| Survey Unit Release Record | | | | |
|---|---|---|---|---|
| **Design #** | EP-Rx 125 | **Revision #** | Original | **Page 1 of 3** |
| **Survey Unit #(s)** | Rx 125 | | | |
| Description | 1) Embedded Pipe (EP) Survey Unit Rx 125 meets the definition of embedded pipe for Plum Brook Reactor Facility (PBRF).<br><br>2) EP Rx 125 is a Class 1, Group 2 survey unit as per the PBRF Final Status Survey Plan (FSSP) and Technical Basis Document (TBD)-06-004.<br><br>3) Surveys in EP Rx 125 were performed using a scintillation detector optimized to measure gamma energies representative of Co-60. Sample #EP 2-4 from Survey Request (SR)-13 was referenced for this decision.<br><br>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.<br><br>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 Rinehart | 11-27-07 |
| Technical Reviewer (FSS/Characterization Engineer) | G Wood | 11-27-07 |
| FSS/Characterization Manager | R. Case | 11/29/07 |

Form
CS-09/1
Rev 0

**1.0** History/Description

1.1 The subject pipe system is a combination of 2” and 4” drain lines located on the -15’ el. of the Rx building.

1.2 EP Rx 125 consists of 2” and 4” diameter piping that is approximately 127 feet in length.

**2.0** Survey Design Information

2.1 EP Rx 125 was surveyed IAW Procedure #BSI/LVS-002.

2.2 100% of the 2” and 4” ID pipe was accessible for survey. The accessible 4” ID pipe was surveyed by static measurement at one foot increments, for a total of 127 survey measurements.

2.3 The total surface area for the 2” and 4” ID piping sections is 95,342 $cm^2$ (9.5 $m^2$) for the entire length of (approximately 127’) of 2” and 4” 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 125 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 | 2", 4" Pipe |
|---|---|
| Total Number of Survey Measurements | 127 |
| Number of Measurements >MDC | 92 |
| Number of Measurements Above 50% of DCGL | 0 |
| Number of Measurements Above DCGL | 0 |
| Mean | 0.0161 |
| Median | 0.0154 |
| Standard Deviation | 0.0060 |
| Maximum | 0.0356 |
| Minimum | 0.0023 |

**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 125 to be less than 1 mrem/yr. The dose contribution is estimated to be 0.016 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 125 & Spreadsheet

**SECTION 7**
**ATTACHMENT 1**
**__6__ PAGE(S)**

Babcock

# BSI EP/BP SURVEY REPORT

| | | | |
|---|---|---|---|
| **Pipe ID** | **EP Rx 125** | **Survey Location** | Floor Drain, el.-15 |
| **Survey Date** | 02/17/2006, 02/21/2006, 03/06/2006 | **2350-1 #** | 203488, 212223 |
| **Survey Time** | 12:50, 08:15, 10:15 | **Detector-Sled #** | Bicron 1MG1 LVS1/101, 44-62 212701/ 121 44-159 215957/no sled |
| **Pipe Size** | 2", 4" | **Detector Efficiency** | 0.00052, 0.0002, .00038 |
| **DCGL** (dpm/100cm2) | 2.41E+05 | Pipe Area Incorporated by Detector Efficiency (in cm2) | 486, 973 |
| Pipe Area Incorporated by Survey Data ($m^2$) | 9.5 | **Field BKG** (cpm) | 19, 5.3, 11 |
| Routine Survey | X | **Field MDCR** (cpm) | 18, 10.9, 14.4 |
| QA Survey | | **Nominal MDC** (dpm/100cm2) | 1557, 6636, 3493 |

| Survey Measurement Results | |
|---|---|
| Total Number of Survey Measurements | 127 |
| Number of Measurements >MDC | 92 |
| Number of Measurements Above 50% DCGL | 0 |
| Number of Measurements Above DCGL | 0 |
| Mean | 0.0161 |
| Median | 0.0154 |
| Standard Deviation | 0.0060 |
| Maximum | 0.0356 |
| Minimum | 0.0023 |

| | |
|---|---|
| Survey Technician(s) | ROSENHAGEN |

| | |
|---|---|
| Survey Unit Classification | 1 |
| TBD 06-004 Piping Group | 2 |
| SR-13 Radionuclide Distribution Sample | EP 2-4 |
| 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 | Oal Rosenhagen 11-27-07 |

