Browns Ferry Nuclear Plant



**Unit 0**

Chemistry Instruction

**CI-401**

**Radwaste System Sampling**

Revision 0046 Quality Related

Level of Use: Multiple

Level of Use or Other Information: Sections 1 through 8 Information Use All Attachments Continuous Use

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# INTRODUCTION

## Purpose

The purpose of this procedure is to provide instructions for obtaining chemistry samples of Radwaste systems.

## Scope

* + 1. This procedure provides samples from various Radwaste systems for use in multiple Chemistry procedures.
    2. Sample panels placed IN-SERVICE per other Chemistry procedures are to be in operationally aligned configuration before performing the associated sections of this procedure, unless otherwise indicated within this procedure. The scope of this procedure does NOT include placing these sample panels IN-SERVICE.

# REFERENCES

## Performance References

* + 1. CI-13.1, Chemistry Program
    2. NPG-SPP-06.5, Foreign Material Control

## Developmental References

* + 1. 0-47E560-11, Mechanical Piping and Equipment Details Process Piping
    2. 0-47E610-43-3, Mechanical Control Diagram Sampling and Water Quality System
    3. 0-47E610-77-6, Mechanical Control Diagram Radwaste System
    4. 0-47E610-77-7, Mechanical Control Diagram Radwaste System
    5. 0-47E830-1 through 9, Flow Diagram Radwaste
    6. 0-47E832-1, Flow Diagram Fuel Pool Filter/Demineralizer System
    7. 0-47W448-8, Mechanical Sampling & Water Quality System
    8. 1-47E610-43-2, Mechanical Control Diagram Sampling and Water Quality System
    9. 2-47E610-43-2, Mechanical Control Diagram Sampling and Water Quality System
    10. 3-47E610-43-2, Mechanical Control Diagram Sampling and Water Quality System

## Commitments

None

# PRECAUTIONS AND LIMITATIONS

## Precautions

None

## Limitations

None

# PREREQUISITE ACTIONS

## Preliminary Actions

[1] **SELECT** Attachment Section(s) to perform tasks(s).

|  |  |  |
| --- | --- | --- |
| **Table 4.1** | | |
| **Attachment** | **Section** | **Section Title** |
| Attachment 1, Radwaste Sample Panel Sampling | 1.0 | Waste Sample Tank (WST) Sampling |
| 2.0 | Waste Surge Tank and Waste Collector Tank Sampling |
| 3.0 | Waste Filter and Waste Demineralizer Sampling |
| 4.0 | Floor Drain Sampling |
| 5.0 | Laundry Drain Tank Sampling |
| 6.0 | Chemical Waste Tank Sampling |
| 7.0 | Fuel Pool Demineralizer Sampling |
| Attachment 2,  Fuel Pool Demineralizer Precoat Resin Check | 1.0 | Fuel Pool Demineralizer Precoat Resin Check |
| Attachment 3, Condensate Supply to Radwaste | 1.0 | Condensate Supply to Radwaste |
| Attachment 4,  Condensate Phase Separator Sampling | 1.0 | Radwaste Condensate and Phase Separator Sampling |
| Attachment 5, Ultrex Sampling | 1.0 | Ultrex Sampling |

## Special Tools, Measuring and Test Equipment, Parts and Supplies

1. **ENSURE** M&TE to be used is within calibration due date.
2. **ENSURE** M&TE movement is recorded in M&TE tracking log.
3. **ENSURE** listed materials relevant to sample to be obtained are available:
   * Polybottle(s)
   * Glass jar
   * Gloves, inserts
   * Yellow bag
   * Survey meter
   * Sample carrier
   * Zebco
   * Flexible tubing
   * Flush container

# ACCEPTANCE CRITERIA

None

# PERFORMANCE

[1] **USE** copy of selected Attachment Section(s) to perform task(s).

# POST PERFORMANCE ACTIVITY

None

# RECORDS

All completed portions of this procedure are to be maintained per NPG-SPP-31.2, Records Management.

## Attachment 1

**(Page 1 of 27) Radwaste Sample Panel Sampling**

* 1. **WASTE SAMPLE TANK (WST) SAMPLING**
  2. **WST Sampling**

**NOTE**

Radwaste sample panel location is between B and C line, W-5, 565’.

1. **ENSURE** WST to be sampled has recirculated minimum 40 minutes.
2. **SELECT** WST to be sampled:



WST B



WST A

1. **RECORD** sample valve and isolation valve **As-Found** positions for selected sample point:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 1-1** | | | | | | |
| **Sample Point** | **Sample Valve** | **As-Found**(1) | | **Isolation Valve** | **As-Found**(1) | |
| **Name** | **Name** |
| WST A | 0-43-864 | OPEN  | | 0-43-726 | OPEN |  |
| WST PUMP A DISCH | CLOSED |  | RW WSTA GR | CLOSED  | |
| FLUSH  | |
| WST B | 0-43-865 | OPEN  | | 0-43-727 | OPEN |  |
| WST PUMP B DISCH | CLOSED |  | RW WST PUMP B GR | CLOSED  | |
| FLUSH  | |

(1)Shaded “As-Found” indicates normal position

**NOTE**

Place-keeping and documentation for Step 1.1[4] through Step 1.1[11] may be performed following exit from contaminated sampling station.

1. **ENSURE** isolation valve is OPEN.
2. **ENSURE** sample valve is OPEN.

