Survey Unit Release Record				
Design #	EP-Rx 1.33	**Revision #**	Original	**Page 1 of 3**
Survey Unit #(s)	Rx 1.33			
Description	1) Embedded Pipe (EP) Survey Unit Rx 1.33 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP Rx 1.33 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 Rx 1.33 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP2-5 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	Carl Randall	10-18-07
Technical Reviewer (FSS/Characterization Engineer)		10/30/07
FSS/Characterization Manager	R. Case	10/31/07

Form CS-09/1 Rev 0

1.0 History/Description

1.1 The subject pipe system is the 3" spare line running through Quad D to the Sub Pile Room.

1.2 EP Rx 1.33 consists of 3" diameter piping that is approximately 29 feet in length.

2.0 Survey Design Information

2.1 EP Rx 1.33 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 29 survey measurements.

2.3 Surface area for the 3" ID piping is 730 cm^2 for each foot of piping, corresponding to a total 3" ID piping surface area of 21,160 cm^2 (2.1 m^2) for the entire length of (approximately 29') 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 Rx 1.33 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	29
Number of Measurements >MDC	16
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0120
Median	0.0123
Standard Deviation	0.0036
Maximum	0.0215
Minimum	0.0046

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 Rx 1.33 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.012 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 Rx 1.33 & Spreadsheet

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ATTACHMENT 1
3 PAGE(S)

BSI EP/BP SURVEY REPORT

Pipe ID	EP Rx 1.33	Survey Location	QUAD D -39'el.
Survey Date	1/16/2006, 1/17/2006	2350-1 #	212223
Survey Time	10:20, 08:05	Detector-Sled #	44-62 212701/121
Pipe Size	3"	Detector Efficiency	0.00013
DCGL (dpm/100cm2)	2.41E+05	Pipe Area Incorporated by Detector Efficiency (In cm2)	730
Pipe Area Incorporated by Survey Data (m^2)	2.1	Field BKG (cpm)	5.2, 5.7
Routine Survey	X	Field MDCR (cpm)	4.4, 11.3
QA Survey		Nominal MDC (dpm/100cm2)	2,779

Survey Measurement Results	
Total Number of Survey Measurements	29
Number of Measurements >MDC	16
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.0120
Median	0.0123
Standard Deviation	0.0036
Maximum	0.0215
Minimum	0.0046

Survey Technician(s)	ROSENHAGEN

Survey Unit Classification	1
TBD 06-004 Piping Group	2
SR-13 Radionuclide Distribution Sample	EP 2-5
Measured Nuclide	Co-60
Area Factor/EMC Used	No
Pass/Fail FSS	Pass
MREM/YR Contribution	<1

COMMENTS:
ACTIVITY VALUES NOT BACKGROUND CORRECTED

RP Engineer | Date	Dal Rosenhagen

EP Rx 1.33
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	33,077	4,533	2,351	38	27	2	130	0.020
2	4.7	4.7	36,154	4,955	2,569	41	29	2	143	0.021
3	1.7	1.7	13,077	1,792	929	15	10	1	52	0.008
4	2.3	2.3	17,692	2,425	1,257	20	14	1	70	0.011
5	1	1	7,692	1,054	547	9	6	1	30	0.005
6	3.7	3.7	28,462	3,901	2,023	32	23	2	112	0.017
7	3	3	23,077	3,163	1,640	26	19	2	91	0.014
8	3	3	23,077	3,163	1,640	26	19	2	91	0.014
9	2.7	2.7	20,769	2,846	1,476	24	17	1	82	0.012
10	2	2	15,385	2,108	1,093	17	12	1	61	0.009
11	2.7	2.7	20,769	2,846	1,476	24	17	1	82	0.012
12	2	2	15,385	2,108	1,093	17	12	1	61	0.009
13	3.3	3.3	25,385	3,479	1,804	29	20	2	100	0.015
14	2	2	15,385	2,108	1,093	17	12	1	61	0.009
15	3	3	23,077	3,163	1,640	26	19	2	91	0.014
16	1.7	1.7	13,077	1,792	929	15	10	1	52	0.008
17	2.7	2.7	20,769	2,846	1,476	24	17	1	82	0.012
18	2	2	15,385	2,108	1,093	17	12	1	61	0.009
19	1.7	1.7	13,077	1,792	929	15	10	1	52	0.008
20	2.7	2.7	20,769	2,846	1,476	24	17	1	82	0.012
21	2.7	2.7	20,769	2,846	1,476	24	17	1	82	0.012
22	2.7	2.7	20,769	2,846	1,476	24	17	1	82	0.012
23	2.3	2.3	17,692	2,425	1,257	20	14	1	70	0.011
24	2.3	2.3	17,692	2,425	1,257	20	14	1	70	0.011
25	2.3	2.3	17,692	2,425	1,257	20	14	1	70	0.011
26	2.7	2.7	20,769	2,846	1,476	24	17	1	82	0.012
27	3.3	3.3	25,385	3,479	1,804	29	20	2	100	0.015
28	2.3	2.3	17,692	2,425	1,257	20	14	1	70	0.011
29	3.3	3.3	25,385	3,479	1,804	29	20	2	100	0.015

