PLUM BROOK REACTOR FACILITY
DECOMMISSIONING PROJECT OFFICE
6100 Columbus Avenue, Sandusky, OH 44870
Phone: (419)621-3269 Fax: (419) 621-3318

MEMORANDUM

June 8, 2007

To: Mr. William Snell, NRC

From: Rod Case, NASA Project Assistant RSO

Subject: PBRF Project Embedded Pipe Survey Unit Release Records

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Enclosed please find the following copies of the PBRF embedded pipe survey unit release records for your review in preparation for your upcoming site inspection.

- Survey Unit Release Record EP 1.24
- Survey Unit Release Record EP 1.25
- Survey Unit Release Record EP 1.26
- Survey Unit Release Record EP 1.36

If you have any questions, please feel free to contact Bill Stoner (419) 621-3349 or myself at (419) 621-3269.

We are looking forward to meeting with you in June.

cc: Keith Peecook
Project File

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Survey Unit Release Record				
Design #	EP-1.24	**Revision #**	Original	**Page 1 of 3**
Survey Unit #(s)	1.24			
Description	1) Embedded Pipe (EP) Survey Unit 1.24 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP 1.24 is a Class 1, Group 2 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004. 3) Surveys in EP 1.24 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP 2-1 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	Earl Rambell	6-7-07
Technical Reviewer (FSS/Characterization Engineer)	Wood	6-7-07
FSS/Characterization Manager	R. Case	6/7/07

Form
CS-09/1
Rev 0

1.0 History/Description

1.1 The subject pipe system is the 3" purge line for Canal "G". The function of this pipe was to convey water from the one 3 inch riser in Canal "G" to the HD sump in Pump Room #22 on the Rx Building -25 ft, where the pipe is currently breached.

1.2 EP 1.24 consists of approximately 39 feet in length from the pump room to the riser in Canal "G". The pipe section has a three mitered elbows ranging between 45° and 90°.

2.0 Survey Design Information

2.1 EP 1.24 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 30 survey measurements.

2.3 Surface area for the 3" ID piping is 729.7 cm^2 for each foot of piping, corresponding to a total 3" ID piping surface area of 21,891 cm^2 (2.2 m^2) for the entire length of (30') 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 1.24 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	3" Pipe
Total Number of Survey Measurements	30
Number of Measurements >MDC	28
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.019 mrem/yr
Median	0.020
Standard Deviation	0.005
Maximum	0.031
Minimum	0.011

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 1.24 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.019 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 1.24 & Spreadsheet

SECTION 7
ATTACHMENT 1
3 PAGE(S)

Babcock

BSI EP/BP SURVEY REPORT

Pipe ID	**1.24**	**Survey Location**	-27 TRENCH
Survey Date	12-16-05/12-20-05	**2350-1 #**	212223
Survey Time	1250/1420	**Detector-Sled #**	44-62/204402-121
Pipe Size	3"	**Detector Efficiency**	0.00014
DCGL (dpm/100cm2)	240800	Pipe Area Incorporated by Detector Efficiency (in cm2)	730
Pipe Area Incorporated by Survey Data (m^2)	2.2	**Field BKG** (cpm)	5.1/6.8
Routine Survey	X	**Field MDCR** (cpm)	10.7/11.9
QA Survey		**Nominal MDC** (dpm/100cm2)	2,842

Survey Measurement Results	
Total Number of Survey Measurements	30
Number of Measurements >MDC	28
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.019
Median	0.020
Standard Deviation	0.005
Maximum	0.031
Minimum	0.011

Survey Technician(s)	ROSENHAGEN

Survey Unit Classification	1
TBD 06-004 Piping Group	2
SR-13 Radionuclide Distribution Sample	EP 2-1
Measured Nuclide	Co60
Area Factor/EMC Used	No
Pass/Fail FSS	Pass
MREM/YR Contribution	<1

COMMENTS:
ACTIVITY VALUES NOT BACKGROUND CORRECTED

RP Engineer | Date	Dale Rosell 6-7-07

EP 1.24
3" Pipe
TBD 06-004 Group 2

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm2)	Cs-137 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	6.3	6.3	45,000	6,167	3,201	51	36	3	179	0.027
2	3	3	21,429	2,937	1,524	24	17	1	85	0.013
3	5	5	35,714	4,894	2,540	41	29	2	142	0.021
4	6	6	42,857	5,873	3,048	49	35	3	170	0.025
5	4.6	4.6	32,857	4,503	2,337	37	27	2	131	0.020
6	7	7	50,000	6,852	3,556	57	40	3	199	0.030
7	7.3	7.3	52,143	7,146	3,709	59	42	4	207	0.031
8	4.6	4.6	32,857	4,503	2,337	37	27	2	131	0.020
9	4	4	28,571	3,916	2,032	32	23	2	114	0.017
10	4.6	4.6	32,857	4,503	2,337	37	27	2	131	0.020
11	5	5	35,714	4,894	2,540	41	29	2	142	0.021
12	4	4	28,571	3,916	2,032	32	23	2	114	0.017
13	4.3	4.3	30,714	4,209	2,185	35	25	2	122	0.018
14	4	4	28,571	3,916	2,032	32	23	2	114	0.017
15	2.6	2.6	18,571	2,545	1,321	21	15	1	74	0.011
16	4	4	28,571	3,916	2,032	32	23	2	114	0.017
17	4.3	4.3	30,714	4,209	2,185	35	25	2	122	0.018
18	4.6	4.6	32,857	4,503	2,337	37	27	2	131	0.020
19	5.3	5.3	37,857	5,188	2,693	43	31	3	150	0.022
20	5.6	5.6	40,000	5,482	2,845	45	32	3	159	0.024
21	5.3	5.3	37,857	5,188	2,693	43	31	3	150	0.022
22	5.3	5.3	37,857	5,188	2,693	43	31	3	150	0.022
23	4.3	4.3	30,714	4,209	2,185	35	25	2	122	0.018
24	3.6	3.6	25,714	3,524	1,829	29	21	2	102	0.015
25	3.6	3.6	25,714	3,524	1,829	29	21	2	102	0.015
26	2.6	2.6	18,571	2,545	1,321	21	15	1	74	0.011
27	5	5	35,714	4,894	2,540	41	29	2	142	0.021
28	3.3	3.3	23,571	3,230	1,677	27	19	2	94	0.014
29	4.6	4.6	32,857	4,503	2,337	37	27	2	131	0.020
30	3	3	21,429	2,937	1,524	24	17	1	85	0.013

EP 1.24
3" Pipe
TBD 06-004 Group 2

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm2)	Cs-137 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	0.019
									MEDIAN	0.020
									STD DEV	0.005
									MAX	0.031
									MIN	0.011

SECTION 7
ATTACHMENT 2
__5__ PAGE(S)

Pipe Interior Radiological Survey Form

Date: 12·16·05 Time: 1250

Building: REACTOR Elevation: -25 Access Point Area: -27 TRENCH

System: CANAL G PURGE Pipe Diameter: 3" Pipe ID # 1-24

Type of Survey Investigation Characterization (Final Survey) Other ✓

Sled Size 3" inch

Detector: 44-60 Detector ID #: 204402-121

Cal Date: 11·17·05 Cal Due Date: 11·17·06

Instrument: 2350-1 Instrument ID #: 212273

Cal Date: 11·17·05 Cal Due Date: 11·17·06

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

Background Value 5.1 cpm

$MDCR_{static}$ 10.7 cpm

Efficiency Factor for Pipe Diameter 0.00014 (taken from detector ~~calibration certificate~~) efficiency determination

MDC_{static} 2842 dpm/100cm^2

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

Comments: ~~NOTE: COULD NOT ACCESS 6 Ft. of PIPE for~~

Complete

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 12·16·05 Time: 1250

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
1	1	3	n/a	n/a	n/a	n/a
2	2	3	n/a	n/a		
3	3	3	15	5		
4	4	3	18	6		
5	5	3	14	4.6		
6	6	3	21	7		
7	7	3	22	7.3		
8	8	3	14	4.6		
9	9	3	12	4		
10	10	3	14	4.6		

REFERENCE COPY

12-16-05

TRENCH
CANAL G PURGE #1.24

Pipe Interior Radiological Survey Form (Continuation Form)