**Attachment 1**

**(Page 2 of 27)**

* 1. **WST Sampling (continued)**

1. **ENSURE** minimum flush of 2.5 liters.
2. **IF** conductivity sample is to be obtained, **THEN**

**ENSURE** conductivity reading has stabilized before completing flush.

1. **OBTAIN** sample.
2. **IF** isolation valve is NOT to be restored to **As-Found** position, **THEN RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

1. **IF** sample valve is NOT to be restored to **As-Found** position, **THEN RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

1. **RESTORE** all other valves to **As-Found** positions.
2. **RECORD** comments for any valve NOT restored to **As-Found** position in eSOMS.
3. **SUBMIT** Attachment 1, Radwaste Sample Panel Sampling, Subsection 1.1 to Chemistry Shift Coordinator or designee.
   1. **WST Chemical Analysis Data Sheet**

**NOTES**

1. Data Sheet is used as a convenience to transpose analytical information to database.
2. Generate CR if AL1 is exceeded on WSTs transferred to CST.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sample Information** | **Date/Time** | | **Tracking Number** | | |
| **Sample Obtained:** |
| **Start Level** | | **Gallons processed** | |  |
| WST A  |  | |  | |
| WST B  |  | |  | |
| **Chemical Analysis** | **Method** | **Result** | | **GPV(6)** | **AL I(1)** |
| Vendor System Effluent Conductivity (S/cm)(2) | CI-617.1 |  | | � 0.10 | >0.10 |
| Conductivity (S/cm)(2) | CI-617.1 |  | | < 0.90 | >1.0 |
| Chloride (ppb)(2) | CI-603.1 |  | | < 1 | >10 |
| Sulfate (ppb)(2) | CI-603.1 |  | | < 1 | >10 |
| Phosphate (ppb)(2)(3) | CI-603.1 |  | | < 5 | >10 |
| Lithium (ppb)(4) | CI-603.1 |  | | < 5 | >10 |
| Sodium (ppb)(4) | CI-603.1 |  | | < 5 | >10 |
| Magnesium (ppb)(4) | CI-603.1 |  | | < 5 | >10 |
| Calcium (ppb)(4) | CI-603.1 |  | | < 5 | >10 |
| SiO2 (ppb)(2) | CI-670 or CI-670.1 |  | | � 20 | >100 |
| TOC (ppb)(2) | CI-632.1 |  | | � 100 | >200 |
| Gamma Isotopic (Ci/ml)(2) | CI-702/703 or CI-307 |  | | < 5.0 E-04 | >1.0E-03 |
| Post-UV Chloride (ppb)(2),(5) | CI-686 |  | | � 2 | >10 |
| Post-UV Nitrate (ppb)(2),(5) | CI-686 |  | | � 2 | >10 |
| Post-UV Sulfate (ppb)(2),(5) | CI-686 |  | | � 2 | >10 |
| Post-UV Phosphate (ppb)(2),(3),(5) | CI-686 |  | | < Min. Det. | >5 |
| Boron (ppb)(6) | CI-603.1 |  | | � 25 | >50 |

Remarks:

* 1. **WST Chemical Analysis Data Sheet (continued)**

(1) If any parameter exceeds the Action Level 1 limit, then the tank is reprocessed before routing to the CST, unless a water emergency exists. If a water emergency exists, the WST is transferred to the CST only after an impact calculation has been completed and evaluated to determine if the CST remains within its limits. During a water emergency, the transfer is approved by the Unit Supervisor and the Chemistry Shift Supervisor/Lead RLA. This approval and impact calculation value are logged in the proper location in the shift logs and with the sample number in the Chemistry database.

(2) Before releasing for plant reuse.

(3) Phosphate should be quantified if a peak above LLD is obtained.

(4) Analyze only if indicated by plant conditions.

(5) Post-UV anions include chloride, sulfate, phosphate, and nitrate. Post-UV phosphate should be quantified if a peak > LLD is obtained. Post-UV phosphate is an indication of EHC fluid contamination. Routine

Post-UV analysis may be performed after releasing for plant use if insufficient analysis time is available.

(6) Boron should be run on each WST.

* 1. **Calculation of CST Concentration After WST Transfer**

**NOTES**

1. C, Cb and Ci can be any chemical species that is expressed in ppb. All calculation results are recorded in remarks section.
2. CST volume is 12,000 gal/ft.
3. Utilize the actual CST concentration or the CST concentration from the previous impact calc, which ever is most recent, as Ci “initial CST concentration”.
4. **WHEN** evaluation is required due to elevated concentrations, **THEN**

**CALCULATE** species concentrations using the following equation.

C  Cb  Vb   Ci  Vi 

Vb  Vi

        



|  |  |  |
| --- | --- | --- |
| where: C | = | CST concentration (ppb) after transfer |
| Cb | = | batch concentration (ppb) |
| Ci | = | initial CST concentration (ppb) |
| Vb | = | batch volume (gallons) |
| Vi | = | initial CST volume (gallons) |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **WST A and WST B Level Vs. Volume** | | | | | | | |
| **Level %** | **Gallons** | **Level %** | **Gallons** | **Level %** | **Gallons** | **Level %** | **Gallons** |
| 78 | 30820 | 84 | 33268 | 90 | 35500 | 96 | 37449 |
| 79 | 31240 | 85 | 33656 | 91 | 35847 | 97 | 37739 |
| 80 | 31656 | 86 | 34039 | 92 | 36186 | 98 | 38019 |
| 81 | 32067 | 87 | 34415 | 93 | 36515 | 99 | 38286 |
| 82 | 32473 | 88 | 34784 | 94 | 36836 | 100 | 38541 |
| 83 | 32873 | 89 | 35146 | 95 | 37148 |  | |

1. **ATTACH** Attachment 1, Subsection 1.3 to Subsection 1.2 when CST impact is performed.
   1. **WASTE SURGE TANK AND WASTE COLLECTOR TANK SAMPLING**
   2. **Waste Surge Tank and Waste Collector Tank Sampling**

**NOTE**

Radwaste sample panel location is between B and C line, W-5, 565’.

