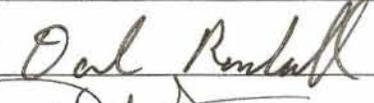
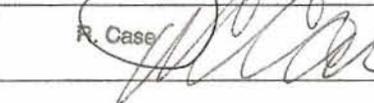


Survey Unit Release Record

Design #	EP-1.62	Revision #	Original	Page 1 of 3
Survey Unit #(s)	1.62			
Description	<p>1) Embedded Pipe (EP) Survey Unit 1.62 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).</p> <p>2) EP 1.62 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 1.62 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>			
Approval Signatures			Date:	
FSS/Characterization Engineer			10-23-07	
Technical Reviewer (FSS/Characterization Engineer)			10/30/07	
FSS/Characterization Manager	 R. Case		NOV 05 2007	

Form
 CS-09/1
 Rev 0

Survey Unit: 1.62

1.0 History/Description

- 1.1 The subject pipe system is the 3" riser in canal "K". The piping is located in the Hot Lab, -25ft el.
- 1.2 EP 1.62 consists of 3" diameter piping that is approximately 55 feet in length.

2.0 Survey Design Information

- 2.1 EP 1.62 was surveyed IAW Procedure #BSI/LVS-002.
- 2.2 100% of the 3" ID pipe was accessible for survey. The accessible 3" ID pipe was surveyed by static measurement at one foot increments, for a total of 55 survey measurements.
- 2.3 Surface area for the 3" ID piping is 730 cm² for each foot of piping, corresponding to a total 3" ID piping surface area of 40,131 cm² (4.0 m²) for the entire length of (approximately 55') of 3" 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 1.62 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.

5.6 Statistical Summary Table

Statistical Parameter	3" Pipe
Total Number of Survey Measurements	55
Number of Measurements >MDC	50
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.047
Median	0.031
Standard Deviation	0.059
Maximum	0.405
Minimum	0.019

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 1.62 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.047 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 1.62 & Spreadsheet

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ATTACHMENT 1
3 **PAGE(S)**



BSI EP/BP SURVEY REPORT

Pipe ID	1.62	Survey Location	Canal K Riser
Survey Date	13-Nov-06	2350-1 #	203488
Survey Time	10:11, 13:38	Detector-Sled #	44-159 238369/no sled
Pipe Size	3"	Detector Efficiency	0.00077
DCGL (dpm/100cm ²)	3.79E+06	Pipe Area Incorporated by Detector Efficiency (in cm ²)	730
Pipe Area Incorporated by Survey Date (m ²)	4.0	Field BKG (cpm)	6, 4.7
Routine Survey	X	Field MDCR (cpm)	11.5, 10.5
QA Survey		Nominal MDC (dpm/100cm ²)	2,660
Survey Measurement Results			
Total Number of Survey Measurements		55	
Number of Measurements >MDC		50	
Number of Measurements Above 50% DCGL		0	
Number of Measurements Above DCGL		0	
Mean		0.047	
Median		0.031	
Standard Deviation		0.059	
Maximum		0.405	
Minimum		0.019	
Survey Technician(s)	STOCK		
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	<i>Dal Russell 10-23-07</i>		

EP 1.62
3" Pipe
TBD 06-004 Group 2

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	27	27	35,065	4,806	9,268	77	54	5	267	0.040
2	30	30	38,961	5,340	10,297	85	60	5	296	0.045
3	33	33	42,857	5,874	11,327	94	66	6	326	0.049
4	17	17	22,078	3,026	5,835	48	34	3	168	0.025
5	21	21	27,273	3,738	7,208	60	42	4	207	0.031
6	14	14	18,182	2,492	4,805	40	28	2	138	0.021
7	16	16	20,779	2,848	5,492	46	32	3	158	0.024
8	19	19	24,675	3,382	6,522	54	38	3	188	0.028
9	14	14	18,182	2,492	4,805	40	28	2	138	0.021
10	15	15	19,481	2,670	5,149	43	30	3	148	0.022
11	18	18	23,377	3,204	6,178	51	36	3	178	0.027
12	23	23	29,870	4,094	7,895	65	46	4	227	0.034
13	19	19	24,675	3,382	6,522	54	38	3	188	0.028
14	20	20	25,974	3,560	6,865	57	40	3	198	0.030
15	21	21	27,273	3,738	7,208	60	42	4	207	0.031
16	19	19	24,675	3,382	6,522	54	38	3	188	0.028
17	22	22	28,571	3,916	7,551	63	44	4	217	0.033
18	20	20	25,974	3,560	6,865	57	40	3	198	0.030
19	20	20	25,974	3,560	6,865	57	40	3	198	0.030
20	28	28	36,364	4,984	9,611	80	56	5	277	0.042
21	18	18	23,377	3,204	6,178	51	36	3	178	0.027
22	29	29	37,662	5,162	9,954	83	58	5	286	0.043
23	34	34	44,156	6,052	11,670	97	68	6	336	0.051
24	21	21	27,273	3,738	7,208	60	42	4	207	0.031
25	14	14	18,182	2,492	4,805	40	28	2	138	0.021
26	18	18	23,377	3,204	6,178	51	36	3	178	0.027
27	14	14	18,182	2,492	4,805	40	28	2	138	0.021
28	19	19	24,675	3,382	6,522	54	38	3	188	0.028
29	24	24	31,169	4,272	8,238	68	48	4	237	0.036
30	148	148	192,208	26,342	50,801	421	297	25	1,462	0.220
31	109	109	141,558	19,401	37,414	310	219	18	1,077	0.162