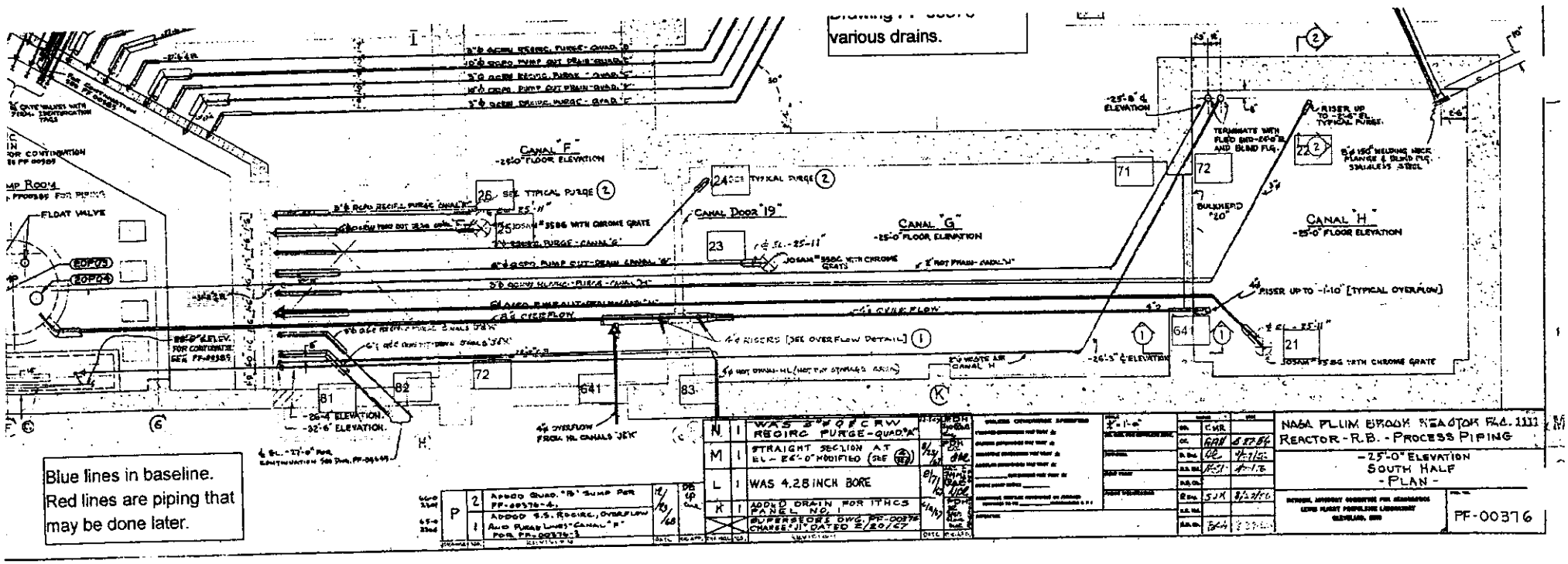
Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm²
11	11	3	15	5	n/a	n/a
12	12	3	12	4		
13	13	3	13	4.3		
14	14	3	12	4		
15	15	3	8	2.6		
16	16	3	12	4		
17	17	3	13	4.3		
18	18	3	14	4.6		
19	19	3	16	5.3		
20	20	3	17	5.6		
21	21	3	16	5.3		
22	22	3	16	5.3		
23	23	3	13	4.3		
24	24	3	11	3.6		
25	25	3	11	3.6		
26	26	3	8	2.6		
27	27	3	15	5		
28	28	3	10	3.3		
29	29	3	14	4.6		
30	30	3	15	3		
			n	a		

Package Page 2 of 2

REFERENCE COPY

Babcock Services Inc.

various drains.



Blue lines in baseline.
Red lines are piping that may be done later.

= Pipe surveyed

ID # 1.24

12-16-05

REFERENCE COPY

Pipe Interior Radiological Survey Form

Date: 12-20-05 Time: 1420

Building: RX Elevation: -25 Access Point Area: CANAL G

System: PURGE Pipe Diameter: 3" Pipe ID # 1.24

Type of Survey Investigation Characterization (Final Survey) Other ✓

Sled Size 3 inch

Detector: 4462 Detector ID #: 204402-121

Cal Date: 11-17-05 Cal Due Date: 11-17-06

Instrument: 2350-1 Instrument ID #: 242223

Cal Date: 11-7-05 Cal Due Date: 11-7-06

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

Background Value 6.8 cpm

$MDCR_{static}$ 11.9 cpm

Efficiency Factor for Pipe Diameter 0.00014 (taken from detector ~~calibration certificate~~) efficiency determination

MDC_{static} 2842 dpm/100cm^2

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

Comments: CONTINUATION SURVEY

SSP / SURVEY DONE

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 12-20-05 Time: 1420

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
1	1	3	19	6.3	n/a	n/a
2	2	3	9	3	↓	↓
3	3	3	9	3		
4						
5						
6				a		
7			n			
8						
9						
10						

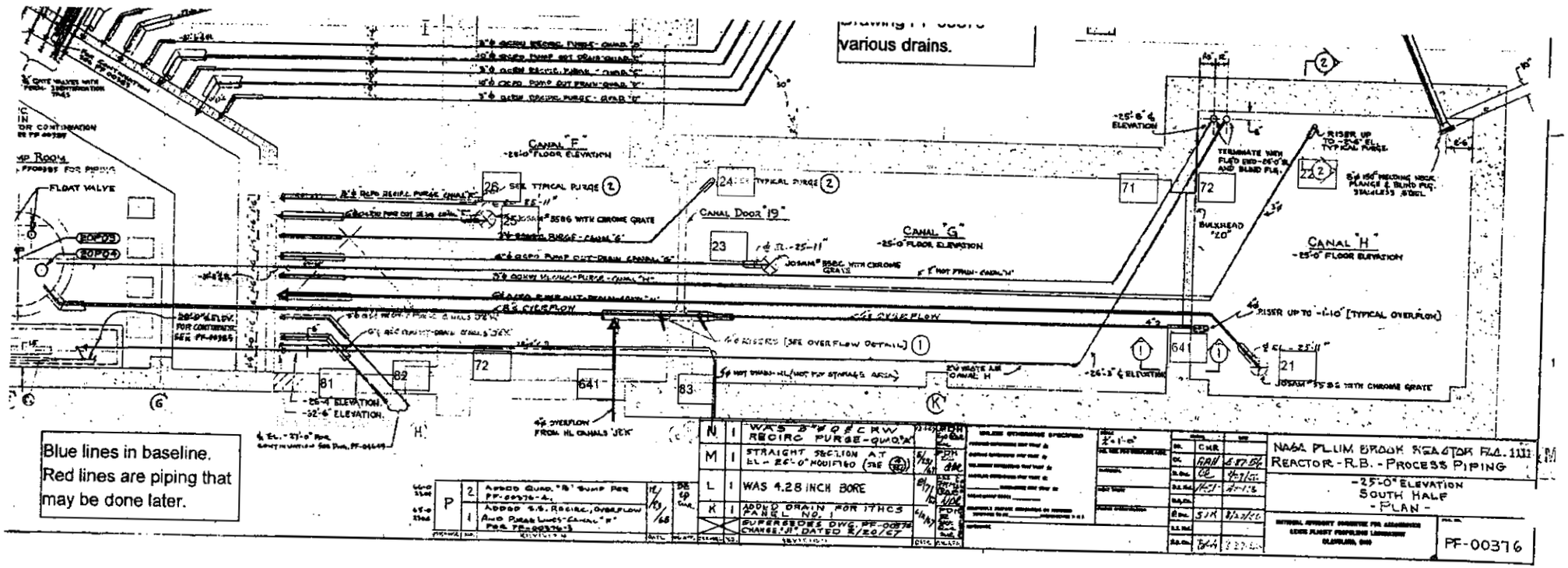
Package Page 1 of 2

Babcock Services Inc.

REFERENCE COPY

various drains.

Blue lines in baseline.
Red lines are piping that may be done later.