EP Rx 1.33
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	0.012
									MEDIAN	0.012
									STD DEV	0.004
									MAX	0.021
									MIN	0.005

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ATTACHMENT 2
___6___ PAGE(S)

Pipe Interior Radiological Survey Form

Date: 1-16-06 Time: 1020

Building: RX Elevation -39 Access Point SPR

System: SPARE TO SPR Pipe Diameter: 3" Area: Pipe ID QUAD D-RX 1.33

Type of Survey Investigation Characterization (Final Survey) # Other ✓

Sled Size 3" VINYL PULLER inch

Detector: 44-62 Detector ID #: 212701 - S/N 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 5.2 cpm

$MDCR_{static}$ 4.4 cpm

Efficiency Factor for Pipe Diameter 0.00013 (taken from detector ~~calibration certificate~~ efficiency determination)

MDC_{static} 2779 dpm/100cm^2

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

Comments: INITIAL SURVEY
POS# 1-14 TAKEN FROM SPR (SUB PILE ROOM)
Complete

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 1-16-06 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	14	4.7		
3	3	3	5	1.7		
4	4	3	7	2.3		
5	5	3	3	1		
6	6	3	11	3.7		
7	7	3	9	3		
8	8	3	9	3		
9	9	3	8	2.7		
10	10	3	6	2		

