGL <sub>w</sub> ?	X		
4. Was the instrumentation MDC for structure scan measurements, soil scan measurements, and embedded/buried piping scan measurements below the DCGL <sub>w</sub> , 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 <sub>w</sub> ?			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 <sub>w</sub> (Class 1 & 2), or 0.5 DCGL <sub>w</sub> (Class 3)?	X		
2. Is the mean of the sample data < DCGL <sub>w</sub> ?	X		
3. If elevated areas have been identified by scans and/or sampling, is the average activity in each elevated area < DCGL <sub>EMC</sub> (Class 1), < DCGL <sub>w</sub> (Class 2), or <0.5 DCGL <sub>w</sub> (Class 3)?			X
4. Is the result of the Elevated Measurements Test < 1.0?			X
5. Is the result of the statistical test ( <b>S+</b> for Sign Test or <b>W<sub>r</sub></b> for WRS Test) ≥ the critical value?			X

Comments:

FSS/Characterization Engineer (print/sign)	<i>Dale Randall</i>	Date	10-23-07
FSS/ Characterization Manager (print/sign)	<i>[Signature]</i> F. Case	Date	10/31/07

Form  
CS-09/2  
Rev 0

**SECTION 7  
ATTACHMENT 4  
1 DISC**