= PIPE SURVEYED

ID # 1.24

12-20-05

PAGE 2 of 2

REFERENCE COPY

SECTION 7
ATTACHMENT 3
___1___ PAGE(S)

DQA Check Sheet				
Design #	EP 1.24	Revision #	Original	
Survey Unit #	EP 1.24			

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)	Dale Randall / Dale Randall	Date	6-7-07
FSS/ Characterization Manager (print/sign)	R. Case	Date	6/7/07

Form
CS-09/2
Rev 0

SECTION 7
ATTACHMENT 4
1 DISC

COPY

Survey Unit Release Record				
Design #	EP-1.25	**Revision #**	Original	**Page 1 of 3**
Survey Unit #(s)	1.25			
Description	1) Embedded Pipe (EP) Survey Unit 1.25 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP 1.25 is a Class 1, Group 2 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004. 3) Surveys in EP 1.25 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP 2-1 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	Oal Rankell	6-6-07
Technical Reviewer (FSS/Characterization Engineer)	[illegible]	6-6-07
FSS/Characterization Manager	[illegible] Case	6/7/07

Form
CS-09/1
Rev 0

1.0 History/Description

1.1 The subject pipe is the floor drain line from Canal "F" to the -25 ft of the Rx Building in Pump Room #22. The function of this pipe was to convey water from a floor drain located in Canal "F" to the Hot Drain (HD) sump in Pump Room #22 on the Rx Building -25 ft, where the pipe is currently breached.

1.2 EP 1.25 consists of 20 linear feet (') of 6 inch (") Inside Diameter (ID) piping from the breach point in Pump Room #22 to the floor drain in Canal "F". The pipe section is relatively straight with no bends.

2.0 Survey Design Information

2.1 EP 1.25 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 20 survey measurements.

2.3 Surface area for the 6" ID piping is 1,459 cm^2 for each foot of piping, corresponding to a total 6" ID piping surface area of 29,180 cm^2 (2.9 m^2) for the entire length of (20') 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 fractions, provided in TBD-06-004, the survey unit that is constituted by EP 1.25 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	6" Pipe
Total Number of Survey Measurements	20
Number of Measurements >MDC	18
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.003
Median	0.002
Standard Deviation	0.002
Maximum	0.012
Minimum	0.001

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 1.25 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 1.25 & Spreadsheet

SECTION 7
ATTACHMENT 1
__2__ PAGE(S)

Babcock

BSI EP/BP SURVEY REPORT

Pipe ID	**1.25**		**Survey Location**	-27 TRENCH
Survey Date	04-Jan-06		**2350-1 #**	134208
Survey Time	0823		**Detector-Sled #**	BICRON 1MG1
Pipe Size	6"		**Detector Efficiency**	0.002
DCGL (dpm/100cm2)	240800		Pipe Area Incorporated by Detector Efficiency (in cm2)	1459
Pipe Area Incorporated by Survey Data (m^2)	2.9		**Field BKG** (cpm)	18
Routine Survey	X		**Field MDCR** (cpm)	22
QA Survey			**Nominal MDC** (dpm/100cm2)	333

Survey Measurement Results	
Total Number of Survey Measurements	20
Number of Measurements >MDC	18
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.003
Median	0.002
Standard Deviation	0.002
Maximum	0.012
Minimum	0.001

Survey Technician(s)	ROSENHAGEN

Survey Unit Classification	1
TBD 06-004 Piping Group	2
SR-13 Radionuclide Distribution Sample	EP 2-1
Measured Nuclide	Co60
Area Factor/EMC Used	No
Pass/Fail FSS	Pass
MREM/YR Contribution	<1

COMMENTS:
ACTIVITY VALUES NOT BACKGROUND CORRECTED

RP Engineer | Date	Oal Rowlall 6-6-07

EP 1.25

TBD 06-004 Group 2

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm2)	Cs-137 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	83	83	41,500	2,844	1,476	24	17	1	82	0.012
2	24	24	12,000	822	427	7	5	0	24	0.004
3	17	17	8,500	583	302	5	3	0	17	0.003
4	8	8	4,000	274	142	2	2	0	8	0.001
5	14	14	7,000	480	249	4	3	0	14	0.002
6	15	15	7,500	514	267	4	3	0	15	0.002
7	21	21	10,500	720	374	6	4	0	21	0.003
8	12	12	6,000	411	213	3	2	0	12	0.002
9	14	14	7,000	480	249	4	3	0	14	0.002
10	11	11	5,500	377	196	3	2	0	11	0.002
11	22	22	11,000	754	391	6	4	0	22	0.003
12	20	20	10,000	685	356	6	4	0	20	0.003
13	18	18	9,000	617	320	5	4	0	18	0.003
14	18	18	9,000	617	320	5	4	0	18	0.003
15	17	17	8,500	583	302	5	3	0	17	0.003
16	15	15	7,500	514	267	4	3	0	15	0.002
17	15	15	7,500	514	267	4	3	0	15	0.002
18	8	8	4,000	274	142	2	2	0	8	0.001
19	14	14	7,000	480	249	4	3	0	14	0.002
20	16	16	8,000	548	285	5	3	0	16	0.002

MEAN	0.003
MEDIAN	0.002
STD DEV	0.002
MAX	0.012
MIN	0.001

SECTION 7
ATTACHMENT 2
3 PAGE(S)

Pipe Interior Radiological Survey Form

Date: 1-4-06 Time: 0900

Building: Reactor Elevation: -25 Access Point Area: -27 Trench

System: Canal-F Pipe Diameter: 6" Pipe ID # 1.25

Type of Survey Investigation Characterization (Final Survey) Other ✓

Sled Size 6" - 107 inch

Detector: Bicron IM01 Detector ID #: 2VS-1

Cal Date: 12-20-05 Cal Due Date: 12-20-06

Instrument: 2350-1 Instrument ID #: 134708

Cal Date: 12-20-05 Cal Due Date: 12-20-06

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

Background Value 18 cpm

$MDCR_{static}$ 22 cpm

Efficiency Factor for Pipe Diameter 0.002 (taken from detector ~~calibration certificate~~ efficiency determination)

MDC_{static} 333 dpm/100cm^2

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

Comments: Initial Survey

SSP / complete

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 1-4-06 Time: 0900

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
1	1ft	1	83	83	n/a	n/a
2	2ft	1	24	24		
3	3ft	1	17	17		
4	4ft	1	8	8		
5	5ft	1	14	14		
6	6ft	1	15	15		
7	7ft	1	21	21		
8	8ft	1	12	12		
9	9ft	1	14	14		
10	10ft	1	11	11		

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Pipe Interior Radiological Survey Form (Continuation Form)

1.25

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
11	11ft	1	22	n/a	n/a	n/a
12	12ft	1	20			
13	13ft	1	18			
14	14ft	1	18			
15	15ft	1	17			
16	16ft	1	15			
17	17ft	1	15			
18	18ft	1	8			
19	19ft	1	14			
20	20ft	1	16			

n.a

Package Page 2 of 2

REFERENCE COPY

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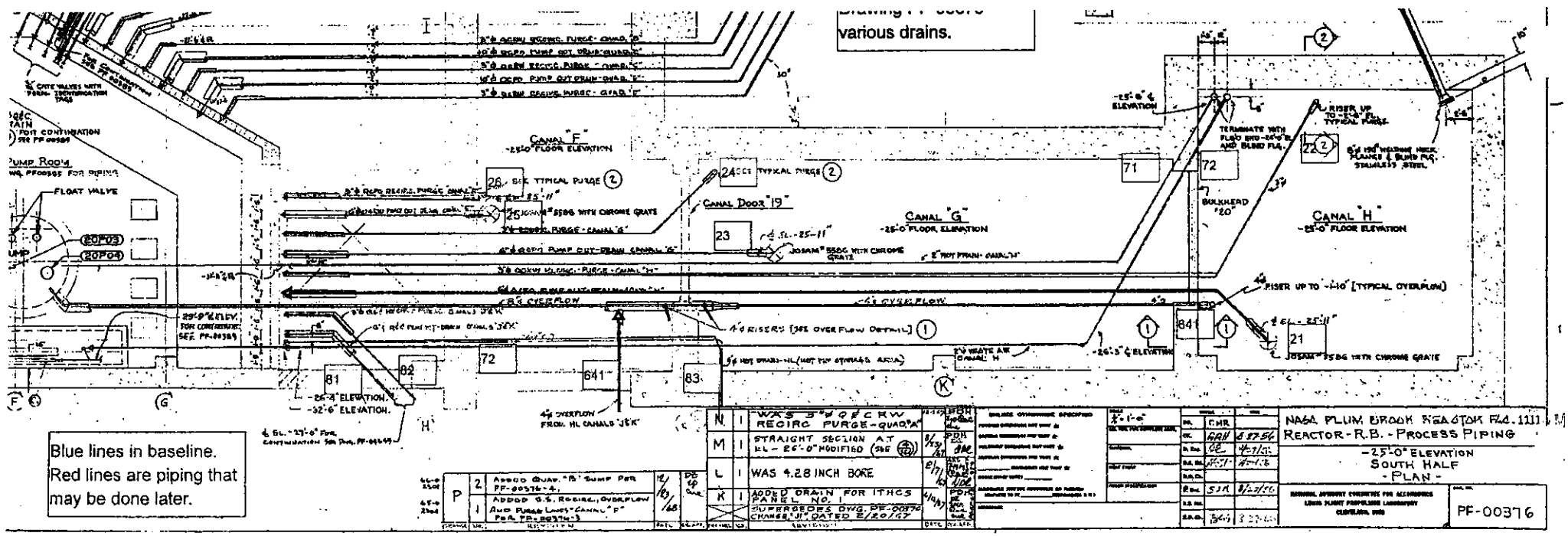
various drains.