1. **SELECT** tank(s) to be sampled:

Waste Collector Tank 

Waste Surge Tank 

1. **RECORD** sample valve and isolation valve **As-Found** positions for selected sample point(s):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 1-2** | | | | | | |
| **Sample Point** | **Sample Valve** | **As-Found**(1) | | **Isolation Valve** | **As-Found**(1) | |
| **Name** | **Name** |
| Waste Surge Tank | 0-43-860 | OPEN  | | 0-43-722 | OPEN |  |
| WASTE SURGE TANK PUMP OUTLET | CLOSED |  | RW WS SYS PMP DISCH GR | CLOSED  | |
| FLUSH  | |
| Waste Collector Tank | 0-43-861 | OPEN  | | 0-ISV-043-0723 | OPEN |  |
| WASTE COLLECTOR TK PUMP DISCH | CLOSED |  | RW WS COLL TK DIS GRAB SAMPLE | CLOSED  | |
| FLUSH  | |

(1)Shaded “As-Found” indicates normal position

**NOTES**

1. Multiple selected samples may be flushed simultaneously for efficient use of time and dose considerations.
2. Flushing is accomplished via sample valve in either FLUSH or OPEN position.
3. Normal process when obtaining multiple selected samples with simultaneous flushing is to place first selected sample valve in OPEN and subsequent selected sample valves in FLUSH.
4. Flush times for sample valves placed in FLUSH are considered same as flush time for first selected sample placed in OPEN, to determine minimum flush volumes.
5. Place-keeping and documentation for Step 2.1[3.1] through Step 2.1[4] may be performed following exit from contaminated sampling station.
6. **PERFORM** the following for each selected sample: [3.1] **ENSURE** isolation valve is OPEN.

**WARNING**

Waste Collector Tank sample may be at high pressure. Caution should be used when opening sample line.

[3.2] **ENSURE** sample valve is OPEN.

[3.3] **ENSURE** minimum flush amount as indicated for selected tank:

* + Waste Surge Tank: 5 liters
  + Waste Collector Tank: 6 liters after establishing steady flow free of resin or air bubbles

[3.4] **OBTAIN** sample.

[3.5] **IF** isolation valve is NOT to be restored to **As-Found** position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**: [3.6] **IF** sample valve is NOT to be restored to **As-Found** position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

1. **RESTORE** all other valves to **As-Found** positions.
2. **RECORD** comments for any valve NOT restored to **As-Found** position in eSOMS.
3. **SUBMIT** Attachment 1, Radwaste Sample Panel Sampling, Subsection 2.1 to Chemistry Shift Coordinator or designee.
   1. **Waste Collector Tank Chemical Analysis Data Sheet**

**NOTE**

Data Sheet is used as a convenience to transpose analytical information to database.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample Information** | | | **Date/Time** | | **Tracking Number** | | |
| **Sample Obtained:** | | |  | |  | | |
| **(%)Start Level** | | | **(%) End Level(1)** | |
| WCT  | | |  | | |  | |
| Other (note in remarks)  | | |  | | |  | |
| **Chemical Analysis(2)** | **Method** | **Result** | | **Vendor Contract Limit** | | | **In Limits** |
| Conductivity (S/cm) | CI-617.1 |  | | 150 S/cm | | | Yes  No  |
| Turbidity (NTU) | CI-683 |  | | 1000 NTU | | | Yes  No  |
| TOC (ppm) | CI-632.1 |  | | 5.0 ppm | | | Yes  No  |
| SiO2 (ppm) | CI-670 or CI-670.1 |  | | 2.0 ppm | | | Yes  No  |
| Cl- Anion(ppm) | CI-603.1 |  | |  | | |  |
| SO4- Anion(ppm) | CI-603.1 |  | | 8.8 ppm | | | Yes  No  |
| NO3- Anion(ppm) | CI-603.1 |  | |  | | |  |
| F- Anion(ppm) | CI-603.1 |  | |  | | |  |
| Na+ Cation (ppm) | CI-603.1 |  | |  | | |  |
| K+ Cation (ppm) | CI-603.1 |  | |  | | |  |
| Ca2+ Cation (ppm)(3) | CI-603.1 |  | |  | | |  |
| Mg2+ Cation (ppm)(3) | CI-603.1 |  | |  | | |  |
| Gamma Isotopic (Ci/ml) | CI-702/703 or CI-307 |  | |  | | |  |
| pH | CI-618.1 |  | |  | | |  |
| Total Dissolved Solids (TDS) (ppm) | (4) |  | |  | | |  |

Remarks

**2.2 Waste Collector Tank Chemical Analysis Data Sheet (continued)**

(1) May be marked as N/A

(2) All analyses may NOT be required. Radwaste Chemist/Thermex may change required analyses.

(3) Hardness is determined by summing Ca2+ and Mg2+ concentrations (reported in ppm).