EP 1.62
3" Pipe
TBD 06-004 Group 2

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
32	18	18	23,377	3,204	6,178	51	36	3	178	0.027
33	26	26	33,766	4,628	8,924	74	52	4	257	0.039
34	18	18	23,377	3,204	6,178	51	36	3	178	0.027
35	19	19	24,675	3,382	6,522	54	38	3	188	0.028
36	19	19	24,675	3,382	6,522	54	38	3	188	0.028
37	23	23	29,870	4,094	7,895	65	46	4	227	0.034
38	23	23	29,870	4,094	7,895	65	46	4	227	0.034
39	27	27	35,065	4,806	9,268	77	54	5	267	0.040
40	18	18	23,377	3,204	6,178	51	36	3	178	0.027
41	43	43	55,844	7,653	14,760	122	86	7	425	0.064
42	272	272	353,247	48,413	93,364	774	547	46	2,687	0.405
43	48	48	62,338	8,543	16,476	137	96	8	474	0.071
44	19	19	24,675	3,382	6,522	54	38	3	188	0.028
45	21	21	27,273	3,738	7,208	60	42	4	207	0.031
46	27	27	35,065	4,806	9,268	77	54	5	267	0.040
47	13	13	16,883	2,314	4,462	37	26	2	128	0.019
48	20	20	25,974	3,560	6,865	57	40	3	198	0.030
49	28	28	36,364	4,984	9,611	80	56	5	277	0.042
50	33	33	42,857	5,874	11,327	94	66	6	326	0.049
51	34	34	44,156	6,052	11,670	97	68	6	336	0.051
52	28	28	36,364	4,984	9,611	80	56	5	277	0.042
53	29	29	37,662	5,162	9,954	83	58	5	286	0.043
54	22	22	28,571	3,916	7,551	63	44	4	217	0.033
55	30	30	38,961	5,340	10,297	85	60	5	296	0.045
									MEAN	0.047
									MEDIAN	0.031
									STD DEV	0.059
									MAX	0.405
									MIN	0.019

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ATTACHMENT 2
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Pipe Interior Radiological Survey Form

Date: 11/13/06 Time: 1011
 Pipe ID#: 1.62 Pipe Diameter: 3" Access Point Area: CANAL K
 Building: HOT LABS Elevation: -25' System: RISER

Type of Survey Investigation Characterization Final Survey Other

Gross Co60 Cs

Detector ID# / Sled ID# 44-159 2383691 NO SLED

Detector Cal Date: 9/5/06 Detector Cal Due Date: 9/5/07

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 9.6 cpm 6.0 cpm

MDCR_{static} 11.5 cpm

Efficiency Factor for Pipe Diameter 0.00066 (from detector efficiency determination)

MDC_{static} 2648 dpm/ 100 cm²

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

Comments: CONTINUATION, POST HYDRO SURVEY EP2-5 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	55	1	27	27	N/A	N/A
2	54	↓	30	30	↓	↓
3	53		33	33		
4	52		17	17		
5	51		21	21		
6	50		14	14		
7	49		16	16		
8	48		19	19		
9	47		14	14		
10	46		15	15		

