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This quality assurance (QA) review is based upon an examination of the data generated from the analyses of the samples collected as part of the:

Data Verification was performed in accordance with the Tennessee Valley Authority Environmental Investigation Plan, John Sevier Fossil Plant (JSF EIP; Revision 3, October 2018). This review was performed with guidance from the National Functional Guidelines for Inorganic Data Review (US EPA, October 2004); the US EPA Region IV Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (November 2001); and the US EPA Region IV Data Validation Standard Operating Procedures. These validation guidance documents specifically address analyses performed in accordance with the Contract Laboratory Program (CLP) analytical methods and are not completely applicable to the type of analyses and analytical protocols performed for the US EPA Methods utilized by the laboratory for these samples. Environmental Standards, Inc. (Environmental Standards) used professional judgment to determine the usability of the analytical results and compliance relative to the US EPA Methods utilized by the laboratory. This QA review was performed on the data associated with Job Number:

**487575**

The findings offered in this report are based on a review of holding times and preservation, method blank results, chemical yield, field blank results, equipment blank results, laboratory control sample/laboratory control sample duplicate recoveries and precision, and/or laboratory and field duplicate precision.

The following results were qualified based on the data verification effort:

| Sample | Location | Sample Type | Method | Anayte | T/D | Result | Qual | Reason Code(s) | MDL | QL | Uncertainty | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JSF-GW-FB01-20190812 | JSF-110 | FB | CALC | Radium-226+228 | T | 0.0552 | U | S | | | 0.556 | PCI/L |
| JSF-GW-026-20190812 | JSF-110 | N | CALC | Radium-226+228 | T | 1.62 | J | S | | | 0.750 | PCI/L |
| JSF-GW-022-20190813 | JSF-106 | N | CALC | Radium-226+228 | T | 0.903 | J | S | | | 0.629 | PCI/L |
| JSF-GW-DUP01-20190813 | JSF-106 | FD | CALC | Radium-226+228 | T | 0.626 | U | S | | | 0.639 | PCI/L |
| JSF-GW-030-20190813 | JSF-209 | N | CALC | Radium-226+228 | T | 0.760 | U | S | | | 0.670 | PCI/L |

| **Data Qualifiers** | |
|---|---|
| U* | This result should be considered “not-detected” because it was detected in a rinsate blank or laboratory blank at a similar level. |
| UR | Unreliable reporting limit; analyte may or may not be present in sample. |
| R | Unreliable positive result; analyte may or may not be present in sample. |
| J | Quantitation is approximate due to limitations identified during data validation. |
| UJ | This analyte was not detected, but the reporting limit may or may not be higher due to a bias identified during data validation. |

| **Reason Codes and Explanations** | |
|---|---|
| BE | Equipment blank contamination. The result should be considered “not-detected.” |
| BF | Field blank contamination. The result should be considered “not-detected.” |
| BL | Laboratory blank contamination. The result should be considered “not-detected.” |
| FD | Field duplicate imprecision. |
| FG | Total versus Dissolved Imprecision. |
| H | Holding time exceeded. |
| L | LCS and LCSD recoveries outside of acceptance limits, indeterminate bias. |
| L+ | LCS and/or LCSD recoveries outside of acceptance limits. The result may be biased high. |
| L- | LCS and/or LCSD recoveries outside of acceptance limits. The result may be biased low. |
| LD | Laboratory duplicate imprecision. |
| LP | LCS/LCSD imprecision. |

| | |
|---|---|
| M | MS and MSD recoveries outside of acceptance limits, indeterminate bias. |
| M+ | MS and/or MSD recoveries outside of acceptance limits.  The result may be biased high. |
| M- | MS and/or MSD recoveries outside of acceptance limits.  The result may be biased low. |
| MP | MS/MSD imprecision. |
| Q | Chemical preservation issue. |
| S | Radium-226+228 flagged due to reporting protocol for combined results. |
| T | Temperature preservation issue. |
| X | Percent solids < 50%. |
| Y+ | Chemical yield outside of acceptance limits.  The result may be biased high. |
| Y- | Chemical yield outside of acceptance limits.  The result may be biased low. |