 Ca 2    

    

(4)

TDS  0.6

 0.4

  Na



 K  Ca 2

 Mg 2

 Cl

 SO 4

 NO3  F

**NOTE**

Radwaste sample panel location is between B and C line, W-5, 565’.

1. **SELECT** point(s) to be sampled:

Waste Demineralizer 

Waste Filter 

1. **RECORD** sample valve and isolation valve **As-Found** positions for selected sample point(s):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 1-3** | | | | | | |
| **Sample Point** | **Sample Valve** | **As-Found**(1) | | **Isolation Valve** | **As-Found**(1) | |
| **Name** | **Name** |
| Waste Filter | 0-43-871 | OPEN  | | 0-43-733 | OPEN |  |
| WASTE FILTER OUTLET | CLOSED |  | RW WST FLTR EFFLUENT GR | CLOSED  | |
| FLUSH  | |
| Waste Demineralizer | 0-43-876 | OPEN  | | 0-43-742 | OPEN |  |
| WASTE DEMIN OUTLET | CLOSED |  | RW WST DEMIN EFF GR | CLOSED  | |
| FLUSH  | |

(1)Shaded “As-Found” indicates normal position

**NOTES**

1. Multiple selected samples may be flushed simultaneously for efficient use of time and dose considerations.
2. Flushing is accomplished via sample valve in either FLUSH or OPEN position.
3. Normal process when obtaining multiple selected samples with simultaneous flushing is to place first selected sample valve in OPEN and subsequent selected sample valves in FLUSH.
4. Flush times for sample valves placed in FLUSH are considered same as flush time for first selected sample placed in OPEN, to determine minimum flush volumes.
5. Placekeeping and documentation for Step 3.0[3.1] through Step 3.0[4] may be performed following exit from contaminated sampling station.
6. **PERFORM** the following for each selected sample: [3.1] **ENSURE** isolation valve is OPEN.

[3.2] **ENSURE** sample valve is OPEN. [3.3] **ENSURE** minimum flush of 1 liter.

[3.4] **IF** conductivity sample is to be obtained, **THEN**

**ENSURE** conductivity reading has stabilized before completing flush. [3.5] **OBTAIN** sample.

[3.6] **IF** isolation valve is NOT to be restored to **As-Found** position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**: [3.7] **IF** sample valve is NOT to be restored to **As-Found** position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

1. **RESTORE** all other valves to **As-Found** positions.
2. **RECORD** comments for any valve NOT restored to **As-Found** position in eSOMS.
3. **SUBMIT** Attachment 1, Radwaste Sample Panel Sampling, Section 3.0 to Chemistry Shift Coordinator or designee.
   1. **FLOOR DRAIN SYSTEM SAMPLING**
   2. **Floor Drain System Sampling**

**NOTE**

Radwaste sample panel location is between B and C line, W-5, 565’.

1. **SELECT** tank(s)/filter to be sampled:

|  |  |  |
| --- | --- | --- |
| Floor Drain   Sample Tanks | Floor Drain   Collector Tank | Floor Drain Filter  |

1. **RECORD** sample valve and isolation valve **As-Found** positions for selected sample point(s):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 1-4** | | | | | | |
| **Sample Point** | **Sample Valve** | **As-Found**(1) | | **Isolation Valve** | **As-Found**(1) | |
| **Name** | **Name** |
| Floor Drain Sample Tanks | 0-43-866 | OPEN |  | 0-43-728 | OPEN |  |
| FL DR SAMPLE TANK PUMP DISCH | CLOSED |  | RW FDST PUMP DISCH GR | CLOSED |  |
| FLUSH |  |
| Floor Drain Collector Tank | 0-43-862 | OPEN |  | 0-43-724 | OPEN |  |
| FDCT PUMP DISCH | CLOSED |  | RW FDC SYSTEM PUMP DISCH GR | CLOSED |  |
| FLUSH |  |
| Floor Drain Filter | 0-43-877    FLOOR DRAIN FILTER OUTLET | OPEN |  | 0-43-743    RW FD FLTR EFF. GR | OPEN |  |
| CLOSED |  | CLOSED |  |
| FLUSH |  |

(1)Shaded “As-Found” indicates normal position

**NOTES**

1. Multiple selected samples may be flushed simultaneously for efficient use of time and dose considerations.
2. Flushing is accomplished via sample valve in either FLUSH or OPEN position.
3. Normal process when obtaining multiple selected samples with simultaneous flushing is to place first selected sample valve in OPEN and subsequent selected sample valves in FLUSH.
4. Flush times for sample valves placed in FLUSH are considered same as flush time for first selected sample placed in OPEN, to determine minimum flush volumes.
5. Placekeeping and documentation for Step 4.1[3.1] through Step 4.1[4] may be performed following exit from contaminated sampling station.
6. **PERFORM** the following for each selected sample: [3.1] **ENSURE** isolation valve is OPEN.

[3.2] **ENSURE** sample valve is OPEN.

[3.3] **ENSURE** minimum flush amount as indicated for selected tank:

* + Floor Drain Tanks: 1.3 liters
  + Floor Collector Tank and Floor Drain Filter: 1 liter [3.4] **OBTAIN** sample.

[3.5] **IF** isolation valve or sample valve is NOT to be restored to **As-Found**

position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

[3.6] **IF** isolation valve or sample valve is NOT to be restored to **As-Found**

position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

1. **RESTORE** all other valves to **As-Found** positions.
2. **RECORD** comments for any valve NOT restored to **As-Found** position in eSOMS.
3. **SUBMIT** Attachment 1, Radwaste Sample Panel Sampling, Subsection 4.1 to Chemistry Shift Coordinator or designee.

