

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:

Watts Barr Fish

Data Verification was performed in accordance with the Tennessee Valley Authority . 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, SW-846, and Standard 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, SW-846, and Standard Methods utilized by the laboratory. This QA review was performed on the data associated with Job Number:

40197419

The findings offered in this report are based on a review of holding times and preservation, method blank results, field blank results, filter blank results, equipment blank results, tubing blank results, matrix spike/matrix spike duplicate recoveries and precision, laboratory control sample/laboratory control sample duplicate recoveries and precision, laboratory and field duplicate precision, total and dissolved results comparisons, and/or positive results between the method detection limit and quantitation limit.

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

Sample	Location	Sample Type	Method	Analyte	T/D	Result	Qual	Reason Code(s)	MDL	QL	Unit
WBF-FH-RS-TRA-F-20190521	WBF-TRA	N	SW-846 6020A	Barium	T	0.061	J	RL	0.031	0.10	MG/KG
WBF-FH-RS-TRA-F-20190521	WBF-TRA	N	SW-846 6020A	Cadmium	T	0.028	J	RL	0.011	0.10	MG/KG
WBF-FH-RS-TRA-F-20190521	WBF-TRA	N	SW-846 6020A	Calcium	T	442	J	FD,M,MP	25.4	84.7	MG/KG
WBF-FH-RS-TRA-F-20190521	WBF-TRA	N	SW-846 6020A	Copper	T	0.48	J	RL	0.28	0.95	MG/KG
WBF-FH-RS-TRA-F-20190521	WBF-TRA	N	SW-846 6020A	Strontium	T	0.17	J	RL	0.16	0.54	MG/KG
WBF-FH-RS-TRA-F-20190521	WBF-TRA	N	SW-846 7473	Mercury	T	0.029	J	M+	0.0071	0.024	MG/KG
WBF-FH-RS-TRD-F-20190521	WBF-TRD	N	SW-846 6020A	Arsenic	T	0.062	J	RL	0.028	0.094	MG/KG
WBF-FH-RS-TRD-F-20190521	WBF-TRD	N	SW-846 6020A	Calcium	T	211	J	M,MP	23.8	79.3	MG/KG
WBF-FH-RS-TRD-F-20190521	WBF-TRD	N	SW-846 7473	Mercury	T	0.083	J	M+	0.0076	0.025	MG/KG
WBF-FH-RS-TRU-F-20190430	WBF-TRU	N	SW-846 6020A	Calcium	T	776	J	FD,M,MP	22.9	76.4	MG/KG
WBF-FH-RS-TRU-F-20190430	WBF-TRU	N	SW-846 7473	Mercury	T	0.060	J	M+	0.0071	0.024	MG/KG
WBF-FH-RS-F-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Calcium	T	148	J	FD,M,MP	22.9	76.3	MG/KG
WBF-FH-RS-F-DUP01-20190515	WBF-TRA	FD	SW-846 7473	Mercury	T	0.057	J	M+	0.0071	0.024	MG/KG
WBF-FH-RS-F-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Barium	T	0.037	J	RL	0.029	0.095	MG/KG
WBF-FH-RS-F-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Calcium	T	346	J	M,MP	24.1	80.5	MG/KG
WBF-FH-RS-F-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Chromium	T	0.11	J	RL	0.084	0.28	MG/KG
WBF-FH-RS-F-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Copper	T	0.35	J	RL	0.27	0.90	MG/KG
WBF-FH-RS-F-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Strontium	T	0.20	J	RL	0.15	0.51	MG/KG
WBF-FH-RS-F-DUP02-20190521	WBF-TRD	FD	SW-846 7473	Mercury	T	0.087	J	M+	0.0073	0.024	MG/KG
WBF-FH-RS-F-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Barium	T	0.043	J	RL	0.029	0.095	MG/KG
WBF-FH-RS-F-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Calcium	T	337	J	FD,M,MP	24.2	80.6	MG/KG