# EP Rx 125
# 2" 4" 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 | 15 | 15 | 28,846 | 2,965 | 1,537 | 25 | 17 | 1 | 85 | 0.013 |
| 2 | 10 | 10 | 19,231 | 1,977 | 1,025 | 16 | 12 | 1 | 57 | 0.009 |
| 3 | 21 | 21 | 40,385 | 4,151 | 2,152 | 34 | 24 | 2 | 119 | 0.018 |
| 4 | 15 | 15 | 28,846 | 2,965 | 1,537 | 25 | 17 | 1 | 85 | 0.013 |
| 5 | 17 | 17 | 32,692 | 3,360 | 1,742 | 28 | 20 | 2 | 97 | 0.015 |
| 6 | 9 | 9 | 17,308 | 1,779 | 922 | 15 | 10 | 1 | 51 | 0.008 |
| 7 | 9 | 9 | 17,308 | 1,779 | 922 | 15 | 10 | 1 | 51 | 0.008 |
| 8 | 10 | 10 | 19,231 | 1,977 | 1,025 | 16 | 12 | 1 | 57 | 0.009 |
| 9 | 6 | 6 | 11,538 | 1,186 | 615 | 10 | 7 | 1 | 34 | 0.005 |
| 10 | 15 | 15 | 28,846 | 2,965 | 1,537 | 25 | 17 | 1 | 85 | 0.013 |
| 11 | 18 | 18 | 34,615 | 3,558 | 1,845 | 30 | 21 | 2 | 102 | 0.015 |
| 12 | 17 | 17 | 32,692 | 3,360 | 1,742 | 28 | 20 | 2 | 97 | 0.015 |
| 13 | 12 | 12 | 23,077 | 2,372 | 1,230 | 20 | 14 | 1 | 68 | 0.010 |
| 14 | 11 | 11 | 21,154 | 2,174 | 1,127 | 18 | 13 | 1 | 63 | 0.009 |
| 15 | 13 | 13 | 25,000 | 2,570 | 1,332 | 21 | 15 | 1 | 74 | 0.011 |
| 16 | 16 | 16 | 30,769 | 3,163 | 1,640 | 26 | 19 | 2 | 91 | 0.014 |
| 17 | 10 | 10 | 19,231 | 1,977 | 1,025 | 16 | 12 | 1 | 57 | 0.009 |
| 18 | 13 | 13 | 25,000 | 2,570 | 1,332 | 21 | 15 | 1 | 74 | 0.011 |
| 19 | 17 | 17 | 32,692 | 3,360 | 1,742 | 28 | 20 | 2 | 97 | 0.015 |
| 20 | 13 | 13 | 25,000 | 2,570 | 1,332 | 21 | 15 | 1 | 74 | 0.011 |
| 21 | 11 | 11 | 21,154 | 2,174 | 1,127 | 18 | 13 | 1 | 63 | 0.009 |
| 22 | 11 | 11 | 21,154 | 2,174 | 1,127 | 18 | 13 | 1 | 63 | 0.009 |
| 23 | 10 | 10 | 19,231 | 1,977 | 1,025 | 16 | 12 | 1 | 57 | 0.009 |
| 24 | 17 | 17 | 32,692 | 3,360 | 1,742 | 28 | 20 | 2 | 97 | 0.015 |
| 25 | 10 | 10 | 19,231 | 1,977 | 1,025 | 16 | 12 | 1 | 57 | 0.009 |
| 26 | 10 | 10 | 19,231 | 1,977 | 1,025 | 16 | 12 | 1 | 57 | 0.009 |
| 27 | 22 | 22 | 42,308 | 4,349 | 2,255 | 36 | 25 | 2 | 125 | 0.019 |
| 28 | 16 | 16 | 30,769 | 3,163 | 1,640 | 26 | 19 | 2 | 91 | 0.014 |
| 29 | 17 | 17 | 32,692 | 3,360 | 1,742 | 28 | 20 | 2 | 97 | 0.015 |
| 30 | 16 | 16 | 30,769 | 3,163 | 1,640 | 26 | 19 | 2 | 91 | 0.014 |
| 31 | 10 | 10 | 19,231 | 1,977 | 1,025 | 16 | 12 | 1 | 57 | 0.009 |

# EP Rx 125
# 2" 4" 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 14 | 14 | 26,923 | 2,767 | 1,435 | 23 | 16 | 1 | 80 | 0.012 |
| 33 | 16 | 16 | 30,769 | 3,163 | 1,640 | 26 | 19 | 2 | 91 | 0.014 |
| 34 | 13 | 13 | 25,000 | 2,570 | 1,332 | 21 | 15 | 1 | 74 | 0.011 |
| 35 | 14 | 14 | 26,923 | 2,767 | 1,435 | 23 | 16 | 1 | 80 | 0.012 |
| 36 | 22 | 22 | 42,308 | 4,349 | 2,255 | 36 | 25 | 2 | 125 | 0.019 |
| 37 | 15 | 15 | 28,846 | 2,965 | 1,537 | 25 | 17 | 1 | 85 | 0.013 |
| 38 | 20 | 20 | 38,462 | 3,953 | 2,050 | 33 | 23 | 2 | 114 | 0.017 |
| 39 | 12 | 12 | 23,077 | 2,372 | 1,230 | 20 | 14 | 1 | 68 | 0.010 |
| 40 | 18 | 18 | 34,615 | 3,558 | 1,845 | 30 | 21 | 2 | 102 | 0.015 |
| 41 | 16 | 16 | 30,769 | 3,163 | 1,640 | 26 | 19 | 2 | 91 | 0.014 |
| 42 | 12 | 12 | 23,077 | 2,372 | 1,230 | 20 | 14 | 1 | 68 | 0.010 |
| 43 | 24 | 24 | 46,154 | 4,744 | 2,460 | 39 | 28 | 2 | 137 | 0.021 |
| 44 | 13 | 13 | 25,000 | 2,570 | 1,332 | 21 | 15 | 1 | 74 | 0.011 |
| 45 | 10 | 10 | 19,231 | 1,977 | 1,025 | 16 | 12 | 1 | 57 | 0.009 |
| 46 | 27 | 27 | 51,923 | 5,337 | 2,767 | 44 | 31 | 3 | 154 | 0.023 |
| 47 | 22 | 22 | 42,308 | 4,349 | 2,255 | 36 | 25 | 2 | 125 | 0.019 |
| 48 | 11 | 11 | 21,154 | 2,174 | 1,127 | 18 | 13 | 1 | 63 | 0.009 |
| 49 | 17 | 17 | 32,692 | 3,360 | 1,742 | 28 | 20 | 2 | 97 | 0.015 |
| 50 | 19 | 19 | 36,538 | 3,756 | 1,947 | 31 | 22 | 2 | 108 | 0.016 |
| 51 | 25 | 25 | 48,077 | 4,942 | 2,562 | 41 | 29 | 2 | 142 | 0.021 |
| 52 | 15 | 15 | 28,846 | 2,965 | 1,537 | 25 | 17 | 1 | 85 | 0.013 |
| 53 | 12 | 12 | 23,077 | 2,372 | 1,230 | 20 | 14 | 1 | 68 | 0.010 |
| 54 | 12 | 12 | 23,077 | 2,372 | 1,230 | 20 | 14 | 1 | 68 | 0.010 |
| 55 | 18 | 18 | 34,615 | 3,558 | 1,845 | 30 | 21 | 2 | 102 | 0.015 |
| 56 | 19 | 19 | 36,538 | 3,756 | 1,947 | 31 | 22 | 2 | 108 | 0.016 |
| 57 | 18 | 18 | 34,615 | 3,558 | 1,845 | 30 | 21 | 2 | 102 | 0.015 |
| 58 | 21 | 21 | 40,385 | 4,151 | 2,152 | 34 | 24 | 2 | 119 | 0.018 |
| 59 | 32 | 32 | 61,538 | 6,325 | 3,280 | 52 | 37 | 3 | 182 | 0.027 |
| 60 | 22 | 22 | 42,308 | 4,349 | 2,255 | 36 | 25 | 2 | 125 | 0.019 |
| 61 | 12 | 12 | 23,077 | 2,372 | 1,230 | 20 | 14 | 1 | 68 | 0.010 |
| 62 | 22 | 22 | 42,308 | 4,349 | 2,255 | 36 | 25 | 2 | 125 | 0.019 |