**NOTE**

Data Sheet is used as a convenience to transpose analytical information to database.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample Information** | | | **Date/Time** | | **Tracking Number** | | |
| **Sample Obtained:** | | |  | |  | | |
| **(%)Start Level** | | | **(%) End Level(1)** | |
| FDCT  | | |  | | |  | |
| Other (note in remarks)  | | |  | | |  | |
| **Chemical Analysis(2)** | **Method** | **Result** | | **Vendor Contract Limit** | | | **In Limits** |
| Conductivity (S/cm) | CI-617.1 |  | | 150 S/cm | | | Yes  No  |
| Turbidity (NTU) | CI-683 |  | | 1000 NTU | | | Yes  No  |
| TOC (ppm) | CI-632.1 |  | | 5.0 ppm | | | Yes  No  |
| SiO2 (ppm) | CI-670 or CI-670.1 |  | | 2.0 ppm | | | Yes  No  |
| Cl- Anion(ppm) | CI-603.1 |  | |  | | |  |
| SO4- Anion(ppm) | CI-603.1 |  | | 8.8 ppm | | | Yes  No  |
| NO3- Anion(ppm) | CI-603.1 |  | |  | | |  |
| F- Anion(ppm) | CI-603.1 |  | |  | | |  |
| Na+ Cation (ppm) | CI-603.1 |  | |  | | |  |
| K+ Cation (ppm) | CI-603.1 |  | |  | | |  |
| Ca2+ Cation (ppm)(3) | CI-603.1 |  | |  | | |  |
| Mg2+ Cation (ppm)(3) | CI-603.1 |  | |  | | |  |
| Gamma Isotopic (Ci/ml) | CI-702/703 or CI-307 |  | |  | | |  |
| pH | CI-618.1 |  | |  | | |  |
| Total Dissolved Solids (TDS) (ppm) | (4) |  | |  | | |  |

Remarks

**(continued)**

(1) May be marked as N/A

(2) All analyses may NOT be required. Radwaste Chemist/Thermex may change required analyses.

(3) Hardness is determined by summing Ca2+ and Mg2+ concentrations (reported in ppm).

 Ca 2    

    

(4)

TDS  0.6

 0.4

  Na



 K  Ca 2

 Mg 2

 Cl

 SO 4

 NO3  F

* 1. **Dewatering Cask Outlet Activity Calculation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample** | **Date/Time** | **Gamma Total Isotopic Activity per CI-702** | **Limit** | **Gallons** |
| Dewatering Cask Outlet |  |  | 8.0 E-2 Ci/ml |  |
| FDCT(1) |  |  | N/A |  |

(1) Only required when Dewatering Cask Outlet limit is exceeded

[1] **IF** Dewatering Cask Outlets exceeds 8.0 E-2 Ci/ml, **THEN PERFORM** the following. Otherwise **MARK** steps N/A.

[1.1] **CALCULATE** final FDCT concentration:

C  Cb  Vb   Ci  Vi 

Vb  Vi

        



|  |  |  |
| --- | --- | --- |
| where: C | = | FDCT concentration after transfer |
| Cb | = | outlet concentration |
| Vb | = | brine liner volume (gallons) |
| Ci | = | initial FDCT concentration |
| Vi | = | initial FDCT volume (gallons) |

[1.2] **IF** C is greater than 8.0 E-2 Ci/ml, **THEN**

**NOTIFY** Radwaste that the limit has been exceeded and further processing to a tank other than FDCT may be required. Otherwise, **MARK** N/A.

**5.0 LAUNDRY DRAIN TANK SAMPLING**

**NOTE**

Radwaste sample panel location is between B and C line, W-5, 565’.

1. **RECORD** sample valve and isolation valve **As-Found** positions:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 1-5** | | | | | | |
| **Sample Point** | **Sample Valve** | **As-Found**(1) | | **Isolation Valve** | **As-Found**(1) | |
| **Name** | **Name** |
| Laundry Drain Tank | 0-43-859 | OPEN |  | 0-43-721 | OPEN |  |
| CASK DECON & LAUNDRY DRAIN TANK | CLOSED |  | RW LAUNDRY SYSTEM GR | CLOSED |  |
| FLUSH |  |

(1)Shaded “As-Found” indicates normal position

**NOTE**

Placekeeping and documentation for Step 5.0[2] through Step 5.0[8] may be performed following exit from contaminated sampling station.

1. **ENSURE** isolation valve is OPEN.
2. **ENSURE** sample valve is OPEN.
3. **FLUSH** minimum 3 liters.
4. **OBTAIN** sample.
5. **IF** isolation valve or sample valve is NOT to be restored to **As-Found**

position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

**5.0 LAUNDRY DRAIN TANK SAMPLING (continued)**

1. **IF** isolation valve or sample valve is NOT to be restored to **As-Found**

position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

1. **RESTORE** all other valves to **As-Found** positions.
2. **RECORD** comments for any valve NOT restored to **As-Found** position in eSOMS.
3. **SUBMIT** Attachment 1, Radwaste Sample Panel Sampling, Section 5.0 to Chemistry Shift Coordinator or designee.

**6.0 CHEMICAL WASTE TANK SAMPLING**

**NOTE**

Radwaste sample panel location is between B and C line, W-5, 565’.

