Survey Unit Release Record				
Design #	EP PPH-101	**Revision #**	Original	**Page 1 of 4**
Survey Unit #(s)	PPH-101			
Description	1) Embedded Pipe (EP) Survey Unit PPH-101 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF). 2) EP PPH-101 is a Class 1, Group 1 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004. 3) Surveys in EP PPH-101 were performed using a scintillation detector optimized to measure beta energies ≥85 keV (ISO 7503-1 Table3, Tc99). This energy is lower than the beta energy for Co60 (96 keV, ISO 7503-1 Table 3), assuring the nuclide of concern for DCGL is assessed during data acquisition. 4) Survey Instructions for this survey unit are incorporated into and performed in accordance with (IAW) the Babcock Services Incorporated (BSI)/LVS-003, 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-003, WEP 05-006, these determinations are appropriate for the types of radiation involved and the media being surveyed.			

Approval Signatures		**Date:**
FSS/Characterization Engineer		2-14-08
FSS/Characterization Manager	R. Case	2/20/08

Form
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1.0 History/Description

1.1 The subject pipe is the 24" secondary cooling supply line for the PCW system. The function of this piping was to convey water from the heat exchangers in PPH Room 4 to the RB-15 level.

1.2 EP PPH-101 consists of 24" diameter piping that is approximately 27 feet in length.

2.0 Survey Design Information

2.1 EP PPH-101 was surveyed IAW Procedure #BSI/LVS-003.

2.2 18 feet of the 24" pipe was accessible for survey. The inaccessible piping includes a 6 foot section of elbow and the three feet of piping between the 0' elevation and the -3' elevation in the PPH Room 4. The 6' elbow is inaccessible to the pipecrawler. The 3' in PPH Room 4 is released to the structural DCGL and will not be grouted. The survey for this piping will be accomplished as part of the structural release survey in PPH Room 4.

2.3 100% of the accessible piping was scanned.

2.4 Eight survey locations were selected by a random number generator for static measurements. Three of these locations were in the inaccessible elbow. At each accessible location four static measurements were acquired IAW BSI/LVS-003 for a total of 20 static measurements (Att. 1A).

2.5 The surface area for the 24" piping is 5837 cm^2 for each foot of piping, corresponding to a piping surface area of 140088 cm^2 (14 m^2) for the 24 feet of embedded pipe 24" 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 1A & 1B.

5.2 This survey unit was assessed for compliance with the release criterion attributing all activity derived dose as a 100% Co60 nuclide distribution. This is the most conservative DCGL for the facility.

5.3 All scan 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.

5.4 Scan measurements require a 90 second scan time to survey each section of accessible 24"piping at ≤ 1inch/second. The documented gross cpm measurement for each scan is the highest, instantaneous, cpm count rate observed during the 90 second scan. The derived activity from these scan measurements is the most conservative quantity for that section of assessed piping. This conservatism is replicated when determining compliance with the DCGL release criterion. (BSI/LVS 003, WEP 05-000-6).

5.5 All static 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.

5.6 When implementing the Unity Rule, provided in Section 3.6.3 of the FSSP, the survey unit that is constituted by EP PPH-101 passes FSS.

5.7 Background was not subtracted from the survey measurements and the Elevated Measurement Comparison (EMC) was not employed for this survey unit.

5.8 Based upon the results of the final survey measurements it is reasonable to conclude that the final survey of the accessible portion of this pipe system is appropriate to demonstrate the radiological condition of the entire pipe. Survey Unit EP PPH-101 demonstrates compliance with the DCGL values, as presented in Sections 3.3, 7.5 and Attachment C of the PBRF FSSP.

5.9 Statistical Summary Table

Statistical Parameter	24" Pipe
Total Number of Static Survey Measurements	20
Number of Measurements >MDC	20
Number of Measurements Above 50% of DCGL	0
Number of Measurements Above DCGL	0
Mean	0.024
Median	0.023
Standard Deviation	0.004
Maximum	0.035
Minimum	0.016

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 PPH-101 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.024 mrem/yr based on the average of the actual gross counts measured.