Blue lines in baseline.
Red lines are piping that may be done later.

REFERENCE COPY

= PIPE SURVEYED

ID # 1.25

1-4-06

SECTION 7
ATTACHMENT 3
___1___ PAGE(S)

DQA Check Sheet				
Design #	EP 1.25	Revision #	Original	
Survey Unit #	EP 1.25			

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)	Dale Randall / Dale Randall	Date	6-6-07
FSS/ Characterization Manager (print/sign)	R. Case	Date	6/7/07

Form CS-09/2 Rev 0

SECTION 7
ATTACHMENT 4
1 DISC

COPY

Survey Unit Release Record				
Design #	EP-1.26	**Revision #**	Original	**Page 1 of 3**
Survey Unit #(s)	1.26			
Description	1) Embedded Pipe (EP) Survey Unit 1.26 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP 1.26 is a Class 1, Group 2 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004. 3) Surveys in EP 1.26 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP 2-1 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	Del Marshall	6-7-07
Technical Reviewer (FSS/Characterization Engineer)	Wood	6-7-07
FSS/Characterization Manager	R. Case	6/7/07

Form CS-09/1 Rev 0

1.0 History/Description

1.1 The subject pipe system is the 3 inch (") purge line for Canal "F". The function of this pipe was to convey water from the one 3" riser in Canal "F" to the HD sump in Pump Room #22 on the Rx Building -25 ft, where the pipe is currently breached.

1.2 EP 1.26 consists of approximately 20 linear feet (') in length from the pump room to the riser in Canal "F". The pipe section has a two 90° mitered elbows.

2.0 Survey Design Information

2.1 EP 1.26 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 21 survey measurements.

2.3 Surface area for the 3" ID piping is 729.7 cm^2 for each foot of piping, corresponding to a total 3" ID piping surface area of 15,321 cm^2 (1.5 m^2) for the entire length of (21') 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 fractions, provided in TBD-06-004, the survey unit that is constituted by EP 1.26 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	3" Pipe
Total Number of Survey Measurements	21
Number of Measurements >MDC	21
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.022
Median	0.021
Standard Deviation	0.005
Maximum	0.033
Minimum	0.013

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 1.26 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.022 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 1.26 & Spreadsheet

SECTION 7
ATTACHMENT 1
__2__ PAGE(S)

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BSI EP/BP SURVEY REPORT

Pipe ID	**1.26**	**Survey Location**	-27 TRENCH
Survey Date	12-16-05/12-20-05	**2350-1 #**	212223
Survey Time	1020/1408	**Detector-Sled #**	44-62/204402-121
Pipe Size	3"	**Detector Efficiency**	0.00014
DCGL (dpm/100cm2)	240800	Pipe Area Incorporated by Detector Efficiency (in cm2)	730
Pipe Area Incorporated by Survey Data (m^2)	1.5	**Field BKG** (cpm)	5.1/6.8
Routine Survey	X	**Field MDCR** (cpm)	10.7/11.9
QA Survey		**Nominal MDC** (dpm/100cm2)	2,842

Survey Measurement Results	
Total Number of Survey Measurements	21
Number of Measurements >MDC	21
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.022
Median	0.021
Standard Deviation	0.005
Maximum	0.033
Minimum	0.013

Survey Technician(s)	ROSENHAGEN

Survey Unit Classification	1
TBD 06-004 Piping Group	2
SR-13 Radionuclide Distribution Sample	EP 2-1
Measured Nuclide	Co60
Area Factor/EMC Used	No
Pass/Fail FSS	Pass
MREM/YR Contribution	<1

COMMENTS:
ACTIVITY VALUES NOT BACKGROUND CORRECTED

RP Engineer | Date	Dale Rudolph 6-7-07

EP 1.26
3" Pipe
TBD 06-004 Group 2

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm2)	Cs-137 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	4.3	4.3	30,714	4,209	2,185	35	25	2	122	0.018
2	6	6	42,857	5,873	3,048	49	35	3	170	0.025
3	4.7	4.7	33,571	4,601	2,388	38	27	2	133	0.020
4	4.7	4.7	33,571	4,601	2,388	38	27	2	133	0.020
5	4.7	4.7	33,571	4,601	2,388	38	27	2	133	0.020
6	7.3	7.3	52,143	7,146	3,709	59	42	4	207	0.031
7	4.7	4.7	33,571	4,601	2,388	38	27	2	133	0.020
8	6	6	42,857	5,873	3,048	49	35	3	170	0.025
9	5	5	35,714	4,894	2,540	41	29	2	142	0.021
10	5.3	5.3	37,857	5,188	2,693	43	31	3	150	0.022
11	5.7	5.7	40,714	5,580	2,896	46	33	3	162	0.024
12	6	6	42,857	5,873	3,048	49	35	3	170	0.025
13	6	6	42,857	5,873	3,048	49	35	3	170	0.025
14	7.7	7.7	55,000	7,537	3,912	63	44	4	219	0.033
15	3.3	3.3	23,571	3,230	1,677	27	19	2	94	0.014
16	5.7	5.7	40,714	5,580	2,896	46	33	3	162	0.024
17	4.3	4.3	30,714	4,209	2,185	35	25	2	122	0.018
18	3	3	21,429	2,937	1,524	24	17	1	85	0.013
19	5	5	35,714	4,894	2,540	41	29	2	142	0.021
20	4.7	4.7	33,571	4,601	2,388	38	27	2	133	0.020
21	3.7	3.7	26,429	3,622	1,880	30	21	2	105	0.016
									MEAN	0.022
									MEDIAN	0.021
									STD DEV	0.005
									MAX	0.033
									MIN	0.013

SECTION 7
ATTACHMENT 2
__5__ PAGE(S)

Pipe Interior Radiological Survey Form

Date: 12-16-05 Time: 1020

Building: RX Elevation: -25 Access Point Area: TRENCH

System: CANAL F-PURGE Pipe Diameter: 3" Pipe ID # 1,26

Type of Survey Investigation Characterization (Final Survey) Other ✓

Sled Size 3" inch

Detector: 4462 Detector ID #: 204402-121

Cal Date: 11-17-05 Cal Due Date: 11-17-06

Instrument: 2350-1 Instrument ID #: 212223

Cal Date: 11-17-05 Cal Due Date: 11-17-06

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

Background Value 5.1 cpm

$MDCR_{static}$ 10.7 cpm

Efficiency Factor for Pipe Diameter 0.00014 (taken from detector ~~calibration certificate)~~ efficiency determination

MDC_{static} 2842 dpm/100cm^2

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

Comments: INITIAL SURVEY

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 12-16-05 Time: 1020

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
1	1	3	13	4.3	n/a	n/a
2	2	3	18	6	↓	↓
3	3	3	14	4.7	↓	↓
4	4	3	14	4.7	↓	↓
5	5	3	14	4.7	↓	↓
6	6	3	22	7.3	↓	↓
7	7	3	14	4.7	↓	↓
8	8	3	18	6	↓	↓
9	9	3	15	5	↓	↓
10	10	3	16	5.3	↓	↓

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12-16-05

TRENCH

Pipe Interior Radiological Survey Form (Continuation Form)

FD # 1.26 CANAL F- PURGE

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm²
11	11	3	17	5.7	n/a	n/a
12	12	3	18	6		
13	13	3	18	6		
14	14	3	23	7.7		
15	15	3	10	3.3		
16	16	3	17	5.7		
17	17	3	13	4.3		
18	18	3	9	3		