1. **RECORD** sample valve and isolation valve **As-Found** positions:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 1-6** | | | | | | |
| **Sample Point** | **Sample Valve** | **As-Found**(1) | | **Isolation Valve** | **As-Found**(1) | |
| **Name** | **Name** |
| Chemical Waste Tank | 0-43-863 | OPEN  | | 0-43-725 | OPEN |  |
| CHM WASTE TANK PUMP DISCH | CLOSED |  | RW CWST PUMP DISCH GR | CLOSED  | |
| FLUSH  | |

(1)Shaded “As-Found” indicates normal position

**NOTE**

Placekeeping and documentation for Step 6.0[2] through Step 6.0[8] may be performed following exit from contaminated sampling station.

1. **ENSURE** isolation valve is OPEN.
2. **ENSURE** sample valve is OPEN.
3. **FLUSH** minimum 1 liter.
4. **OBTAIN** sample.
5. **IF** isolation valve or sample valve is NOT to be restored to **As-Found**

position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

**6.0 CHEMICAL WASTE TANK SAMPLING (continued)**

1. **IF** isolation valve or sample valve is NOT to be restored to **As-Found**

position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

1. **RESTORE** all other valves to **As-Found** positions.
2. **RECORD** comments for any valve NOT restored to **As-Found** position in eSOMS.
3. **SUBMIT** Attachment 1, Radwaste Sample Panel Sampling, Section 6.0 to Chemistry Shift Coordinator or designee.

**7.0 FUEL POOL DEMINERALIZER SAMPLING**

**NOTE**

Radwaste sample panel location is between B and C line, W-5, 565’.

1. **SELECT** demineralizer(s) to be sampled:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Fuel Pool Vessel A |  | Fuel Pool Vessel B |  | Fuel Pool Vessel C |  | Fuel Pool Vessel D |  |

1. **RECORD** sample valve and isolation valve **As-Found** positions for selected sample point(s):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 1-7** | | | | | | |
| **Sample Point** | **Sample Valve** | **As-Found**(1) | | **Isolation Valve** | **As-Found**(1) | |
| **Name** | **Name** |
| Fuel Pool Vessel A Inlet | 1-FLV-043-0867 | OPEN |  | 1-SHV-043-0729 | OPEN |  |
| FP DEMIN A INLET | CLOSED |  | FUEL POOL F/D A INL GRAB | CLOSED |  |
| FLUSH |  |
| Fuel Pool Vessel A Outlet | 1-FLV-043-0872 | OPEN |  | 1-SHV-043-0734 | OPEN |  |
| FP DEMIN A OUTLET | CLOSED |  | FUEL POOL F/D A OUTL GRAB | CLOSED |  |
| FLUSH |  |
| Fuel Pool Vessel B Inlet | 2-43-868    FP FILTER-DEMIN INLET PIPE B | OPEN |  | 2-43-730    RW FP DEMIN INFLUENT B GR | OPEN |  |
| CLOSED |  | CLOSED |  |
| FLUSH |  |
| Fuel Pool Vessel B Outlet | 2-43-873 | OPEN |  | 2-43-736 | OPEN |  |
| OUTLET FP FILTER-DEMIN B | CLOSED |  | RW FP DEMIN EFFLUENT B GR | CLOSED |  |
| FLUSH |  |
| Fuel Pool Vessel C Inlet | 3-43-869 | OPEN |  | 3-43-731 | OPEN |  |
| FP FILTER-DEMIN INLET PIPE C | CLOSED |  | RW FP DEMIN INFLUENT C GR | CLOSED |  |
| FLUSH |  |
| Fuel Pool Vessel C Outlet | 3-43-874 | OPEN |  | 3-43-738 | OPEN |  |
| OUTLET FP FILTER-DEMIN C | CLOSED |  | RW FP DEMIN EFFLUENT C GR | CLOSED |  |
| FLUSH |  |
| Fuel Pool Vessel D Inlet | 0-43-870 | OPEN |  | 0-43-732 | OPEN |  |
| FP FILTER-DEMIN INLET PIPE D | CLOSED |  | RW FP DEMIN INFLUENT D GR | CLOSED |  |
| FLUSH |  |
| Fuel Pool Vessel D Outlet | 0-43-875 | OPEN |  | 0-43-741 | OPEN |  |
| OUTLET FP FILTER-DEMIN D | CLOSED |  | RW FP DEMIN EFFLUENT D GR | CLOSED |  |
| FLUSH |  |

(1)Shaded “As-Found” indicates normal position

**NOTES**

1. Multiple selected samples may be flushed simultaneously for efficient use of time and dose considerations.
2. Flushing is accomplished via sample valve in either FLUSH or OPEN position.
3. Normal process when obtaining multiple selected samples with simultaneous flushing is to place first selected sample valve in OPEN and subsequent selected sample valves in FLUSH.
4. Flush times for sample valves placed in FLUSH are considered same as flush time for first selected sample placed in OPEN, to determine minimum flush volumes.
5. Placekeeping and documentation for Step 7.0[3.1] through Step 7.0[4] may be performed following exit from contaminated sampling station.
6. **PERFORM** the following for each selected sample: [3.1] **ENSURE** isolation valve is OPEN.

[3.2] **ENSURE** sample valve is Open.