7.0 Attachments

Attachment 1A – BSI EP/BP Survey Report Static & Random Number Generated Static Locations

Attachment 1B – BSI EP/BP Survey Report Scan

Attachment 2 – Pipe Interior Radiological Survey Form

Attachment 3 – DQA Worksheet

Attachment 4 – EP PPH-101 SURR & Spreadsheet Disc

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ATTACHMENT 1A
3 PAGES

BSI EP/BP SURVEY REPORT (STATIC)

Pipe ID	PPH 101		Survey Location	PPH RM4
Survey Date	09-Aug-06		2350-1 #	203488
Survey Time	1600		Detector-Sled #	223210-LVS CRLR24
Pipe Size	24"		Detector Efficiency	0.0556
DCGL (dpm/100cm2)	240800		Pipe Area Incorporated by Detector Efficiency (in cm2)	100
50% DCGL (dpm/100cm2)	120400		Field BKG (cpm)	280
Routine Survey	X		Field MDCR (cpm)	61
QA Survey			Nominal MDC (dpm/100cm2)	1,092

Survey Measurement Results	
Total Number of Survey Measurements	20
Number of Measurements >MDC	20
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.024
Median	0.023
Standard Deviation	0.004
Maximum	0.035
Minimum	0.016
Survey Technician(s)	WOOD

Survey Unit Classification	1
TBD 06-004 Piping Group	1
SR-13 Radionuclide Distribution Sample	EP 3-9
Area Factor/EMC Used	No
Pass/Fail FSS	Pass
MREM/YR Contribution	<1

COMMENTS:

ACTIVITY VALUES NOT BACKGROUND CORRECTED.

RP Engineer | Date	12-14-08

EP PPH-101
24" Pipe
TBD 06-004 Group 1

Measurement ID #	gcpm	net cpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100 cm2)	Unity
4	309	309	5,558	5,558	0.023
5	296	296	5,324	5,324	0.022
6	465	465	8,363	8,363	0.035
8	280	280	5,036	5,036	0.021
18	301	301	5,414	5,414	0.022
19	298	298	5,360	5,360	0.022
20	326	326	5,863	5,863	0.024
21	416	416	7,482	7,482	0.031
30	311	311	5,594	5,594	0.023
31	276	276	4,964	4,964	0.021
32	406	406	7,302	7,302	0.030
33	365	365	6,565	6,565	0.027
42	218	218	3,921	3,921	0.016
43	297	297	5,342	5,342	0.022
44	326	326	5,863	5,863	0.024
45	351	351	6,313	6,313	0.026
50	267	267	4,802	4,802	0.020
51	343	343	6,169	6,169	0.026
52	298	298	5,360	5,360	0.022
53	309	309	5,558	5,558	0.023
				MEAN	0.024
				MEDIAN	0.023
				STD DEV	0.004
				MAX	0.035
				MIN	0.016

RANDOM GENERATED STATIC MEASUREMENT LOCATIONS PPH 101

SURVEY LOCATION	COMMENTS
5	
7	
10	INACCESSIBLE
11	INACCESSIBLE
15	INACCESSIBLE
17	
21	
26	

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ATTACHMENT 1B
2 PAGES

Babcock BSI EP/BP SURVEY REPORT (SCAN)

Pipe ID	PPH 101		Survey Location	PPH RM4
Survey Date	09-Aug-06		2350-1 #	203488
Survey Time	1600		Detector-Sled #	223210-LVS CRLR24
Pipe Size	24"		Detector Efficiency	0.0481
DCGL (dpm/100cm2)	240800		Pipe Area Incorporated by Detector Efficiency (in cm2)	100
50% DCGL (dpm/100cm2)	120400		Field BKG (cpm)	280
Routine Survey	X		Field MDCR (cpm)	61
QA Survey			Nominal MDC (dpm/100cm2)	5,658

Survey Measurement Results	
Total Number of Survey Measurements	37
Number of Measurements >MDC	37
Number of Measurements Above 50% DCGL	0
Number of Measurements Above DCGL	0
Mean	0.038
Median	0.039
Standard Deviation	0.005
Maximum	0.048
Minimum	0.026
Survey Technician(s)	WOOD

Survey Unit Classification	1
TBD 06-004 Piping Group	1
SR-13 Radionuclide Distribution Sample	EP 3-9
Area Factor/EMC Used	No
Pass/Fail FSS	Pass
MREM/YR Contribution	<1

COMMENTS:

ACTIVITY VALUES NOT BACKGROUND CORRECTED.