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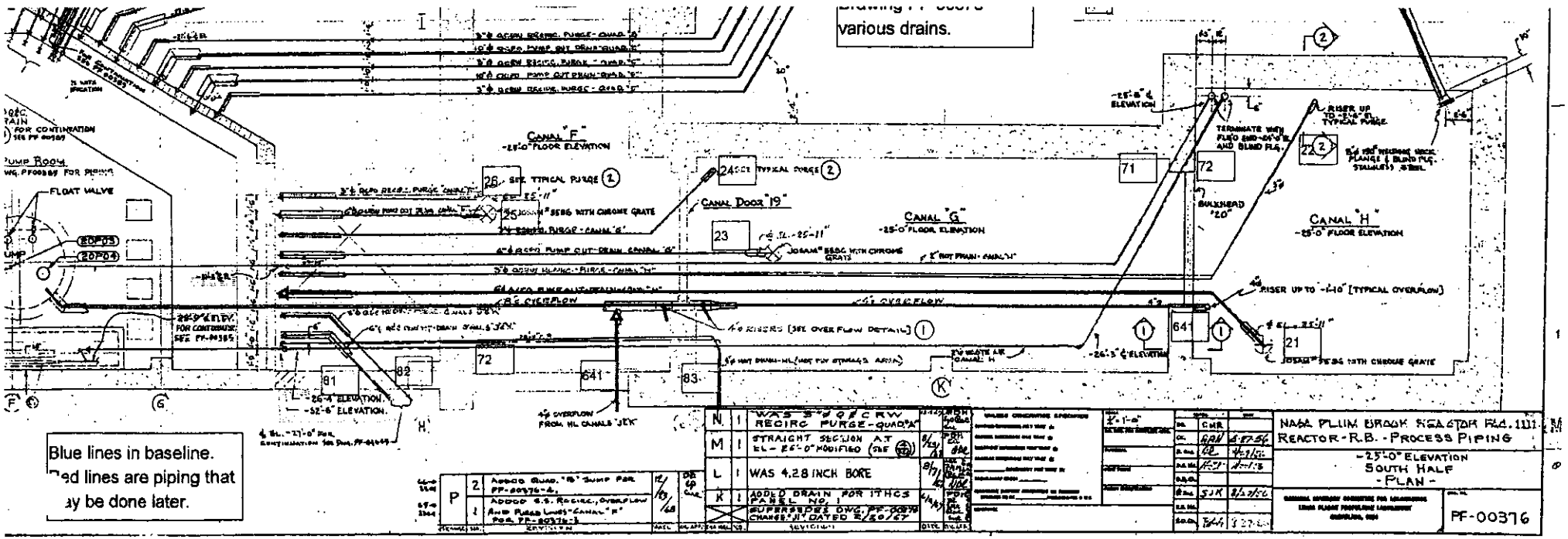
various drains.



Blue lines in baseline.
Red lines are piping that may be done later.

= PIPE SURVEYED

ID # 1.26

12-16-05

Pipe Interior Radiological Survey Form

Date: 12-20-05 Time: 1408

Building: RX Elevation: -25 Access Point Area: CANAL F

System: PURGE Pipe Diameter: 3" Pipe ID # 1.26

Type of Survey Investigation Characterization (Final Survey) Other ✓

Sled Size 3 inch

Detector: 44-62 Detector ID #: 204402-121

Cal Date: 11-17-05 Cal Due Date: 11-17-06

Instrument: 2350-1 Instrument ID #: 212223

Cal Date: 11-17-05 Cal Due Date: 11-17-06

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

Background Value 6.8 cpm

$MDCR_{static}$ 11.9 cpm

Efficiency Factor for Pipe Diameter 0.00014 (taken from detector ~~calibration certificate)~~ efficiency determination

MDC_{static} 2842 dpm/100cm^2

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

Comments: CONTINUATION SURVEY

SSP / SURVEY DONE

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 12-20-05 Time: 1408

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
1	1	3	15	5	n/a	n/a
2	2	3	14	4.7	↓	↓
3	3	3	11	3.7	↓	↓
4						
5						
6						
7						
8						
9						
10						

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Package Page 1 of 2

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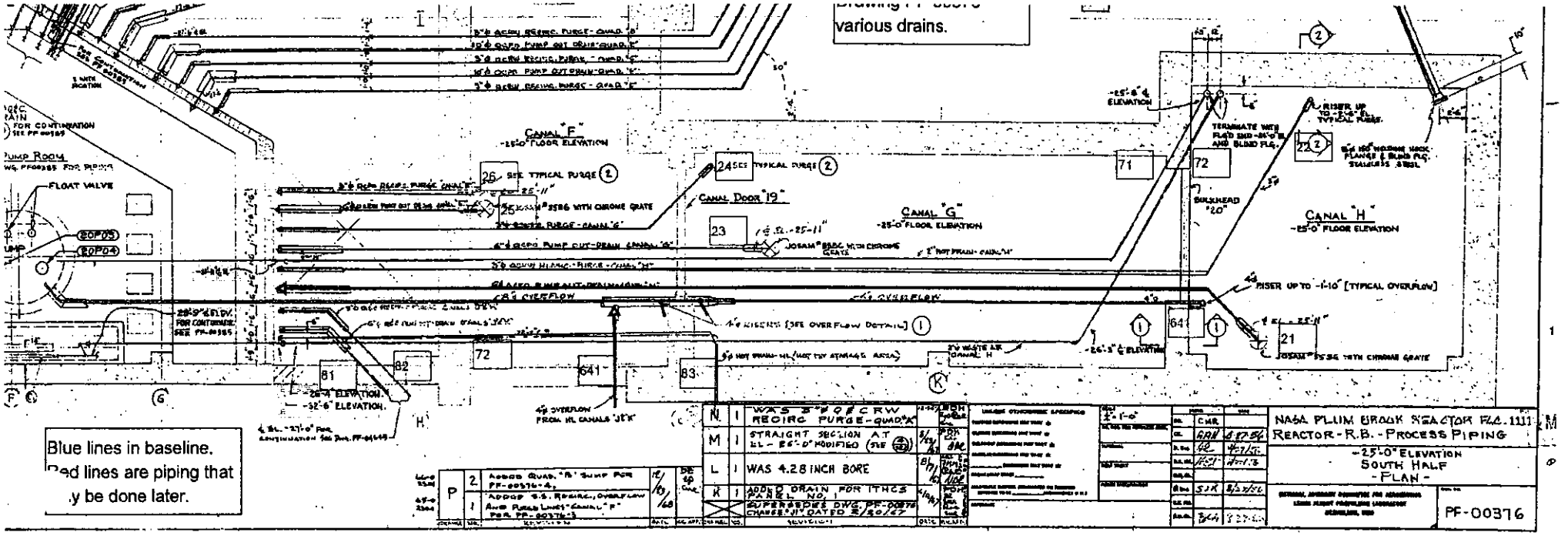
PAGE 2 of 2



= PIPE SURVEYED

ID # 1.26

12-20-06

SECTION 7
ATTACHMENT 3
____1___ PAGE(S)

DQA Check Sheet				
Design #	EP 1.26	Revision #	Original	
Survey Unit #	EP 1.26			

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)	Dale Randall / Dale Randall	Date	6-7-07
FSS/ Characterization Manager (print/sign)	R. Case	Date	6/7/07

Form
CS-09/2
Rev 0

SECTION 7
ATTACHMENT 4
1 DISC

COPY

Survey Unit Release Record				
Design #	EP 1.36	**Revision #**	Original	**Page 1 of 4**
Survey Unit #(s)	EP 1.36			
Description	1) Embedded Pipe (EP) Survey Unit EP 1.36 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). The survey unit consists of the drain line from Canal "E" in the Containment Building to the -25 ft of the Rx Building in Pump Room #22. 2) EP 1.36 is a Class 1, Group 2 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004. 3) Surveys in EP 1.36 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP 2-1 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	Gal Rudell	6-6-07
Technical Reviewer (FSS/Characterization Engineer)	[illegible]	6-7-07
FSS/Characterization Manager	R. Case [illegible]	6/7/07

Form CS-09/1 Rev 0

1.0 History/Description

1.1 EP 1.36 is the drain line from Canal "E".

1.2 The subject pipe is the drain line from Canal "E" in the Containment Building to the -25 ft of the Rx Building in Pump Room #22. The function of this pipe was to convey water from three floor drains, identified as hole "A", hole "B" and hole "C", in Canal "E" of the Containment Building to the HD sump in Pump Room #22 on the Rx Building -25 ft, where the pipe is currently breached.