# EP Rx 125
# 2" 4" 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 63 | 23 | 23 | 44,231 | 4,546 | 2,357 | 38 | 27 | 2 | 131 | 0.020 |
| 64 | 26 | 26 | 50,000 | 5,139 | 2,665 | 43 | 30 | 3 | 148 | 0.022 |
| 65 | 19 | 19 | 36,538 | 3,756 | 1,947 | 31 | 22 | 2 | 108 | 0.016 |
| 66 | 20 | 20 | 38,462 | 3,953 | 2,050 | 33 | 23 | 2 | 114 | 0.017 |
| 67 | 9 | 9 | 17,308 | 1,779 | 922 | 15 | 10 | 1 | 51 | 0.008 |
| 68 | 16 | 16 | 30,769 | 3,163 | 1,640 | 26 | 19 | 2 | 91 | 0.014 |
| 69 | 12 | 12 | 23,077 | 2,372 | 1,230 | 20 | 14 | 1 | 68 | 0.010 |
| 70 | 5 | 5 | 25,000 | 5,139 | 2,665 | 43 | 30 | 3 | 148 | 0.022 |
| 71 | 2 | 2 | 10,000 | 2,056 | 1,066 | 17 | 12 | 1 | 59 | 0.009 |
| 72 | 4.5 | 4.5 | 22,500 | 4,625 | 2,398 | 38 | 27 | 2 | 133 | 0.020 |
| 73 | 3.5 | 3.5 | 17,500 | 3,598 | 1,865 | 30 | 21 | 2 | 104 | 0.016 |
| 74 | 5.5 | 5.5 | 27,500 | 5,653 | 2,931 | 47 | 33 | 3 | 163 | 0.025 |
| 75 | 5.5 | 5.5 | 27,500 | 5,653 | 2,931 | 47 | 33 | 3 | 163 | 0.025 |
| 76 | 2.5 | 2.5 | 12,500 | 2,570 | 1,332 | 21 | 15 | 1 | 74 | 0.011 |
| 77 | 5 | 5 | 25,000 | 5,139 | 2,665 | 43 | 30 | 3 | 148 | 0.022 |
| 78 | 3 | 3 | 15,000 | 3,084 | 1,599 | 26 | 18 | 2 | 89 | 0.013 |
| 79 | 4 | 4 | 20,000 | 4,112 | 2,132 | 34 | 24 | 2 | 118 | 0.018 |
| 80 | 3 | 3 | 15,000 | 3,084 | 1,599 | 26 | 18 | 2 | 89 | 0.013 |
| 81 | 8 | 8 | 40,000 | 8,223 | 4,264 | 68 | 48 | 4 | 237 | 0.036 |
| 82 | 5.5 | 5.5 | 27,500 | 5,653 | 2,931 | 47 | 33 | 3 | 163 | 0.025 |
| 83 | 7 | 7 | 35,000 | 7,195 | 3,731 | 60 | 42 | 4 | 207 | 0.031 |
| 84 | 2.5 | 2.5 | 12,500 | 2,570 | 1,332 | 21 | 15 | 1 | 74 | 0.011 |
| 85 | 3 | 3 | 15,000 | 3,084 | 1,599 | 26 | 18 | 2 | 89 | 0.013 |
| 86 | 4.5 | 4.5 | 22,500 | 4,625 | 2,398 | 38 | 27 | 2 | 133 | 0.020 |
| 87 | 4 | 4 | 20,000 | 4,112 | 2,132 | 34 | 24 | 2 | 118 | 0.018 |
| 88 | 2 | 2 | 10,000 | 2,056 | 1,066 | 17 | 12 | 1 | 59 | 0.009 |
| 89 | 5 | 5 | 25,000 | 5,139 | 2,665 | 43 | 30 | 3 | 148 | 0.022 |
| 90 | 3.5 | 3.5 | 17,500 | 3,598 | 1,865 | 30 | 21 | 2 | 104 | 0.016 |
| 91 | 2.5 | 2.5 | 12,500 | 2,570 | 1,332 | 21 | 15 | 1 | 74 | 0.011 |
| 92 | 6.5 | 6.5 | 32,500 | 6,681 | 3,464 | 55 | 39 | 3 | 192 | 0.029 |
| 93 | 5.5 | 5.5 | 27,500 | 5,653 | 2,931 | 47 | 33 | 3 | 163 | 0.025 |