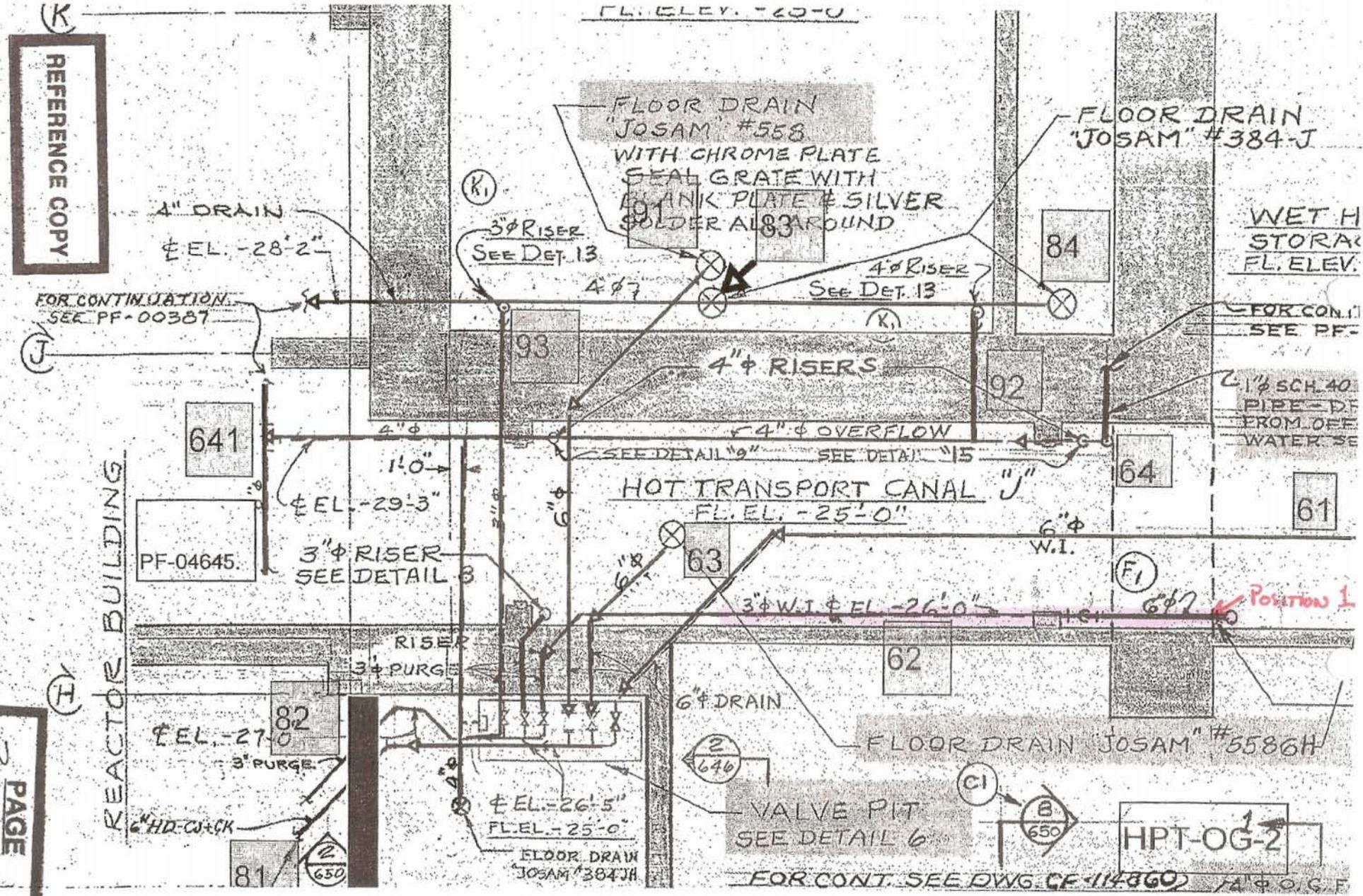


REFERENCE COPY

3 of 3 PAGE

REACTOR BUILDING

FL. ELEV. -20'-0"



4" DRAIN
EL. -28'-2"

FLOOR DRAIN
"JOSAM" #558
WITH CHROME PLATE
SEAL GRATE WITH
BLANK PLATE & SILVER
SOLDER AL83 AROUND

FLOOR DRAIN
"JOSAM" #384-J

WET H
STORAGE
FL. ELEV.

FOR CONTINUATION
SEE PF-00387

FOR CONT.
SEE PF-

2 1/2" SCH. 40
PIPE - DE
FROM OFF
WATER SE

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

Position 1

VALVE PIT
SEE DETAIL 6

HPT-OG-2

FOR CONT. SEE DWG. CF-1148602

Pipe Interior Radiological Survey Form

Date: 11/13/06 Time: 1338
 Pipe ID#: 1.62 Pipe Diameter: 3" Access Point Area: VALVE PIT
 Building: HOT LAB Elevation: -27' System: RISER K CRAWL

Type of Survey Investigation Characterization Final Survey Other

Gross Co60 Cs

Detector ID# / Sled ID# 44-159 238569 1 NO SLED

Detector Cal Date: 9/5/06 Detector Cal Due Date: 9/5/07

Instrument: 2350-1 Instrument ID #: 203988

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 4.7 cpm

MDCR_{static} 10.5 cpm

Efficiency Factor for Pipe Diameter 0.00066 (from detector efficiency determination)

MDC_{static} 2648 dpm/ 100 cm²

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

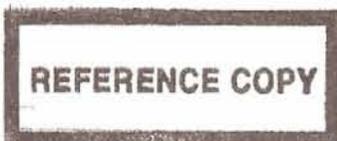
Comments: SECOND POST HYDRO SURVEY EP2-5 PARTIAL