**TVA CCR Program**
**Facility: John Sevier Fossil Plant**
**SDG: 487575**

| | |
|---|---|
| **Lab Sample ID** | 487575001 |
| **Sys Sample Code** | JSF-GW-FB01-20190812 |
| **Sample Name** | JSF-GW-FB01-20190812 |
| **Sample Date** | 8/12/2019 3:50:00 PM |
| **Location** | JSF-110 |
| **Sample Type** | FB |
| **Parent Sample** | |

| Analytic Method | Chemical Name | CAS Rn | Fraction | Result Unit | Final Result | Final Qual | Reason code | Uncertainty | Final MDL | Final RL | Final QL | Final Detect | Final Report | DF | Basis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALC | Radium-226+228 | RA226/228 | T | PCI/L | 0.0552 | U | S | 0.556 | | | | N | Yes | 1 | NA |
| EPA 903.0 | Radium-226 | 13982-63-3 | T | PCI/L | 0.0552 | U | | 0.395 | 0.860 | 0.860 | 1.00 | N | Yes | 1 | NA |
| EPA 904.0 | Radium-228 | 15262-20-1 | T | PCI/L | -0.127 | U | | 0.392 | 0.748 | 0.748 | 1.00 | N | Yes | 1 | NA |

**TVA CCR Program**
**Facility: John Sevier Fossil Plant**
**SDG: 487575**

| | |
|---|---|
| **Lab Sample ID** | 487575002 |
| **Sys Sample Code** | JSF-GW-026-20190812 |
| **Sample Name** | JSF-GW-026-20190812 |
| **Sample Date** | 8/12/2019 4:05:00 PM |
| **Location** | JSF-110 |
| **Sample Type** | N |
| **Parent Sample** | |

| Analytic Method | Chemical Name | CAS Rn | Fraction | Result Unit | Final Result | Final Qual | Reason code | Uncertainty | Final MDL | Final RL | Final QL | Final Detect | Final Report | DF | Basis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALC | Radium-226+228 | RA226/228 | T | PCI/L | 1.62 | J | S | 0.750 | | | | Y | Yes | 1 | NA |
| EPA 903.0 | Radium-226 | 13982-63-3 | T | PCI/L | 0.692 | U | | 0.624 | 0.913 | 0.913 | 1.00 | N | Yes | 1 | NA |
| EPA 904.0 | Radium-228 | 15262-20-1 | T | PCI/L | 0.928 | | | 0.416 | 0.437 | 0.437 | 1.00 | Y | Yes | 1 | NA |

**TVA CCR Program**
**Facility: John Sevier Fossil Plant**
**SDG: 487575**

| | |
|---|---|
| **Lab Sample ID** | 487575003 |
| **Sys Sample Code** | JSF-GW-022-20190813 |
| **Sample Name** | JSF-GW-022-20190813 |
| **Sample Date** | 8/13/2019 8:20:00 AM |
| **Location** | JSF-106 |
| **Sample Type** | N |
| **Parent Sample** | |

| Analytic Method | Chemical Name | CAS Rn | Fraction | Result Unit | Final Result | Final Qual | Reason code | Uncertainty | Final MDL | Final RL | Final QL | Final Detect | Final Report | DF | Basis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALC | Radium-226+228 | RA226/228 | T | PCI/L | 0.903 | J | S | 0.629 | | | | Y | Yes | 1 | NA |
| EPA 903.0 | Radium-226 | 13982-63-3 | T | PCI/L | 0.895 | | | 0.598 | 0.665 | 0.665 | 1.00 | Y | Yes | 1 | NA |
| EPA 904.0 | Radium-228 | 15262-20-1 | T | PCI/L | 0.00814 | U | | 0.196 | 0.381 | 0.381 | 1.00 | N | Yes | 1 | NA |

**TVA CCR Program**
**Facility: John Sevier Fossil Plant**
**SDG: 487575**

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|---|---|
| **Lab Sample ID** | 487575004 |
| **Sys Sample Code** | JSF-GW-DUP01-20190813 |
| **Sample Name** | JSF-GW-DUP01-20190813 |
| **Sample Date** | 8/13/2019 12:00:00 AM |
| **Location** | JSF-106 |
| **Sample Type** | FD |
| **Parent Sample** | JSF-GW-022-20190813 |

| Analytic Method | Chemical Name | CAS Rn | Fraction | Result Unit | Final Result | Final Qual | Reason code | Uncertainty | Final MDL | Final RL | Final QL | Final Detect | Final Report | DF | Basis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALC | Radium-226+228 | RA226/228 | T | PCI/L | 0.626 | U | S | 0.639 | | | | N | Yes | 1 | NA |
| EPA 903.0 | Radium-226 | 13982-63-3 | T | PCI/L | 0.626 | U | | 0.565 | 0.827 | 0.827 | 1.00 | N | Yes | 1 | NA |
| EPA 904.0 | Radium-228 | 15262-20-1 | T | PCI/L | -0.0911 | U | | 0.297 | 0.578 | 0.578 | 1.00 | N | Yes | 1 | NA |