# EP Rx 125
# 2" 4" 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 94 | 4.5 | 4.5 | 22,500 | 4,625 | 2,398 | 38 | 27 | 2 | 133 | 0.020 |
| 95 | 2.5 | 2.5 | 12,500 | 2,570 | 1,332 | 21 | 15 | 1 | 74 | 0.011 |
| 96 | 3.5 | 3.5 | 17,500 | 3,598 | 1,865 | 30 | 21 | 2 | 104 | 0.016 |
| 97 | 3 | 3 | 15,000 | 3,084 | 1,599 | 26 | 18 | 2 | 89 | 0.013 |
| 98 | 4.5 | 4.5 | 22,500 | 4,625 | 2,398 | 38 | 27 | 2 | 133 | 0.020 |
| 99 | 3 | 3 | 15,000 | 3,084 | 1,599 | 26 | 18 | 2 | 89 | 0.013 |
| 100 | 4 | 4 | 20,000 | 4,112 | 2,132 | 34 | 24 | 2 | 118 | 0.018 |
| 101 | 4 | 4 | 20,000 | 4,112 | 2,132 | 34 | 24 | 2 | 118 | 0.018 |
| 102 | 4.5 | 4.5 | 22,500 | 4,625 | 2,398 | 38 | 27 | 2 | 133 | 0.020 |
| 103 | 5 | 5 | 25,000 | 5,139 | 2,665 | 43 | 30 | 3 | 148 | 0.022 |
| 104 | 1 | 1 | 2,632 | 541 | 281 | 4 | 3 | 0 | 16 | 0.002 |
| 105 | 11 | 11 | 28,947 | 5,951 | 3,086 | 49 | 35 | 3 | 171 | 0.026 |
| 106 | 12 | 12 | 31,579 | 6,492 | 3,366 | 54 | 38 | 3 | 187 | 0.028 |
| 107 | 12 | 12 | 31,579 | 6,492 | 3,366 | 54 | 38 | 3 | 187 | 0.028 |
| 108 | 7 | 7 | 18,421 | 3,787 | 1,964 | 31 | 22 | 2 | 109 | 0.016 |
| 109 | 8 | 8 | 21,053 | 4,328 | 2,244 | 36 | 25 | 2 | 125 | 0.019 |
| 110 | 7 | 7 | 18,421 | 3,787 | 1,964 | 31 | 22 | 2 | 109 | 0.016 |
| 111 | 10 | 10 | 26,316 | 5,410 | 2,805 | 45 | 32 | 3 | 156 | 0.023 |
| 112 | 11 | 11 | 28,947 | 5,951 | 3,086 | 49 | 35 | 3 | 171 | 0.026 |
| 113 | 9 | 9 | 23,684 | 4,869 | 2,525 | 40 | 29 | 2 | 140 | 0.021 |
| 114 | 8 | 8 | 21,053 | 4,328 | 2,244 | 36 | 25 | 2 | 125 | 0.019 |
| 115 | 8 | 8 | 21,053 | 4,328 | 2,244 | 36 | 25 | 2 | 125 | 0.019 |
| 116 | 10 | 10 | 26,316 | 5,410 | 2,805 | 45 | 32 | 3 | 156 | 0.023 |
| 117 | 11 | 11 | 28,947 | 5,951 | 3,086 | 49 | 35 | 3 | 171 | 0.026 |
| 118 | 6 | 6 | 15,789 | 3,246 | 1,683 | 27 | 19 | 2 | 93 | 0.014 |
| 119 | 8 | 8 | 21,053 | 4,328 | 2,244 | 36 | 25 | 2 | 125 | 0.019 |
| 120 | 10 | 10 | 26,316 | 5,410 | 2,805 | 45 | 32 | 3 | 156 | 0.023 |
| 121 | 7 | 7 | 18,421 | 3,787 | 1,964 | 31 | 22 | 2 | 109 | 0.016 |
| 122 | 9 | 9 | 23,684 | 4,869 | 2,525 | 40 | 29 | 2 | 140 | 0.021 |
| 123 | 9 | 9 | 23,684 | 4,869 | 2,525 | 40 | 29 | 2 | 140 | 0.021 |
| 124 | 12 | 12 | 31,579 | 6,492 | 3,366 | 54 | 38 | 3 | 187 | 0.028 |

# EP Rx 125
# 2" 4" 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 125 | 6 | 6 | 15,789 | 3,246 | 1,683 | 27 | 19 | 2 | 93 | 0.014 |
| 126 | 8 | 8 | 21,053 | 4,328 | 2,244 | 36 | 25 | 2 | 125 | 0.019 |
| 127 | 8 | 8 | 21,053 | 4,328 | 2,244 | 36 | 25 | 2 | 125 | 0.019 |
| | | | | | | | | | | |
| | | | | | | | | | MEAN | 0.016 |
| | | | | | | | | | MEDIAN | 0.015 |
| | | | | | | | | | STD DEV | 0.006 |
| | | | | | | | | | MAX | 0.036 |
| | | | | | | | | | MIN | 0.002 |

**SECTION 7**
**ATTACHMENT 2**
**__10__ PAGE(S)**

## Pipe Interior Radiological Survey Form

Date: 2-17-06 Time: 1250

Pipe ID#: RX 125 Pipe Diameter: 4" Access Point Area: -15 floor Drain

Building: REACTOR Elevation: -15 System: -15 floor Drain

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

Gross ____ Co60 ✓ Cs ____

Detector ID# / Sled ID# BICRON 1M61-LVS-1 / 101

Detector Cal Date: 20-Dec-05 Detector Cal Due Date: 20-Dec-06

Instrument: 2350-1 Instrument ID #: 203488

Instrument Cal Date: 17-Nov-05 Instrument Cal Due Date: 17-Nov-06

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

Background Value 19 cpm

$MDCR_{static}$ 18 cpm

Efficiency Factor for Pipe Diameter 0.00052 (from detector efficiency determination)

$MDC_{static}$ 1557 dpm/ 100 $cm^2$

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

Comments: INITIAL SURVEY
READING @ 68' is pipe STEM
READING @ 69 is pipe STEM → SEE MAP

Technician Signature [signature]

### Pipe Interior Radiological Survey

| Position # | Feet into Pipe from Opening | Count Time (min) | Gross Counts | Gross cpm | Net cpm | dpm/100cm² |
|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 15 | 15 | n/a | n/a |
| 2 | 2 | ↓ | 10 | 10 | ↓ | ↓ |
| 3 | 3 | ↓ | 21 | 21 | ↓ | ↓ |
| 4 | 4 | ↓ | 15 | 15 | ↓ | ↓ |
| 5 | 5 | ↓ | 17 | 17 | ↓ | ↓ |
| 6 | 6 | ↓ | 9 | 9 | ↓ | ↓ |
| 7 | 7 | ↓ | 9 | 9 | ↓ | ↓ |
| 8 | 8 | ↓ | 10 | 10 | ↓ | ↓ |
| 9 | 9 | ↓ | 6 | 6 | ↓ | ↓ |
| 10 | 10 | ↓ | 15 | 15 | ↓ | ↓ |