Sample	Location	Sample Type	Method	Anayte	T/D	Result	Qual	Reason Code(s)	MDL	QL	Unit
WBF-FH-RS-F-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Strontium	T	0.19	J	RL	0.15	0.51	MG/KG
WBF-FH-RS-F-DUP03-20190430	WBF-TRU	FD	SW-846 7473	Mercury	T	0.053	J	M+	0.0073	0.024	MG/KG
WBF-FH-RS-TRA-O-20190521	WBF-TRA	N	SW-846 6020A	Arsenic	T	0.22	J	FD	0.028	0.092	MG/KG
WBF-FH-RS-TRA-O-20190521	WBF-TRA	N	SW-846 6020A	Barium	T	0.35	J	FD	0.028	0.092	MG/KG
WBF-FH-RS-TRA-O-20190521	WBF-TRA	N	SW-846 6020A	Calcium	T	173	J	M,MP	23.3	77.5	MG/KG
WBF-FH-RS-TRA-O-20190521	WBF-TRA	N	SW-846 6020A	Cobalt	T	0.035	J	RL	0.017	0.092	MG/KG
WBF-FH-RS-TRA-O-20190521	WBF-TRA	N	SW-846 6020A	Molybdenum	T	0.039	J	RL	0.033	0.11	MG/KG
WBF-FH-RS-TRA-O-20190521	WBF-TRA	N	SW-846 6020A	Strontium	T	0.22	J	RL	0.15	0.49	MG/KG
WBF-FH-RS-TRA-O-20190521	WBF-TRA	N	SW-846 6020A	Vanadium	T	0.038	J	RL	0.030	0.10	MG/KG
WBF-FH-RS-TRD-O-20190521	WBF-TRD	N	SW-846 6020A	Arsenic	T	0.14	J	FD	0.030	0.10	MG/KG
WBF-FH-RS-TRD-O-20190521	WBF-TRD	N	SW-846 6020A	Calcium	T	197	J	FD,M,MP	25.3	84.3	MG/KG
WBF-FH-RS-TRD-O-20190521	WBF-TRD	N	SW-846 6020A	Cobalt	T	0.045	J	RL	0.019	0.10	MG/KG
WBF-FH-RS-TRD-O-20190521	WBF-TRD	N	SW-846 6020A	Molybdenum	T	0.044	J	RL	0.036	0.12	MG/KG
WBF-FH-RS-TRD-O-20190521	WBF-TRD	N	SW-846 6020A	Nickel	T	0.041	J	RL	0.041	0.14	MG/KG
WBF-FH-RS-TRD-O-20190521	WBF-TRD	N	SW-846 6020A	Strontium	T	0.19	J	FD	0.16	0.54	MG/KG
WBF-FH-RS-TRD-O-20190521	WBF-TRD	N	SW-846 6020A	Vanadium	T	0.053	J	RL	0.033	0.11	MG/KG
WBF-FH-RS-TRD-O-20190521	WBF-TRD	N	SW-846 7473	Mercury	T	0.0080	J	M+	0.0072	0.024	MG/KG
WBF-FH-RS-TRU-O-20190430	WBF-TRU	N	SW-846 6020A	Calcium	T	160	J	M,MP	24.6	82.0	MG/KG
WBF-FH-RS-TRU-O-20190430	WBF-TRU	N	SW-846 6020A	Cobalt	T	0.031	J	RL	0.018	0.097	MG/KG
WBF-FH-RS-TRU-O-20190430	WBF-TRU	N	SW-846 6020A	Molybdenum	T	0.060	J	RL	0.035	0.12	MG/KG
WBF-FH-RS-TRU-O-20190430	WBF-TRU	N	SW-846 6020A	Strontium	T	0.22	J	RL	0.16	0.52	MG/KG
WBF-FH-RS-TRU-O-20190430	WBF-TRU	N	SW-846 6020A	Vanadium	T	0.070	J	RL	0.032	0.11	MG/KG
WBF-FH-RS-O-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Arsenic	T	0.71	J	FD	0.030	0.099	MG/KG
WBF-FH-RS-O-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Barium	T	0.15	J	FD	0.030	0.099	MG/KG
WBF-FH-RS-O-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Calcium	T	137	J	M,MP	25.1	83.7	MG/KG
WBF-FH-RS-O-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Cobalt	T	0.033	J	RL	0.019	0.099	MG/KG
WBF-FH-RS-O-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Molybdenum	T	0.041	J	RL	0.035	0.12	MG/KG
WBF-FH-RS-O-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Strontium	T	0.21	J	RL	0.16	0.53	MG/KG
WBF-FH-RS-O-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Vanadium	T	0.078	J	RL	0.033	0.11	MG/KG
WBF-FH-RS-O-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Arsenic	T	0.52	J	FD	0.029	0.095	MG/KG
WBF-FH-RS-O-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Calcium	T	1990	J	FD,M,MP	24.2	80.8	MG/KG
WBF-FH-RS-O-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Cobalt	T	0.049	J	RL	0.018	0.095	MG/KG
WBF-FH-RS-O-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Copper	T	0.89	J	RL	0.27	0.91	MG/KG
WBF-FH-RS-O-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Molybdenum	T	0.049	J	RL	0.034	0.11	MG/KG
WBF-FH-RS-O-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Strontium	T	1.4	J	FD	0.15	0.52	MG/KG
WBF-FH-RS-O-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Calcium	T	104	J	M,MP	22.7	75.7	MG/KG