1.3 EP 1.36 consists of approximately 56 feet in length from the breach point in Pump Room #22 to the furthermost floor drain in Canal "E", involving slight bend of approximately 30° and two "Y" connections to the ancillary floor drains in the canal. The pipe diameter reduces from a 10 inch ID to 8 and 6 inch ID toward the canal floor drain openings.

2.0 Survey Design Information

2.1 EP 1.36 was surveyed IAW Procedure #BSI/LVS-002.

2.2 100% of the 10" and 8" ID pipe was accessible for survey. However, due to an obstruction caused by a pipe weld, only 6' of the estimated total of 9' pipe length of hole "C" piping was accessible. The accessible 10", 8" and 6" ID pipe was surveyed by static measurement at one foot increments, for a total of 53 survey measurements. Approximately 3' of 6" piping was not accessible.

2.3 Surface area for the 10" ID piping is 2,432 cm^2 for each foot of piping, corresponding to a total 10" ID piping surface area of 72,960 cm^2 (7.3 m^2) for the entire length of (30') of 10" piping.

2.4 Surface area for the 6" ID piping is 1,459 cm^2 for each foot of piping, corresponding to a total 6" ID piping surface area of 18,967 cm^2 (1.9 m^2) for the accessible length (13') of 6" piping.

2.5 Surface area for the 8" ID piping is 1,946 cm^2 for each foot of piping, corresponding to a total 8" ID piping surface area of 19,458 cm^2 (1.9 m^2) for the entire length of (10') of 8" piping.

2.6 Total accessible surface area for the 10", 6" and 8" piping that constitutes EP 1.36 is 11.1 m^2.

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 fractions, provided in TBD-06-004, the survey unit that is constituted by EP 1.36 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	10" Pipe	6" Pipe	8" Pipe
Total Number of Survey Measurements	30	13	10
Number of Measurements >MDC	3	10	3
Number of Measurements Above 50% of DCGL	0	0	0
Number of Measurements Above DCGL	0	0	0
Mean	0.029	0.002	0.066
Median	0.022	0.002	0.054
Standard Deviation	0.019	0.001	0.039
Maximum	0.084	0.003	0.150
Minimum	0.013	0.001	0.030

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 1.36 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.029 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 2 – Pipe Interior Radiological Survey Form
Attachment 3 – DQA Worksheet
Attachment 4 –Disc containing RR for EP 1.36 & Spreadsheet

SECTION 7
ATTACHMENT 1
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BSI EP/BP SURVEY REPORT

Pipe ID	1.36	Survey Location	-27 TRENCH		
Survey Date	12-7-05/12-23-05/1-10-06	2350-1 #	203488/134738/203488		
Survey Time	1305/1130/0815	Detector-Sled #	BICRON G3/1MG1/G3		
Pipe Size	10"/6"/8"	Detector Efficiency	0.003	0.002	0.003
DCGL (dpm/100cm2)	240,800	Pipe Area incorporated by Detector Efficiency (in cm2)	2432	1459	1946
Pipe Area incorporated by Survey Data (m²)	11.1	Field BKG	496/17.6/396.7		
Routine Survey	X	Field MDCR (cpm)	79.8/17.4/69.3		
QA Survey		Nominal MDC (dpm/100cm2)	13177/333/16192		

Survey Measurement Results	10" PIPE	6" PIPE	8" PIPE
Total Number of Survey Measurements	30	13	10
Number of Measurements >MDC	3	10	3
Number of Measurements Above 50% DCGL	0	0	0
Number of Measurements Above DCGL	0	0	0
Mean	0.029	0.002	0.066
Median	0.022	0.002	0.054
Standard Deviation	0.019	0.001	0.039
Maximum	0.084	0.003	0.150
Minimum	0.013	0.001	0.030

Survey Technician(s)	ROSENHAGEN

Survey Unit Classification	1
TBD 06-004 Piping Group	2
SR-13 Radionuclide Distribution Sample	EP 2-1
Measured Nuclide	Co60
Area Factor/EMC Used	No
Pass/Fail FSS	Pass
MREM/YR Contribution	<1

COMMENTS:

ACTIVITY VALUES NOT BACKGROUND CORRECTED.

Survey measurements on 6" pipe were conducted in Hole A (measurements 1 & 2), Hole B (measurements 3-7) and Hole C (measurements 8-13). Access was denied to the remaining piping due to a pipe weld obstructing the path of the survey sled. However, since activity levels both upstream and downstream of the obstruction were significantly less than the DCGL it can be concluded that the activity levels in the inaccessible section of the embedded piping is also significantly less than the DCGL. Therefore, it can be concluded that the dose to the public from the inaccessible section of embedded piping is also less than 1 mrem per year.

RP Engineer | Date	Dale Rendall 6-6-07

EP 1.36
10" Pipe
TBD 06-004 Group 2

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm2)	Cs-137 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	667	667	222,333	9,142	4,745	76	54	4	265	0.040
2	377	377	125,667	5,167	2,682	43	30	3	150	0.022
3	336	336	112,000	4,605	2,390	38	27	2	134	0.020
4	298	298	99,333	4,084	2,120	34	24	2	118	0.018
5	410	410	136,667	5,620	2,917	47	33	3	163	0.024
6	383	383	127,667	5,249	2,724	44	31	3	152	0.023
7	342	342	114,000	4,688	2,433	39	28	2	136	0.020
8	493	493	164,333	6,757	3,507	56	40	3	196	0.029
9	320	320	106,667	4,386	2,276	36	26	2	127	0.019
10	327	327	109,000	4,482	2,326	37	26	2	130	0.019
11	301	301	100,333	4,126	2,141	34	24	2	120	0.018
12	335	335	111,667	4,592	2,383	38	27	2	133	0.020
13	432	432	144,000	5,921	3,073	49	35	3	172	0.026
14	366	366	122,000	5,016	2,604	42	30	2	145	0.022
15	483	483	161,000	6,620	3,436	55	39	3	192	0.029
16	460	460	153,333	6,305	3,272	52	37	3	183	0.027
17	399	399	133,000	5,469	2,838	45	32	3	159	0.024
18	297	297	99,000	4,071	2,113	34	24	2	118	0.018
19	269	269	89,667	3,687	1,914	31	22	2	107	0.016
20	224	224	74,667	3,070	1,593	25	18	2	89	0.013
21	274	274	91,333	3,755	1,949	31	22	2	109	0.016
22	290	290	96,667	3,975	2,063	33	23	2	115	0.017
23	372	372	124,000	5,099	2,646	42	30	2	148	0.022
24	311	311	103,667	4,263	2,212	35	25	2	124	0.018
25	398	398	132,667	5,455	2,831	45	32	3	158	0.024
26	810	810	270,000	11,102	5,762	92	66	5	322	0.048
27	764	764	254,667	10,471	5,435	87	62	5	304	0.045
28	1415	1415	471,667	19,394	10,066	161	114	10	562	0.084
29	1331	1331	443,667	18,243	9,468	151	108	9	529	0.079
30	1205	1205	401,667	16,516	8,572	137	97	8	479	0.072

EP 1.36
10" Pipe
TBD 06-004 Group 2

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm2)	Cs-137 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	0.029
									MEDIAN	0.022
									STD DEV	0.019
									MAX	0.084
									MIN	0.013

EP 1.36
6" Pipe
TBD 06-004 Group 2

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm 2)	Cs-137 activity (dpm/100cm 2)	Eu-152 activity (dpm/100cm 2)	Eu-154 activity (dpm/100cm 2)	Nb-94 activity (dpm/100cm 2)	Ag-108m activity (dpm/100cm 2)	Unity
1	19	19	9,500	651	338	5	4	0	19	0.003
2	23	23	11,500	788	409	7	5	0	23	0.003
3	13	13	6,500	446	231	4	3	0	13	0.002
4	14	14	7,000	480	249	4	3	0	14	0.002
5	13	13	6,500	446	231	4	3	0	13	0.002
6	17	17	8,500	583	302	5	3	0	17	0.003
7	19	19	9,500	651	338	5	4	0	19	0.003
8	9	9	4,500	308	160	3	2	0	9	0.001
9	14	14	7,000	480	249	4	3	0	14	0.002
10	11	11	5,500	377	196	3	2	0	11	0.002
11	8	8	4,000	274	142	2	2	0	8	0.001
12	10	10	5,000	343	178	3	2	0	10	0.001
13	8	8	4,000	274	142	2	2	0	8	0.001
									MEAN	0.002
									MEDIAN	0.002
									STD DEV	0.001
									MAX	0.003
									MIN	0.001