REFERENCE COPY

**Pipe Interior Radiological Survey Form (Continuation Form)**

Date: 2-17-06
Pipe ID#: RX 125 Pipe Diameter: 4" Access Point Area: -15 Floor Drain
Building: Reactor Elevation: -15 System:

| Position # | Feet into Pipe from Opening | Count Time (min) | Gross Counts | Gross cpm | Net cpm | dpm/100cm$^2$ |
|---|---|---|---|---|---|---|
| 11 | 11 | 1 | 18 | 18 | N/a | N/a |
| 12 | 12 | | 17 | 17 | | |
| 13 | 13 | | 12 | 12 | | |
| 14 | 14 | | 11 | 11 | | |
| 15 | 15 | | 13 | 13 | | |
| 16 | 16 | | 16 | 16 | | |
| 17 | 17 | | 10 | 10 | | |
| 18 | 18 | | 13 | 13 | | |
| 19 | 19 | | 17 | 17 | | |
| 20 | 20 | | 13 | 13 | | |
| 21 | 21 | | 11 | 11 | | |
| 22 | 22 | | 11 | 11 | | |
| 23 | 23 | | 10 | 10 | | |
| 24 | 24 | | 17 | 17 | | |
| 25 | 25 | | 10 | 10 | | |
| 26 | 26 | | 10 | 10 | | |
| 27 | 27 | | 22 | 22 | | |
| 28 | 28 | | 16 | 16 | | |
| 29 | 29 | | 17 | 17 | | |
| 30 | 30 | | 16 | 16 | | |
| 31 | 31 | | 10 | 10 | | |
| 32 | 32 | | 14 | 14 | | |
| 33 | 33 | | 16 | 16 | | |
| 34 | 34 | | 13 | 13 | | |
| 35 | 35 | | 14 | 14 | | |
| 36 | 36 | | 22 | 22 | | |
| 37 | 37 | | 15 | 15 | | |
| 38 | 38 | | 20 | 20 | | |
| 39 | 39 | | 12 | 12 | | |
| 40 | 40 | | 18 | 18 | | |
| 41 | 41 | | 16 | 16 | | |
| 42 | 42 | | 12 | 12 | | |
| 43 | 43 | | 24 | 24 | | |
| 44 | 44 | | 13 | 13 | | |
| 45 | 45 | | 10 | 10 | | |

Package Page 2 of 4

REFERENCE COPY

**Pipe Interior Radiological Survey Form (Continuation Form)**

Date: 2·17·06
Pipe ID#: RX 125 Pipe Diameter: 4" Access Point Area: -15 floor Drain
Building: Reactor Elevation: -15 System:

| Position # | Feet into Pipe from Opening | Count Time (min) | Gross Counts | Gross cpm | Net cpm | dpm/100cm$^2$ |
|---|---|---|---|---|---|---|
| 46 | 46 | 1 | 27 | 27 | N/a | N/a |
| 47 | 47 | | 22 | 22 | | |
| 48 | 48 | | 11 | 11 | | |
| 49 | 49 | | 17 | 17 | | |
| 50 | 50 | | 19 | 19 | | |
| 51 | 51 | | 25 | 25 | | |
| 52 | 52 | | 15 | 15 | | |
| 53 | 53 | | 12 | 12 | | |
| 54 | 54 | | 12 | 12 | | |
| 55 | 55 | | 18 | 18 | | |
| 56 | 56 | | 19 | 19 | | |
| 57 | 57 | | 18 | 18 | | |
| 58 | 58 | | 21 | 21 | | |
| 59 | 59 | | 32 | 32 | | |
| 60 | 60 | | 22 | 22 | | |
| 61 | 61 | | 12 | 12 | | |
| 62 | 62 | | 22 | 22 | | |
| 63 | 63 | | 23 | 23 | | |
| 64 | 64 | | 26 | 26 | | |
| 65 | 65 | | 19 | 19 | | |
| 66 | 66 | | 20 | 20 | | |
| 67 | 67 | | 9 | 9 | | |
| 68 | 68 | | 16 | 16 | | |
| 69 | 69 | | 12 | 12 | | |
| | | | | | | |
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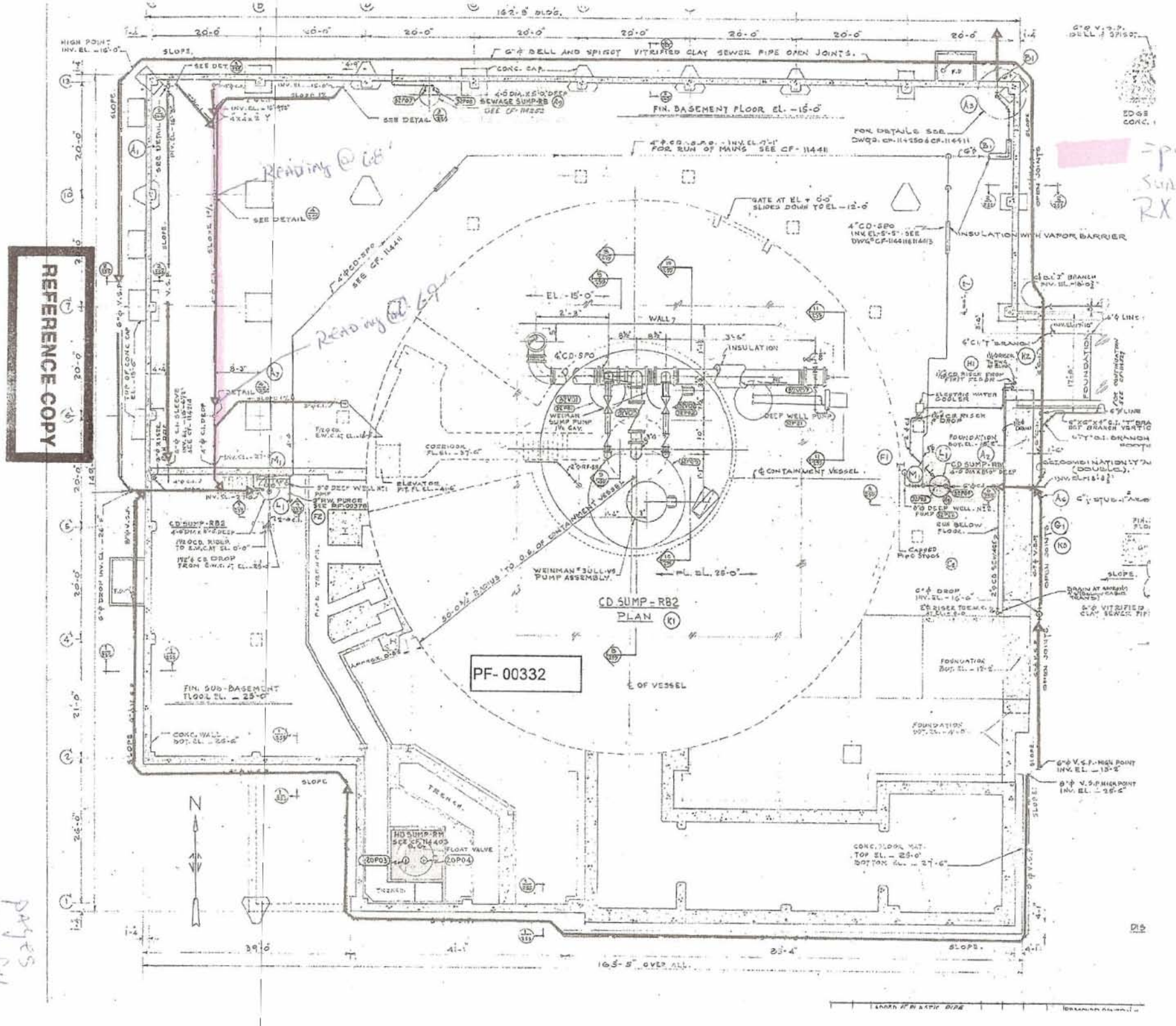