Sample	Location	Sample Type	Method	Anayte	T/D	Result	Qual	Reason Code(s)	MDL	QL	Unit
WBF-FH-RS-O-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Cobalt	T	0.031	J	RL	0.017	0.089	MG/KG
WBF-FH-RS-O-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Molybdenum	T	0.053	J	RL	0.032	0.11	MG/KG
WBF-FH-RS-O-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Strontium	T	0.16	J	RL	0.14	0.48	MG/KG
WBF-FH-RS-O-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Vanadium	T	0.051	J	RL	0.030	0.098	MG/KG
WBF-FH-RS-TRA-L-20190521	WBF-TRA	N	SW-846 6020A	Calcium	T	73.3	J	M,MP	23.1	77.0	MG/KG
WBF-FH-RS-TRA-L-20190521	WBF-TRA	N	SW-846 6020A	Copper	T	4.4	J	FD	0.26	0.86	MG/KG
WBF-FH-RS-TRA-L-20190521	WBF-TRA	N	SW-846 6020A	Nickel	T	0.058	J	RL	0.037	0.13	MG/KG
WBF-FH-RS-TRA-L-20190521	WBF-TRA	N	SW-846 6020A	Selenium	T	2.1	J	FD	0.046	0.15	MG/KG
WBF-FH-RS-TRA-L-20190521	WBF-TRA	N	SW-846 6020A	Thallium	T	0.017	J	RL	0.012	0.091	MG/KG
WBF-FH-RS-TRA-L-20190521	WBF-TRA	N	SW-846 6020A	Vanadium	T	0.41	J	FD	0.030	0.10	MG/KG
WBF-FH-RS-TRA-L-20190521	WBF-TRA	N	SW-846 7473	Mercury	T	0.081	J	M+	0.0072	0.024	MG/KG
WBF-FH-RS-TRD-L-20190521	WBF-TRD	N	SW-846 6020A	Arsenic	T	0.42	J	FD	0.028	0.093	MG/KG
WBF-FH-RS-TRD-L-20190521	WBF-TRD	N	SW-846 6020A	Calcium	T	87.2	J	M,MP	23.6	78.8	MG/KG
WBF-FH-RS-TRD-L-20190521	WBF-TRD	N	SW-846 6020A	Nickel	T	0.050	J	RL	0.038	0.13	MG/KG
WBF-FH-RS-TRD-L-20190521	WBF-TRD	N	SW-846 6020A	Vanadium	T	0.24	J	FD	0.031	0.10	MG/KG
WBF-FH-RS-TRD-L-20190521	WBF-TRD	N	SW-846 7473	Mercury	T	0.14	J	FD,M+	0.0071	0.024	MG/KG
WBF-FH-RS-TRU-L-20190430	WBF-TRU	N	SW-846 6020A	Cadmium	T	0.023	J	RL	0.011	0.096	MG/KG
WBF-FH-RS-TRU-L-20190430	WBF-TRU	N	SW-846 6020A	Calcium	T	89.0	J	M,MP	24.4	81.2	MG/KG
WBF-FH-RS-TRU-L-20190430	WBF-TRU	N	SW-846 7473	Mercury	T	0.045	J	M+	0.0073	0.024	MG/KG
WBF-FH-RS-L-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Cadmium	T	0.061	J	RL	0.010	0.091	MG/KG
WBF-FH-RS-L-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Calcium	T	78.1	J	M,MP	23.1	77.1	MG/KG
WBF-FH-RS-L-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Copper	T	1.8	J	FD	0.26	0.87	MG/KG
WBF-FH-RS-L-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Nickel	T	0.048	J	RL	0.037	0.13	MG/KG
WBF-FH-RS-L-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Selenium	T	1.2	J	FD	0.046	0.15	MG/KG
WBF-FH-RS-L-DUP01-20190515	WBF-TRA	FD	SW-846 6020A	Vanadium	T	0.69	J	FD	0.030	0.10	MG/KG
WBF-FH-RS-L-DUP01-20190515	WBF-TRA	FD	SW-846 7473	Mercury	T	0.034	J	M+	0.0070	0.023	MG/KG
WBF-FH-RS-L-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Arsenic	T	0.72	J	FD	0.028	0.092	MG/KG
WBF-FH-RS-L-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Calcium	T	82.6	J	M,MP	23.3	77.8	MG/KG
WBF-FH-RS-L-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Nickel	T	0.069	J	RL	0.038	0.13	MG/KG
WBF-FH-RS-L-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Thallium	T	0.012	J	RL	0.012	0.092	MG/KG
WBF-FH-RS-L-DUP02-20190521	WBF-TRD	FD	SW-846 6020A	Vanadium	T	1.2	J	FD	0.031	0.10	MG/KG
WBF-FH-RS-L-DUP02-20190521	WBF-TRD	FD	SW-846 7473	Mercury	T	0.052	J	FD,M+	0.0070	0.023	MG/KG
WBF-FH-RS-L-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Cadmium	T	0.019	J	RL	0.010	0.093	MG/KG
WBF-FH-RS-L-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Calcium	T	54.7	J	M,MP	23.5	78.4	MG/KG
WBF-FH-RS-L-DUP03-20190430	WBF-TRU	FD	SW-846 6020A	Thallium	T	0.013	J	RL	0.012	0.093	MG/KG
WBF-FH-RS-L-DUP03-20190430	WBF-TRU	FD	SW-846 7473	Mercury	T	0.029	J	M+	0.0073	0.024	MG/KG

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.
RL	Reported Results between the MDL and RL.
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.