[3.3] **ENSURE** minimum flush amount as indicated for selected sample:

* + Vessels A, B, D Inlets: 5 liters
  + Vessel C Inlet: 6 liters
  + Vessel A Outlet: 3.5 liters
  + Vessels B, C, D Outlets: 3 liters

[3.4] **IF** conductivity sample is to be obtained, **THEN**

**ENSURE** conductivity reading has stabilized before completing flush. [3.5] **OBTAIN** sample.

[3.6] **IF** isolation valve or sample valve is NOT to be restored to **As-Found**

position, **THEN**

**RECORD** reason. Otherwise, **MARK** N/A.

Reason for NOT returned to **As-Found**:

1. **RESTORE** all other valves to **As-Found** positions.
2. **RECORD** comments for any valve NOT restored to **As-Found** position in eSOMS.
3. **SUBMIT** Attachment 1, Radwaste Sample Panel Sampling, Section 7.0 to Chemistry Shift Coordinator or designee.

**Fuel Pool Demineralizer Precoat Resin Check**

**1.0 FUEL POOL DEMINERALIZER PRECOAT RESIN CHECK**

**NOTE**

Millipore Filter sampling location: 0-DOOR-260-0388, EVAPORATOR ROOM AND PRECOAT TANK PUMP ROOM, C-line, W-4, 565’, next to precoat tank

1. **NOTIFY** radwaste operator that assistance is required.
2. **OBTAIN** Radiation Protection (RP) assistance.
3. **RECORD** sample valve and isolation valve **As-Found** positions:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 2-1** | | | | | | |
| **Sample Point** | **Sample Valve** | **As-Found**(1) | | **Isolation Valve** | **As-Found**(1) | |
| **Name** | **Name** |
| Millipore Filter | 0-77-1356 | OPEN  | | 0-77-1084 | OPEN  | |
| MILLIPORE FILTER ISOL VLV | CLOSED |  | MILLIPORE FILTER ISOL | CLOSED |  |

(1)Shaded “As-Found” indicates normal position

1. **ENSURE** Millipore Filter support is removed prior to sampling.
2. **ENSURE** flexible tubing is attached to sample line.
3. **OPEN** 0-77-1084, MILLIPORE FILTER ISOL.
4. **OPEN** 0-77-1356, MILLIPORE FILTER ISOL VLV.
5. **FLUSH** minimum 3 liters into suitable container.

**NOTE**

Sample valve is cycled closed then opened following flush to minimize radiological spillage and contamination during transition between flush and sample collection.

1. **CLOSE** 0-77-1356, MILLIPORE FILTER ISOL VLV.

**1.0 FUEL POOL DEMINERALIZER PRECOAT RESIN CHECK**

**(continued)**

1. **PLACE** sample container in position for collection.
2. **OPEN** 0-77-1356, MILLIPORE FILTER ISOL VLV.
3. **OBTAIN** sample.
4. **CLOSE** 0-77-1356, MILLIPORE FILTER ISOL VLV.
5. **CLOSE** 0-77-1084, MILLIPORE FILTER ISOL.
6. **SUBMIT** Attachment 2, Fuel Pool Demineralizer Precoat Resin Check, to Chemistry Shift Coordinator or designee.

**Condensate Supply to Radwaste**

**1.0 CONDENSATE SUPPLY TO RADWASTE**

**NOTE**

Sampling location: Near radwaste precoat tank, W-1.5, 565’

1. **IF** desired for ease of flushing and sampling, **THEN**

**ENSURE** flexible tubing is attached to 02-6021, RT VLV. Otherwise, **MARK** N/A.

1. **OPEN** 0-2-6021, RT VLV.
2. **FLUSH** minimum 5 liters into suitable container.

**NOTE**

Sample valve is cycled closed then opened following flush to minimize radiological spillage and contamination during transition between flush and sample collection.

1. **CLOSE** 0-2-6021, RT VLV.
2. **PLACE** sample container in position for collection.
3. **OPEN** 0-2-6021, RT VLV.
4. **OBTAIN** sample.
5. **CLOSE** 0-2-6021, RT VLV.
6. **SUBMIT** Attachment 3, Condensate Supply to Radwaste, to Chemistry Shift Coordinator or designee.

**Condensate Phase Separator Sampling**

**1.0 CONDENSATE AND WASTE PHASE SEPARATOR SAMPLING**

**NOTES**

1. Sampling locations: A-G lines, W-1 / W-2, 565’.
2. Samples are obtained using Zebco.
3. **SELECT** Condensate & Waste phase separator(s) to be sampled:

|  |  |
| --- | --- |
| **Table 4-1** | |
| **Condensate & Waste Phase Separator** | **()** |
| BFN-0-SEP-077-1346, COND & WASTE PHASE SEPERATOR A |  |
| BFN-0-SEP-077-1347, COND & WASTE PHASE SEPERATOR B |  |
| BFN-0-SEP-077-1348, COND & WASTE PHASE SEPERATOR C |  |
| BFN-0-SEP-077-1349, COND & WASTE PHASE SEPERATOR D |  |
| BFN-0-SEP-077-1350, COND & WASTE PHASE SEPERATOR E |  |
| BFN-0-SEP-077-1351, COND & WASTE PHASE SEPERATOR F |  |

**WARNING**

High dose rates are possible during sampling. Dose rates in phase separator area should be monitored. Time, distance, shielding, and other ALARA practices are to be followed.

1. **NOTIFY** Radwaste Operator prior to sampling.
2. **ENSURE** Radiation Work Permit (RWP) monitoring requirements are followed during sampling.