PF- 00332

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Pipe Surveyed RX 125

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## Pipe Interior Radiological Survey Form

Date: 2·21·06 Time: 0815

Pipe ID#: RX 125 Pipe Diameter: 2" Access Point Area: NW & NE CORNER -15 DRAIN LINE

Building: RX Elevation: -15 System: -15 FLOOR DRAIN

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

Gross ____ Co60 ✓ Cs ____

Detector ID# / Sled ID# 44-62 / 212701 / 121

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

Instrument: 2350-1 Instrument ID #: 212223

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

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

Background Value 5.3 cpm

$MDCR_{static}$ 10.9 cpm

Efficiency Factor for Pipe Diameter 0.0002 (from detector efficiency determination)

$MDC_{static}$ 6636 ~~1004~~ dpm/ 100 $cm^2$

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

Comments: CONTINUATION SURVEY
POSITION 1 THRU 10 2" PIPE NW of 4" LINE
POSITION 11 THRU 2" PIPE NE of 4" LINE

Technician Signature [signature]

### Pipe Interior Radiological Survey

| Position # | Feet into Pipe from Opening | Count Time (min) | Gross Counts | Gross cpm | Net cpm | dpm/100cm² |
|---|---|---|---|---|---|---|
| 1 | 1 | 2 | 10 | 5 | n/a | n/a |
| 2 | 2 | ↓ | 4 | 2 | ↓ | ↓ |
| 3 | 3 | ↓ | 9 | 4.5 | ↓ | ↓ |
| 4 | 4 | ↓ | 7 | 3.5 | ↓ | ↓ |
| 5 | 5 | ↓ | 11 | ~~3~~ 5.5 | ↓ | ↓ |
| 6 | 6 | ↓ | 11 | 5.5 | ↓ | ↓ |
| 7 | 7 | ↓ | 5 | 2.5 | ↓ | ↓ |
| 8 | 8 | ↓ | 10 | 5 | ↓ | ↓ |
| 9 | 9 | ↓ | 6 | 3 | ↓ | ↓ |
| 10 | 10 | ↓ | 8 | 4 | ↓ | ↓ |



REFERENCE COPY

**Pipe Interior Radiological Survey Form (Continuation Form)**

Date: 2.21.06
Pipe ID#: RX 125 Pipe Diameter: 1030 Access Point Area: NW & NE CORNER -15 DRAIN LINE
Building: TRX Elevation: -15 System: -15 FLOOR DRAIN

| Position # | Feet into Pipe from Opening | Count Time (min) | Gross Counts | Gross cpm | Net cpm | dpm/100cm$^2$ |
|---|---|---|---|---|---|---|
| 11 | 1 | 2 | 6 | 3 | n/a | n/a |
| 12 | 2 | | 16 | 8 | | |
| 13 | 3 | | 11 | 5.5 | | |
| 14 | 4 | | 14 | 7 | | |
| 15 | 5 | | 5 | 2.5 | | |
| 16 | 6 | | 6 | 3 | | |
| 17 | 7 | | 9 | 4.5 | | |
| 18 | 8 | | 8 | 4 | | |
| 19 | 9 | | 4 | 2 | | |
| 20 | 10 | | 10 | 5 | | |
| 21 | ~~11~~ | | 7 | 3.5 | | |
| 22 | ~~12~~ | | 5 | 2.5 | | |
| 23 | ~~13~~ | | 13 | 6.5 | | |
| 24 | ~~14~~ | | 11 | 5.5 | | |
| 25 | ~~15~~ | | 9 | 4.5 | | |
| 26 | 16 | | 5 | 2.5 | | |
| 27 | 17 | | 7 | 3.5 | | |
| 28 | 18 | | 6 | 3 | | |
| 29 | 19 | | 9 | 4.5 | | |
| 30 | 20 | | 6 | 3 | | |
| 31 | 21 | | 8 | 4 | | |
| 32 | 22 | | 8 | 4 | | |
| 33 | 23 | | 9 | 4.5 | | |
| 34 | 24 | 2 | 10 | 5 | | |
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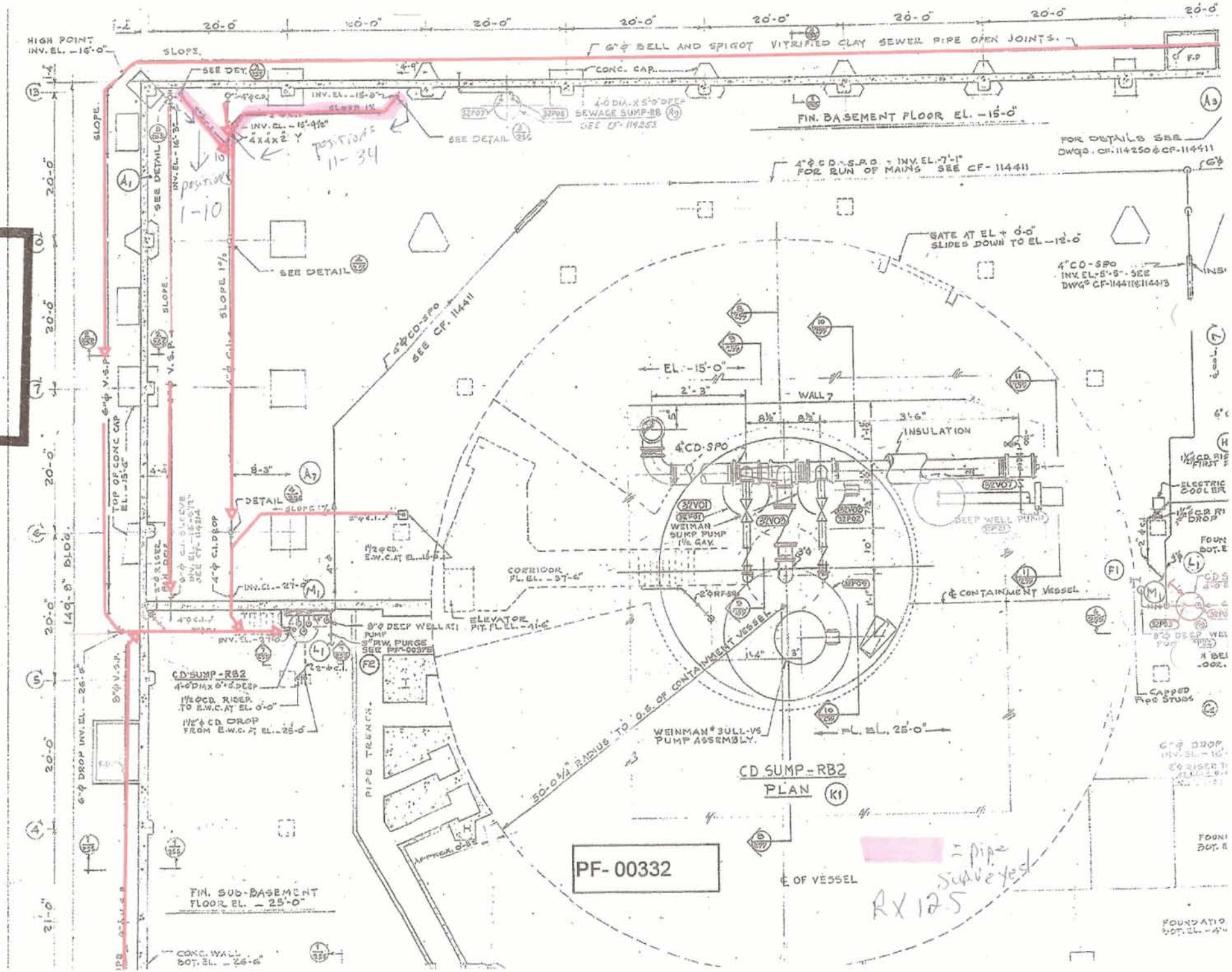
Package Page 2 of 3