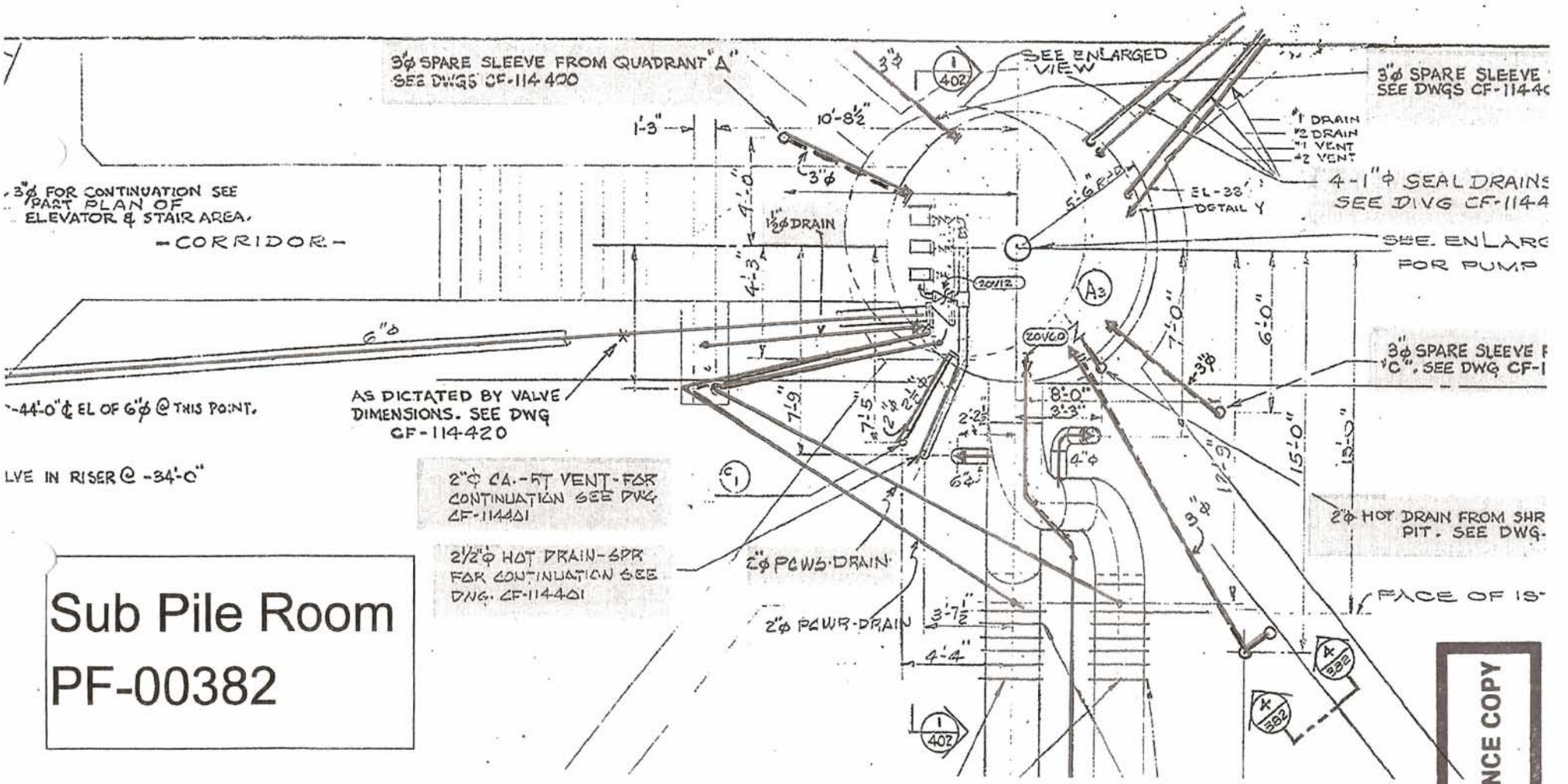
Pipe Interior Radiological Survey Form (Continuation Form)

QUAD-D Rx 1.33 SPR 1-16-06

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
11	11	3	8	2.7	n/a	n/a
12	12	3	6	2	↓	↓
13	13	3	10	3.3		
14	14	3	6	2		

N/A

Package Page 2 of 2



Sub Pile Room
PF-00382

= PIPE SURVEYED
14'
ID RX 1.33
1-16-08

Pipe Interior Radiological Survey Form

Date: 1-17-06 Time: 0805

Building: RX Elevation: -25 Access Point Area: QUAD D

System: SPARE TO SPR Pipe Diameter: 3" Pipe ID # RX 1.33

Type of Survey Investigation Characterization (Final Survey) Other ✓

Sled Size 3" VINYL PULLER inch

Detector: 44-62 Detector ID #: 212701 - 121 S/N

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 5.7 cpm

$MDCR_{static}$ 11.3 cpm

Efficiency Factor for Pipe Diameter 0.0003 (taken from detector ~~calibration certificate~~ efficiency determination)

MDC_{static} 2729 dpm/100cm²

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

Comments: CONTINUATION SURVEY FROM 1-16-06
POS # 1 - TAKEN FROM QUAD D

Complete

Pipe Interior Radiological Survey

Radiological Survey Commenced: Date: 1-17-06 Time: 0805

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm²
1	1	3	09	3	n/a	n/a
2	2	3	5	1.7	↓	↓
3	3	3	8	2.7		
4	4	3	6	2		
5	5	3	5	1.7		
6	6	3	8	2.7		
7	7	3	8	2.7		
8	8	3	8	2.7		
9	9	3	7	2.3		
10	10	3	7	2.3	↓	↓

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Pipe Interior Radiological Survey Form (Continuation Form)