RP Engineer | Date	[signature] 12-14-28

EP PPH-101
24" Pipe
TBD 06-004 Group 1

Measurement ID #	gcpm	net cpm	Co-60 activity (total dpm)	Co-60 activity (dpm/100 cm2)	Unity
1	474	474	9,854	9,854	0.041
2	428	428	8,898	8,898	0.037
3	413	413	8,586	8,586	0.036
8	396	396	8,233	8,233	0.034
9	458	458	9,522	9,522	0.040
10	413	413	8,586	8,586	0.036
11	466	466	9,688	9,688	0.040
12	312	312	6,486	6,486	0.027
13	297	297	6,175	6,175	0.026
14	389	389	8,087	8,087	0.034
15	466	466	9,688	9,688	0.040
16	421	421	8,753	8,753	0.036
17	409	409	8,503	8,503	0.035
22	506	506	10,520	10,520	0.044
23	419	419	8,711	8,711	0.036
24	381	381	7,921	7,921	0.033
25	511	511	10,624	10,624	0.044
26	489	489	10,166	10,166	0.042
27	319	319	6,632	6,632	0.028
28	501	501	10,416	10,416	0.043
29	417	417	8,669	8,669	0.036
34	509	509	10,582	10,582	0.044
35	404	404	8,399	8,399	0.035
36	489	489	10,166	10,166	0.042
37	551	551	11,455	11,455	0.048
38	417	417	8,669	8,669	0.036
39	449	449	9,335	9,335	0.039
40	311	311	6,466	6,466	0.027
41	381	381	7,921	7,921	0.033
46	479	479	9,958	9,958	0.041
47	483	483	10,042	10,042	0.042
48	431	431	8,960	8,960	0.037
49	463	463	9,626	9,626	0.040
54	499	499	10,374	10,374	0.043
55	506	506	10,520	10,520	0.044
56	527	527	10,956	10,956	0.045
57	461	461	9,584	9,584	0.040
				MEAN	0.038
				MEDIAN	0.039
				STD DEV	0.005
				MAX	0.048
				MIN	0.026

SECTION 7
ATTACHMENT 2
4 PAGES

Pipe Interior Radiological Survey Form

Date: 8-9-06 Time: 1600

Pipe ID#: PPH 101 Pipe Diameter: 24" Access Point Area: PPH RM4

Building: PPH Elevation: 0' System: PCW

Type of Survey Investigation ____ Characterization ____ Final Survey X Other X

Gross X Co60 ____ Cs137 ____

Detector ID# / Sled ID# 223210 / LVSPCRLR24

Detector Cal Date: 7.5.06 Detector Cal Due Date: 7.5.07

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 280 cpm

$MDCR_{static}$ 61 cpm

Efficiency Factor for Pipe Diameter 0.0556 (from detector efficiency determination)

MDC_{static} 1092 dpm/ 100 cm^2

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

Comments: INACCESSIBLE TO SURVEY FROM 15' to 9', and 3' from PPH access

SCAN EFF => 4.81%, SCAN MDC => 5658 dpm/100 cm^2

Technician Signature [signature]

Pipe Interior Radiological Survey

Measurment ID #	Location in Pipe	Scan/Count Time (min/sec)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
1	27'	90s	474	474	n/a	n/a
2	26.5'	90s	428	428		
3	26'	90s	413	413		
4	26' 90°	1.0m	309	309		
5	26' 180°	1.0m	296	296		
6	26' 270°	1.0m	465	465		
7	26' 360°	1.0m	280	280		
8	25.5'	90s	396	396		
9	25'	90s	458	458		
10	24.5'	90s	413	413		

Pipe Interior Radiological Survey Form (Continuation Form)

Date: 8-9-06
Pipe ID#: PPH 101 Pipe Diameter: 24" Access Point Area: PPH RM4
Building: PPH Elevation: 0' System: PCW