**TVA CCR Program**
**Facility: John Sevier Fossil Plant**
**SDG: 487575**

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|---|---|
| **Lab Sample ID** | 487575005 |
| **Sys Sample Code** | JSF-GW-027-20190813 |
| **Sample Name** | JSF-GW-027-20190813 |
| **Sample Date** | 8/13/2019 11:20:00 AM |
| **Location** | JSF-206 |
| **Sample Type** | N |
| **Parent Sample** | |

| Analytic Method | Chemical Name | CAS Rn | Fraction | Result Unit | Final Result | Final Qual | Reason code | Uncertainty | Final MDL | Final RL | Final QL | Final Detect | Final Report | DF | Basis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALC | Radium-226+228 | RA226/228 | T | PCI/L | 0.350 | U | | 0.514 | | | | N | Yes | 1 | NA |
| EPA 903.0 | Radium-226 | 13982-63-3 | T | PCI/L | 0.122 | U | | 0.450 | 0.925 | 0.925 | 1.00 | N | Yes | 1 | NA |
| EPA 904.0 | Radium-228 | 15262-20-1 | T | PCI/L | 0.228 | U | | 0.248 | 0.400 | 0.400 | 1.00 | N | Yes | 1 | NA |

**TVA CCR Program**
**Facility: John Sevier Fossil Plant**
**SDG: 487575**

| | |
|---|---|
| **Lab Sample ID** | 487575006 |
| **Sys Sample Code** | JSF-GW-030-20190813 |
| **Sample Name** | JSF-GW-030-20190813 |
| **Sample Date** | 8/13/2019 3:10:00 PM |
| **Location** | JSF-209 |
| **Sample Type** | N |
| **Parent Sample** | |

| Analytic Method | Chemical Name | CAS Rn | Fraction | Result Unit | Final Result | Final Qual | Reason code | Uncertainty | Final MDL | Final RL | Final QL | Final Detect | Final Report | DF | Basis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALC | Radium-226+228 | RA226/228 | T | PCI/L | 0.760 | U | S | 0.670 | | | | N | Yes | 1 | NA |
| EPA 903.0 | Radium-226 | 13982-63-3 | T | PCI/L | 0.760 | U | | 0.636 | 0.898 | 0.898 | 1.00 | N | Yes | 1 | NA |
| EPA 904.0 | Radium-228 | 15262-20-1 | T | PCI/L | -0.0948 | U | | 0.209 | 0.437 | 0.437 | 1.00 | N | Yes | 1 | NA |

**TVA CCR Program**
**Facility: John Sevier Fossil Plant**
**SDG: 487575**

| | |
|---|---|
| **Lab Sample ID** | 487575007 |
| **Sys Sample Code** | JSF-GW-FB02-20190813 |
| **Sample Name** | JSF-GW-FB02-20190813 |
| **Sample Date** | 8/13/2019 3:48:00 PM |
| **Location** | JSF-209 |
| **Sample Type** | FB |
| **Parent Sample** | |

| Analytic Method | Chemical Name | CAS Rn | Fraction | Result Unit | Final Result | Final Qual | Reason code | Uncertainty | Final MDL | Final RL | Final QL | Final Detect | Final Report | DF | Basis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CALC | Radium-226+228 | RA226/228 | T | PCI/L | 0.378 | U | | 0.497 | | | | N | Yes | 1 | NA |
| EPA 903.0 | Radium-226 | 13982-63-3 | T | PCI/L | 0.234 | U | | 0.435 | 0.810 | 0.810 | 1.00 | N | Yes | 1 | NA |
| EPA 904.0 | Radium-228 | 15262-20-1 | T | PCI/L | 0.144 | U | | 0.240 | 0.415 | 0.415 | 1.00 | N | Yes | 1 | NA |