HIGH POINT INV. EL. -16'-0"
SLOPE
6"φ BELL AND SPIGOT VITRIFIED CLAY SEWER PIPE OPEN JOINTS.
CONC. CAP.
FIN. BASEMENT FLOOR EL. -15'-0"
4'-0 DIA. X 5'-0" DEEP SEWAGE SUMP-RB
SEE CF-114253
SEE DETAIL
INV. EL. -15'-8"
INV. EL. -15'-9½"
4x4x2 Y
position 11-34
position 1-10
FOR DETAILS SEE DWGS. CF-114250 & CF-114411
4"φ CD-SPO INV. EL. -7'-1" FOR RUN OF MAINS SEE CF-114411
GATE AT EL + 0'-0" SLIDES DOWN TO EL -12'-0"
4"CD-SPO INV. EL. -5'-6" - SEE DWGS CF-114411 & 114413
4"φ CD-SPO SEE CF. 114411
SLOPE 1%
TOP OF CONC CAP EL. -15'-6"
149'-8" BLDG.
DETAIL
INV. EL. -21'-0"
1½"φ CD. E.W.C. AT EL. -16'-8"
CORRIDOR FL. EL. -37'-6"
ELEVATOR PIT FL. EL. -41'-6"
8"φ DEEP WELL AT PUMP
3" RW. PURGE SEE PF-00378
CD SUMP-RB2
4'-0" DIA. X 8'-0" DEEP
1½"φ CD. RISER TO E.W.C. AT EL. 0'-0"
1½"φ CD. DROP FROM E.W.C. AT EL. -25'-6"
6"φ DROP INV. EL. -26'-6"
PIPE TRENCH
FIN. SUB-BASEMENT FLOOR EL. -25'-0"
CONC. WALL BOT. EL. -26'-6"
EL. -15'-0"
WALL 7
2'-3"
8½"
8½"
3'-6"
INSULATION
4"CD-SPO
WEIMAN SUMP PUMP 1½ GAV.
DEEP WELL PUMP
ELECTRIC COOLER
℄ CONTAINMENT VESSEL
50'-0 3/4" RADIUS TO O.S. OF CONTAINMENT VESSEL
WEINMAN 3ULL-VS PUMP ASSEMBLY.
FL. EL. 25'-0"
CD SUMP-RB2 PLAN
℄ OF VESSEL
CAPPED PIPE STUBS
= pipe surveyed
RX 125
PF-00332
REFERENCE COPY
Pages 3 of 3

## Pipe Interior Radiological Survey Form

Date: 3-6-06 Time: 1015

Pipe ID#: RX 125 Pipe Diameter: 2" Access Point Area: -15 DRAIN

Building: RX Elevation: -15 System: FLOOR DRAIN

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

Gross ____ Co60 ✓ Cs ____

Detector ID# / Sled ID# 44-159 / 215957 / NO SLED

Detector Cal Date: 20-FEB-06 Detector Cal Due Date: 20-FEB-07

Instrument: 2350-1 Instrument ID #: 212223

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

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

Background Value 11 cpm

$MDCR_{static}$ 14.4 cpm

Efficiency Factor for Pipe Diameter 0.00038 (from detector efficiency determination)

$MDC_{static}$ 3493 dpm/ 100 $cm^2$

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

Comments: CONTINUATION SURVEY

COMPLETE

Technician Signature [signature]