Measurment ID #	Location in Pipe	Scan/Count Time (min/sec)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
11	24'	90s	466	466	n/a	n/a
12	23.5'	90s	312	312		
13	23'	90s	297	297		
14	22.5'	90s	389	389		
15	22'	90s	466	466		
16	21.5'	90s	421	421		
17	21'	90s	409	40		
18	21' 90°	1.0m	301	301		
19	21' 180°	1.0m	298	298		
20	21' 270°	1.0m	326	326		
21	21' 360°	1.0m	416	416		
22	20.5'	90s	506	506		
23	20'	90s	419	419		
24	19.5'	90s	381	381		
25	19'	90s	511	511		
26	18.5'	90s	489	489		
27	18'	90s	319	319		
28	17.5'	90s	501	501		
29	17'	90s	417	417		
30	17' 90°	1.0m	311	311		
31	17' 180°	1.0m	276	276		
32	17' 270°	1.0m	401	401		
33	17' 360°	1.0m	365	365		
34	16.5'	90s	509	509		
35	16'	90s	404	404		
36	15.5'	90s	489	489		
37	9'	90s	551	551		
38	8.5'	90s	417	417		
39	8'	90s	449	449		
40	7.5'	90s	311	311		
41	7'	90s	381	381		
42	7' 90°	1.0m	218	218		
43	7' 180°	1.0m	297	297		
44	7' 270°	1.0m	326	326		
45	7' 360°	1.0m	351	351		

Pipe Interior Radiological Survey Form (Continuation Form)

Date: 8-9-06
Pipe ID#: PPH 101 Pipe Diameter: 24" Access Point Area: PPH RM4
Building: PPH Elevation: 0' System: PCW

Measurment ID #	Location in Pipe	Scan/Count Time (min/sec)	Gross Counts	Gross cpm	Net cpm	dpm/100cm^2
46	6.5'	90s	479	479	n/a	n/a
47	6'	90s	483	483		
48	5.5'	90s	431	431		
49	5'	90s	463	463		
50	5' 90°	1.0m	267	267		
51	5' 180°	1.0m	343	343		
52	5' 270°	1.0m	298	298		
53	5' 360°	1.0m	309	309		
54	4.5'	90s	499	499		
55	4'	90s	506	506		
56	3.5'	90s	527	527		
57	3'	90s	461	461		

DH

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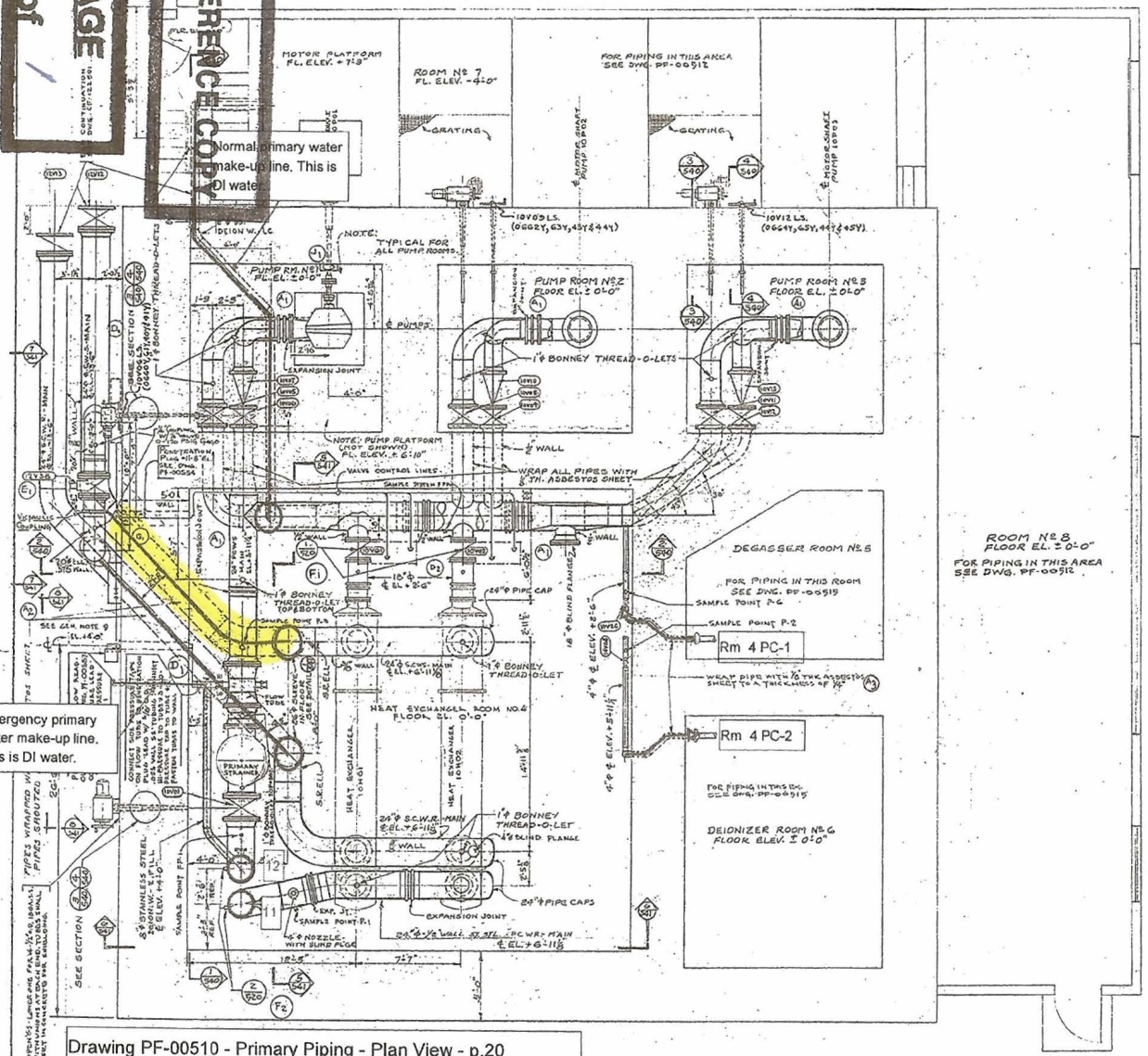
REFERENCE COPY