**1.0 CONDENSATE AND WASTE PHASE SEPARATOR SAMPLING**

**(continued)**

1. **PERFORM** the following for each selected sample:

[4.1] **INSPECT** sampling area for presence of foreign material per NPG-SPP-06.5, Foreign Material Control.

[4.2] **OBTAIN** sample from top of phase separator.

[4.3] **ENSURE** NO foreign material remains in sampling area per NPG-SPP-06.5, Foreign Material Control.

1. **SUBMIT** Attachment 4, Condensate Phase Separator Sampling, to Chemistry Shift Coordinator or designee.

**Ultrex Sampling**

**1.0 ULTREX SAMPLING**

**NOTE**

1. Sampling location A train: W-3, D-line, El 578’
2. Placekeeping and documentation for this Attachment may be performed following exit from contaminated sampling station.
3. **RECORD** sample valve **As-Found** positions for desired sample point(s):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 1-7** | | | | | | |
| **Sample Point** | **Sample Valve** | **As-Found**(1) | | **Sample Valve** | **As-Left**(1) | |
| **Name** | **Name** |
| Polisher-2 Outlet | 0-DRIV-77-3173 | OPEN  | | 0-DRIV-77-3173 | OPEN  | |
| INSTR DR From 0-PIT-77-3173 | CLOSED |  | INSTR DR From 0-PIT-77-3173 | CLOSED |  |
|  | |
| Polisher-1 Outlet | 0-DRIV-77-3165 | OPEN  | | 0-DRIV-77-3165 | OPEN  | |
| INSTR DR from  0-PIT-77-3165 | CLOSED |  | INSTR DR from  0-PIT-77-3165 | CLOSED |  |
|  | |
| 2ND Pass Permeate | 0-DRIV-77-3149    2ND Pass to Permeate sample sink | OPEN  | | 0-DRIV-77-3149    2ND Pass to Permeate sample sink | OPEN  | |
| CLOSED |  | CLOSED |  |
|  | |
| Degassifier Outlet | 0-DRIV-77-3132 | OPEN  | | 0-DRIV-77-3132 | OPEN  | |
| INSTR DR from  0-PIT-77-3132 | CLOSED |  | INSTR DR from  0-PIT-77-3132 | CLOSED |  |
|  | |
| 1st Pass Permeate | 0-DRIV-77-3103C | OPEN  | | 0-DRIV-77-3103C | OPEN  | |
| Train A 1st Pass Permeate Sample | CLOSED |  | Train A 1st Pass Permeate Sample | CLOSED |  |
|  | |
| RO Recirc Filter Outlet | 0-DRIV-77-3082 | OPEN  | | 0-DRIV-77-3082 | OPEN  | |
| Train A RO Recirc Tank Outlet Sample | CLOSED |  | Train A RO Recirc Tank Outlet Sample | CLOSED |  |
|  | |
| RO Recirc tank Outlet | 0-DRIV-77-3066C | OPEN  | | 0-DRIV-77-3066C | OPEN  | |
| Train A RO Recirc Tank Sample | CLOSED |  | Train A RO Recirc Tank Sample | CLOSED |  |
|  | |

**1.0 ULTREX SAMPLING (continued)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table 1-7** | | | | | | |
| **Sample Point** | **Sample Valve** | **As-Found**(1) | | **Sample Valve** | **As-Left**(1) | |
| **Name** | **Name** |
| RO Pre-Filter Outlet | 0-DRIV-77-3054 | OPEN  | | 0-DRIV-77-3054 | OPEN  | |
| INSTR DR from  0-PIT-77-3054 | CLOSED |  | INSTR DR from  0-PIT-77-3054 | CLOSED |  |
|  | |
| GAC Filter Outlet | 0-DRIV-77-3045 | OPEN  | | 0-DRIV-77-3045 | OPEN  | |
| INSTR DR from  0-PIT-77-3045 | CLOSED |  | INSTR DR from  0-PIT-77-3045 | CLOSED |  |
|  | |
| Ozone Outlet | 0-DRIV-77-3037 | OPEN  | | 0-DRIV-77-3037 | OPEN  | |
| INSTR DR from  0-PIT-77-3037 | CLOSED |  | INSTR DR from  0-PIT-77-3037 | CLOSED |  |
|  | |
| Primary Filter Outlet | 0-DRIV-77-3018 | OPEN  | | 0-DRIV-77-3018 | OPEN  | |
| INSTR DR from  0-PIT-77-3018 | CLOSED |  | INSTR DR from  0-PIT-77-3018 | CLOSED |  |
|  | |
| System Inlet | 0-DRIV-77-3010 | OPEN  | | 0-DRIV-77-3010 | OPEN  | |
| INSTR DR from  0-PIT-77-3010 | CLOSED |  | INSTR DR from  0-PIT-77-3010 | CLOSED |  |
|  | |
| Condensate Rinse Water | 0-SHV-77-3009 | OPEN  | | 0-SHV-77-3009 | OPEN  | |
| Condensate Rinse Water | CLOSED |  | Condensate Rinse Water | CLOSED |  |
|  | |

(1)Shaded “As-Found” indicates normal position

1. **OPEN** sample valve.
2. **ENSURE** minimum flush volume of 1 liter.
3. **OBTAIN** sample.
4. **CLOSE** sample valve.
5. **IF** sample valve is NOT to be restored to **As-Found** position, **THEN RECORD** reason in Narrative Logs. Otherwise, **MARK** this step N/A.