EP 1.36
8" Pipe
TBD 06-004 Group 2

Measurement #	gcpm	ncpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100cm 2)	Cs-137 activity (dpm/100cm 2)	Eu-152 activity (dpm/100cm 2)	Eu-154 activity (dpm/100cm 2)	Nb-94 activity (dpm/100cm 2)	Ag-108m activity (dpm/100cm 2)	Unity
1	1260	1260	420,000	21,583	11,201	179	127	11	626	0.094
2	913	913	304,333	15,639	8,117	130	92	8	454	0.068
3	519	519	173,000	8,890	4,614	74	52	4	258	0.039
4	508	508	169,333	8,702	4,516	72	51	4	252	0.038
5	400	400	133,333	6,852	3,556	57	40	3	199	0.030
6	410	410	136,667	7,023	3,645	58	41	3	204	0.030
7	530	530	176,667	9,078	4,712	75	54	4	263	0.039
8	940	940	313,333	16,101	8,357	134	95	8	467	0.070
9	2024	2024	674,667	34,669	17,993	288	205	17	1,005	0.150
10	1347	1347	449,000	23,073	11,975	192	136	11	669	0.100
									MEAN	0.066
									MEDIAN	0.054
									STD DEV	0.039
									MAX	0.150
									MIN	0.030

SECTION 7
ATTACHMENT 2
__8__ PAGE(S)

Pipe Interior Radiological Survey Form

Date: 12-7-05 Time: 1305

Building: RX BLDG Elevation: -25 Access Point Area: TRENCH

System: CANALE/PUMP OUT DRAIN Pipe Diameter: 10" Pipe ID # 1.36

Type of Survey Investigation Characterization (Final Survey) Other V

Sled Size 10 inch

Detector: G3/BICRON Detector ID #: A689X-111

Cal Date: 11-17-05 Cal Due Date: 11-17-06

Instrument: 2350-1 Instrument ID #: 203488

Cal Date: 11-17-05 Cal Due Date: 11-17-06

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

Background Value 496 cpm

$MDCR_{static}$ 79.8 cpm

Efficiency Factor for Pipe Diameter 0.003 (taken from detector ~~calibration certificate~~) efficiency determination

MDC_{static} 13177 dpm/100cm^2

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

Comments: DETECTOR COULD NOT REACH TOTAL PIPE DISTANCE

Complete

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 12-7-05 Time: 1305

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
1	1	1	667	667	171	n/a
2	2	1	377	377	-119	
3	3	1	336	336	-160	
4	4	1	298	298	-198	
5	5	1	410	410	-86	
6	6	1	383	383	-113	
7	7	1	342	342	-154	
8	8	1	493	493	-3	
9	9	1	320	320	-176	
10	10	1	327	327	-169	

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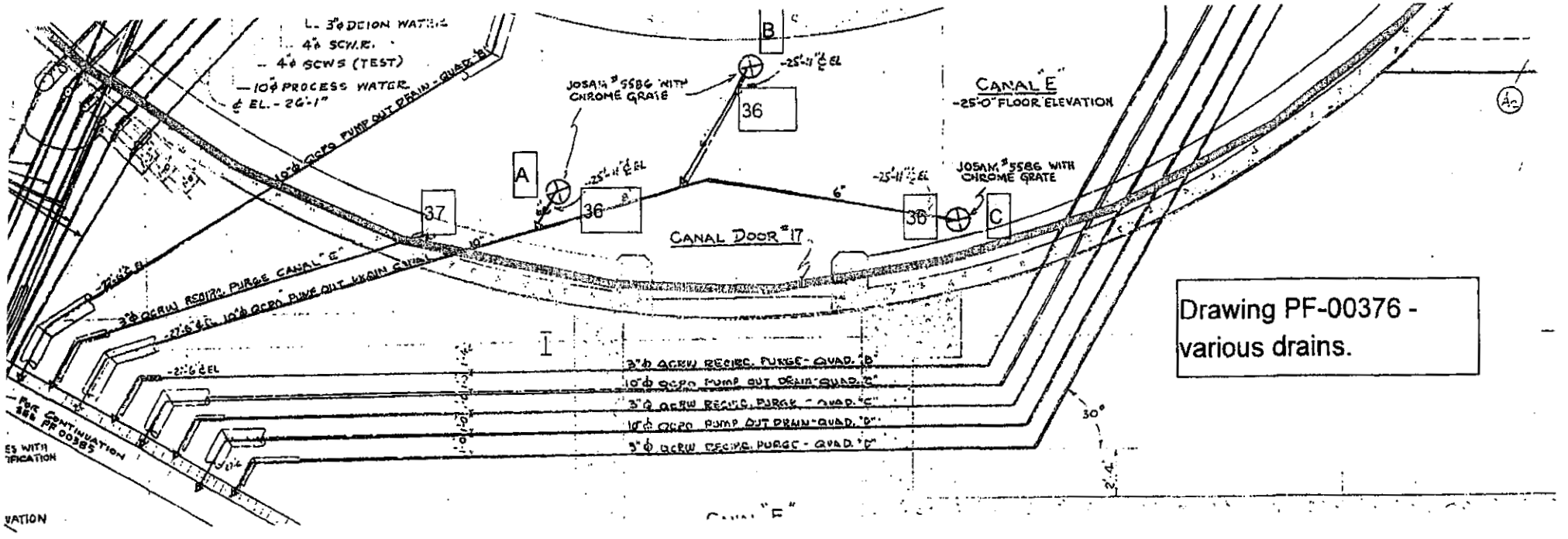
REFERENCE COPY

Pipe Interior Radiological Survey Form (Continuation Form)

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
11	11	1	301	301	-195	n/a
12	12	1	335	335	-161	
13	13	1	432	432	-64	
14	14	1	366	366	-130	
15	15	1	483	483	-13	
16	16	1	460	460	-36	
17	17	1	399	399	-97	
18	18	1	297	297	-199	
19	19	1	269	269	-227	
20	20	1	224	224	-272	
21	21	1	274	274	-222	
22	22	1	290	290	-206	
23	23	1	372	372	-124	
24	24	1	311	311	-185	
25	25	1	398	398	-98	
26	26	1	810	810	314	
27	27	1	764	764	268	
28	28	1	1415	1415	919	
29	29	1	1331	1331	835	
30	30	1	1205	1205	709	
			n	a		

Package Page 2 of 2

REFERENCE COPY



Drawing PF-00376 - various drains.

REFERENCE COPY

Pipe Interior Radiological Survey Form

Date: 12-23-05 Time: 1130

Building: REACTOR Elevation: -25 Access Point Area: CANAL E

System: CANAL E DRAIN Pipe Diameter: 6" Pipe ID # 1.36 A, B, C

Type of Survey Investigation Characterization (Final Survey) Other ✓

Sled Size 6" inch

Detector: BICRON IMG1 Detector ID #: LVS-1-107

Cal Date: 20-DEC-05 Cal Due Date: 20-DEC-06

Instrument: 2350-1 Instrument ID #: 134738

Cal Date: 20-DEC-05 Cal Due Date: 20-DEC-06

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

Background Value 17.6 cpm

$MDCR_{static}$ 17.4 cpm

Efficiency Factor for Pipe Diameter 0.002 (taken from detector ~~calibration certificate~~ efficiency determination)

MDC_{static} 333 dpm/100cm^2

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

Comments: POSITION 1 & 2 is HOLE A 1.36
POSITION 4 THRU 8 is HOLE B 1.36
POSITION 10 THRU 15 is HOLE C 1.36 MSF / CONTINUATION
NOTE C: Could only go 6FT on 6" pipe IN C HOLE; SOMETHING STOPPING SLED

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 12-23-05 Time: 1130

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
1	1FT	1	19	19	n/a	n/a
2	2FT	1	23	23		
3	n/a	n/a	n/a	n/a		
4	1FT	1	13	13		
5	2FT	1	14	14		
6	3FT	1	13	13		
7	4FT	1	17	17		
8	5FT	1	19	19		
9	n/a	n/a	n/a	n/a		
10	1FT	1	9	9		

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REFERENCE COPY

Babcock Services Inc.