### Pipe Interior Radiological Survey

| Position # | Feet into Pipe from Opening | Count Time (min) | Gross Counts | Gross cpm | Net cpm | dpm/100cm² |
|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | n/a | n/a |
| 2 | 2 | ↓ | 11 | 11 | ↓ | ↓ |
| 3 | 3 | | 12 | 12 | | |
| 4 | 4 | | 12 | 12 | | |
| 5 | 5 | | 7 | 7 | | |
| 6 | 6 | | 8 | 8 | | |
| 7 | 7 | | 7 | 7 | | |
| 8 | 8 | | 10 | 10 | | |
| 9 | 9 | | 11 | 11 | | |
| 10 | 10 | | 9 | 9 | | |

Package Page 1 of 3

REFERENCE COPY

**Pipe Interior Radiological Survey Form (Continuation Form)**

Date: 3-6-06
Pipe ID#: RX 125 Pipe Diameter: 2" Access Point Area: -15 DRAIN
Building: RX Elevation: -15 System: FLOOR DRAIN

| Position # | Feet into Pipe from Opening | Count Time (min) | Gross Counts | Gross cpm | Net cpm | dpm/100cm$^2$ |
|---|---|---|---|---|---|---|
| 11 | 11 | 1 | 8 | 8 | n/a | n/a |
| 12 | 12 | | 8 | 8 | | |
| 13 | 13 | | 10 | 10 | | |
| 14 | 14 | | 11 | 11 | | |
| 15 | 15 | | 6 | 6 | | |
| 16 | 16 | | 8 | 8 | | |
| 17 | 17 | | 10 | 10 | | |
| 18 | 18 | | 7 | 7 | | |
| 19 | 19 | | 9 | 9 | | |
| 20 | 20 | | 9 | 9 | | |
| 21 | 21 | | 12 | 12 | | |
| 22 | 22 | | 6 | 6 | | |
| 23 | 23 | | 8 | 8 | | |
| 24 | 24 | | 8 | 8 | | |

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Package Page 2 of 3

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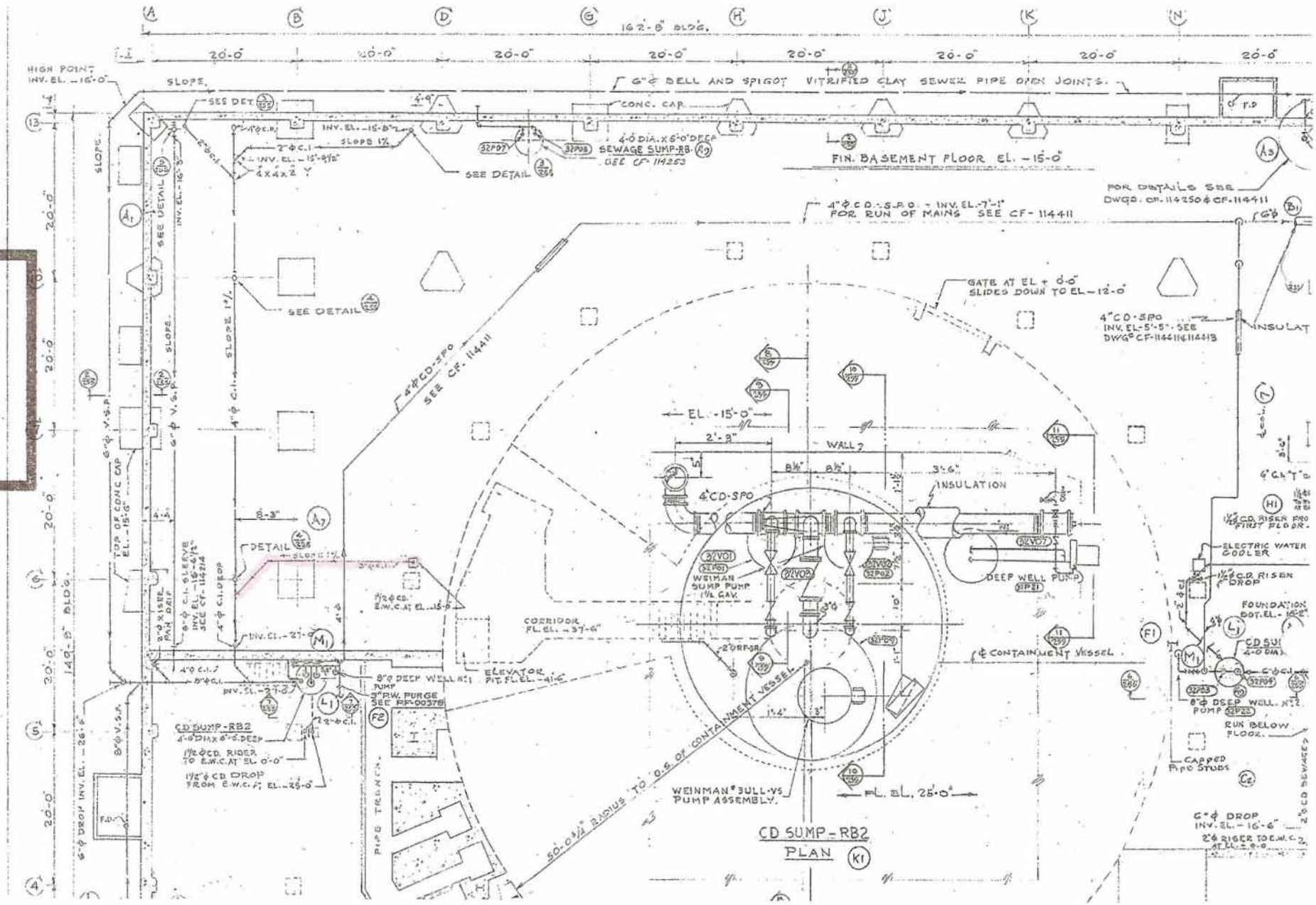


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PAGES 3 of 3

= pipe Surveyed

RX-125

**SECTION 7**
**ATTACHMENT 3**
**___1___ PAGE(S)**

| DQA Check Sheet | | | | |
|---|---|---|---|---|
| Design # | Rx 125 | Revision # | Original | |
| Survey Unit # | Rx 125 | | | |

| 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 / Dale Randall | Date | 11-27-07 |
| FSS/ Characterization Manager (print/sign) | R. Case | Date | 11/29/07 |

Form
CS-09/2
Rev 0

**SECTION 7**
**ATTACHMENT 4**
**1 DISC**