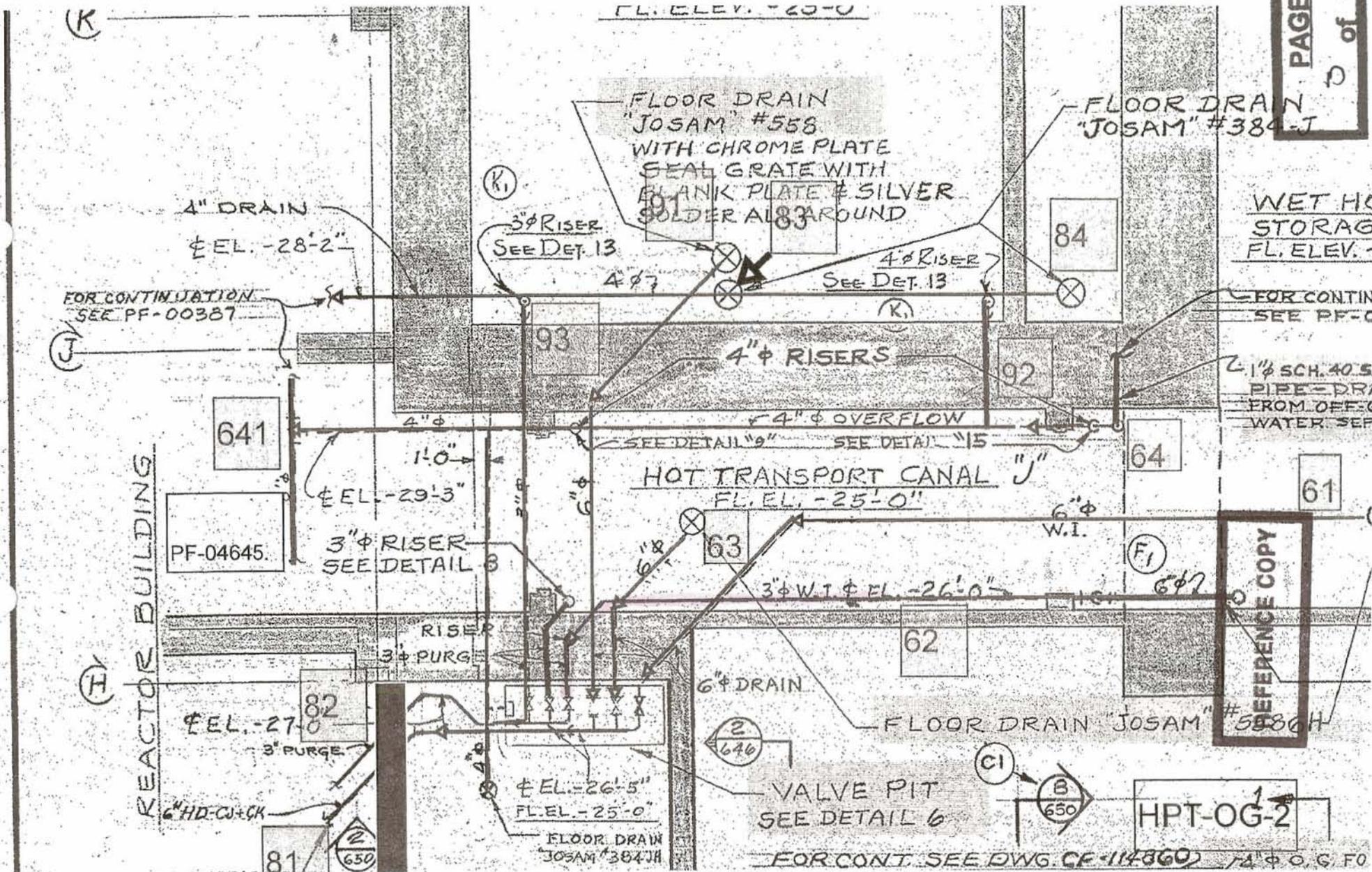
Position [#] 7: SECOND CORANT 338cpm

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	4	19	19	n/a	n/a
2	2	↓	23	23	↓	↓
3	3		23	23		
4	4		27	27		
5	5		18	18		
6	6		43	43		
7	7		272	272		
8	8		48	48		
9	9		19	19		
10	10		21	21		





REFERENCE COPY

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DQA Check Sheet

Design #	EP 1.62	Revision #	Original	
Survey Unit #	EP 1.62			

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)	<i>Dale Randall</i>	Date	10-23-07
FSS/ Characterization Manager (print/sign)	R. Case	Date	11/5/07

Form
CS-09/2
Rev 0

**SECTION 7
ATTACHMENT 4
1 DISC**