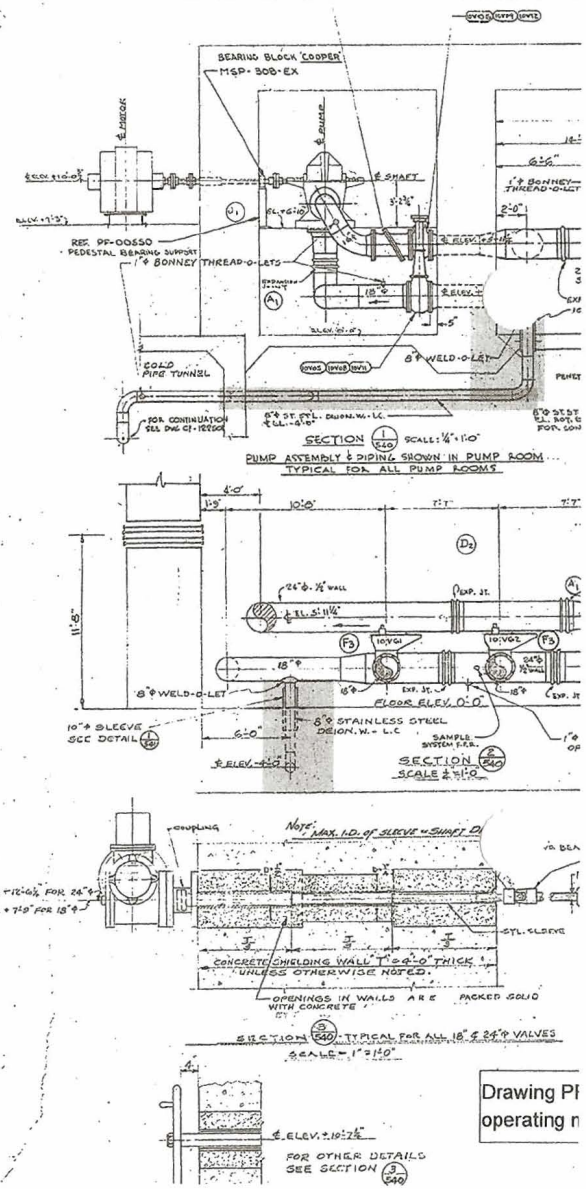
Normal primary water make-up line. This is DI water.

emergency primary water make-up line. This is DI water.



Drawing PF-00510 - Primary Piping - Plan View - p.20

Drawing PF-00510A - Primary Piping - Elevation



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SECTION 7
ATTACHMENT 3
1 PAGE

DQA Check Sheet							
Design #	EP PPH-101	Revision #	Original				
Survey Unit #	EP PPH-101						
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)					Date		
FSS/ Characterization Manager (print/sign)					Date		

C. Wood / [signature]

R. Case [signature]

2-14-08

2/20/08

Form
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