12-23-05

Pipe Interior Radiological Survey Form (Continuation Form) 1.36 Hole C Continuation

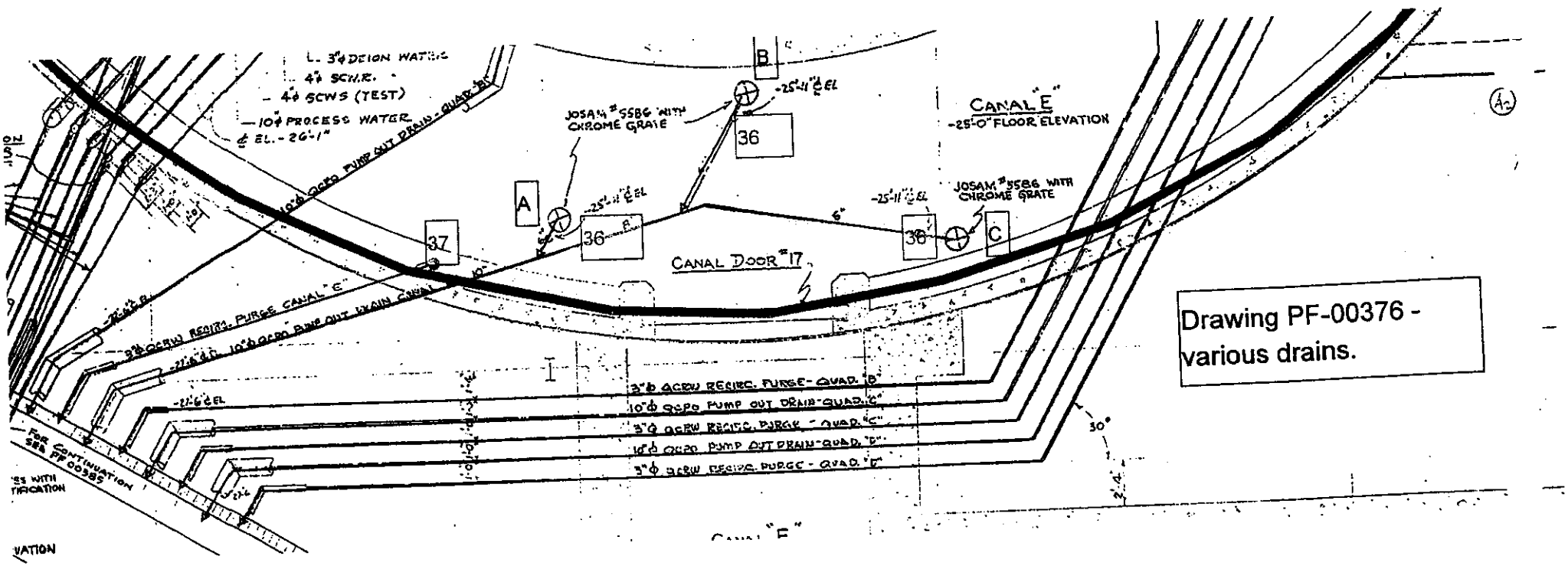
Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
11	2ft	1	14	14	n/a	n/a
12	3ft	1	11	11		
13	4ft	1	8	8		
14	5ft	1	10	10		
15	6ft	1	8	8		

n a

Package Page 2 of 2

Babcock Services Inc.

REFERENCE COPY



Drawing PF-00376 - various drains.

= PIPE SURVEYED

ID # 1.36 C, B + A

12-23-06

REFERENCE COPY

Pipe Interior Radiological Survey Form

Date: 1-10-06 Time: 0815

Building: REACTOR Elevation: -25 Access Point Area: -27 TRENCH

System: CANAL E DRAIN Pipe Diameter: 8" Pipe ID # 1-36

Type of Survey Investigation Characterization (Final Survey) Other ✓

Sled Size 8" inch

Detector: BICRON / G3 Detector ID #: B566A-108

Cal Date: 17-NOV-05 Cal Due Date: 17-NOV-06

Instrument: 2350-1 Instrument ID #: 203488

Cal Date: 17-NOV-05 Cal Due Date: 17-NOV-06

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

Background Value 369.7 cpm

$MDCR_{static}$ 69.3 cpm

Efficiency Factor for Pipe Diameter 0.003 (taken from detector ~~calibration certificate)~~ efficiency determination

MDC_{static} 16,192 dpm/100cm^2

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

Comments: CONTINUATION SURVEY

MSP / Complete

Pipe Interior Radiological Survey

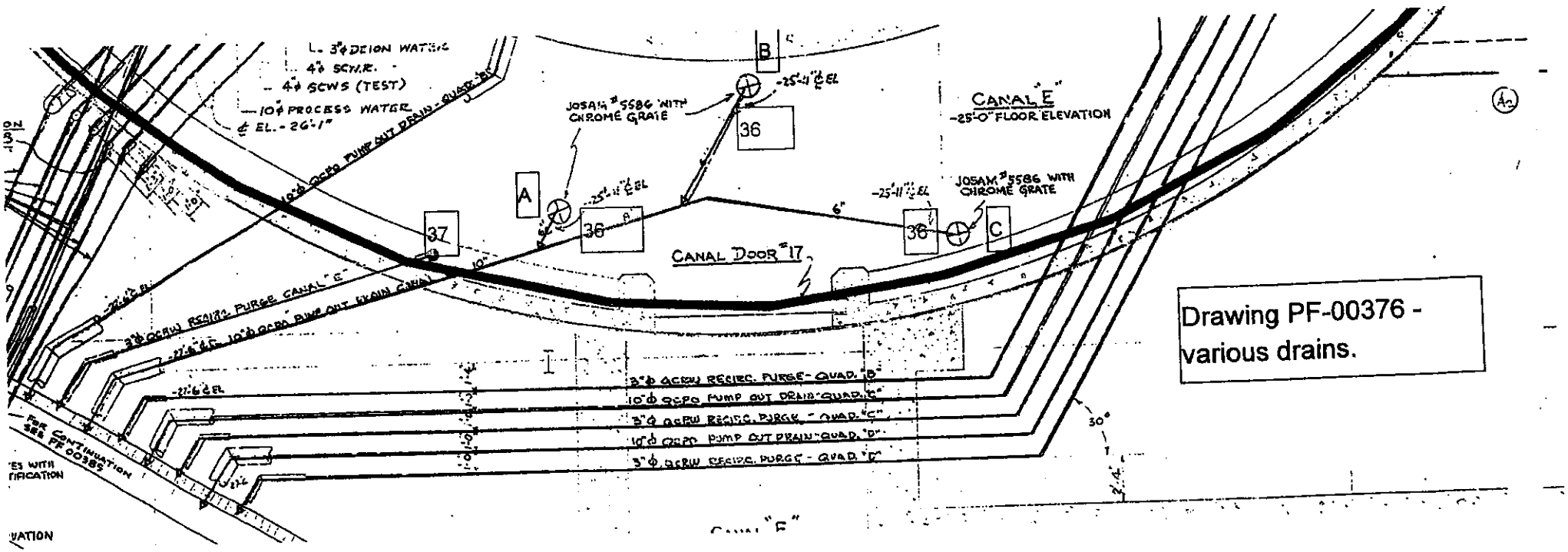
Radiological Survey Commenced: Date: 1-10-06 Time: 0815

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
1	31	1	1260	1260	n/a	n/a
2	32	1	913	913		
3	33	1	519	519		
4	34	1	508	508		
5	35	1	400	406		
6	36	1	410	410		
7	37	1	530	530		
8	38	1	940	940		
9	39	1	2024	2024		
10	40	1	1347	1347		

Package Page 1 of 1

Babcock Services Inc.

REFERENCE COPY



Drawing PF-00376 - various drains.

REFERENCE COPY

= pipe surveyed

ID # 1.36

1-10-06

SECTION 7
ATTACHMENT 3
____1___ PAGE(S)

DQA Check Sheet				
Design #	EP 1.36	Revision #	Original	
Survey Unit #	EP 1.36			

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)	Dale Randall / Dal Randall	Date	6-6-07
FSS/ Characterization Manager (print/sign)	R. Case	Date	6/7/07

Form
CS-09/2
Rev 0

SECTION 7
ATTACHMENT 4
1 DISC