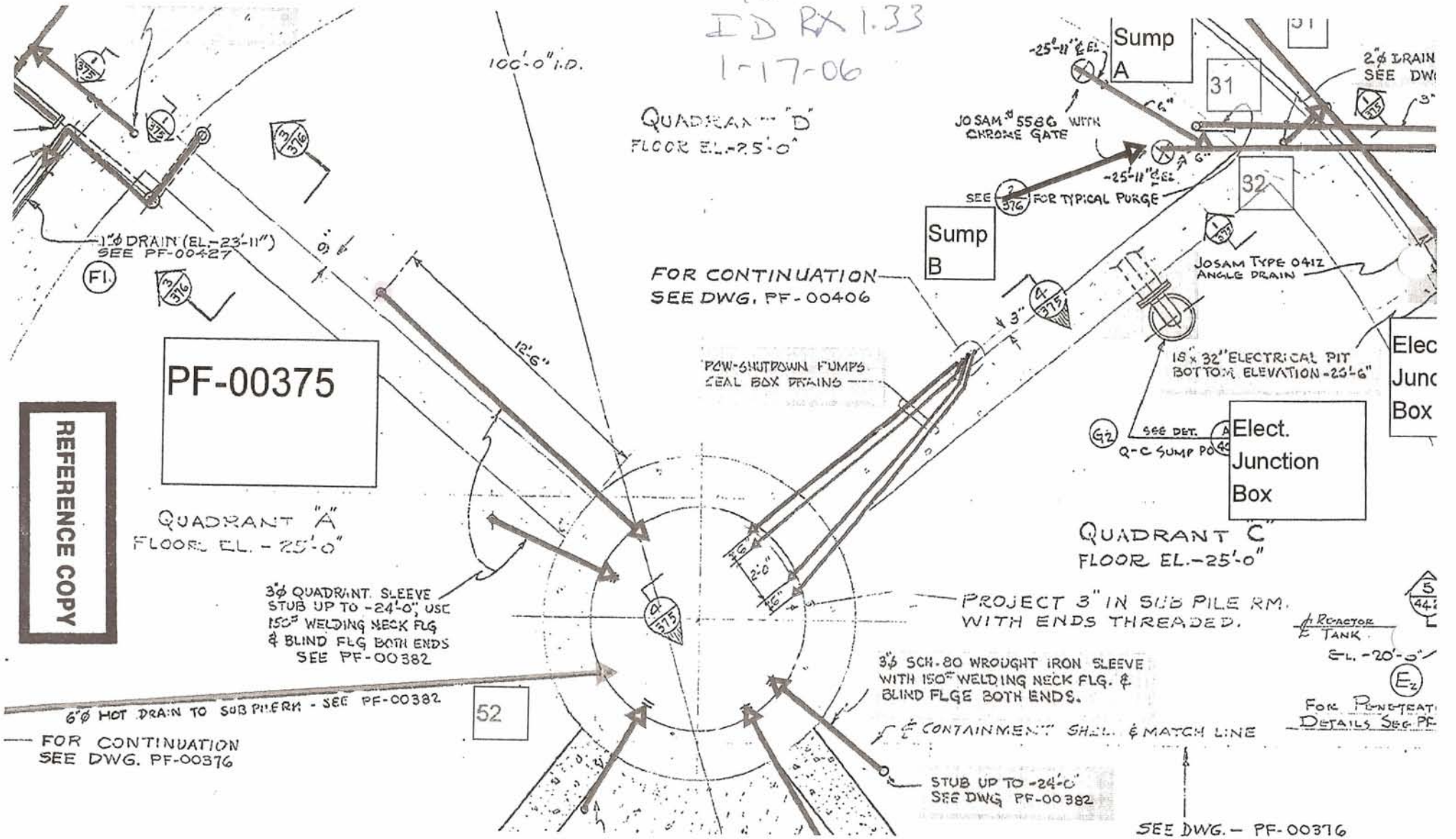
QUAD D #RX 1.33 1-17-06

Position #	Feet into Pipe from Opening	Count Time (min)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
11	11	3	7	2.3	n/a	n/a
12	12	3	8	2.7		
13	13	3	10	3.3		
14	14	3	7	2.3		
15	15	3	10	3.3		

a

n

= Pipe Surveyed
15'
ID RX 1.33
1-17-06



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ATTACHMENT 3
___1___ PAGE(S)

DQA Check Sheet				
Design #	Rx 1.33	Revision #	Original	
Survey Unit #	Rx 1.33			

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)	Dale Randall	Date	10-18-07
FSS/ Characterization Manager (print/sign)	R. Case	Date	10/31/07

Form CS-09/2 Rev 0

SECTION 7
ATTACHMENT 4
1 DISC