

## Total Selected Metals - EPA Method 29 Results

---

Client: ORRCO  
 Location: Klamath Falls, OR  
 Source: Auxiliary Boiler  
 Date: Aug. 25 & 26, 2020  
 Project No.: 2020.2232

### Three Run Average

<u>Analyte</u>	<u>ug/dscm</u>	<u>lbs/hr</u>	<u>lbs/1000 gal.</u>
Aluminum (Al)	38.979	9.91E-05	6.60E-03
Antimony (Sb)	<0.556	<1.41E-06	<9.40E-05
Arsenic (As)	<0.717	<1.82E-06	<1.21E-04
Beryllium (Be)	<0.021	<5.23E-08	<3.48E-06
Cadmium (Cd)	<0.099	<2.58E-07	<1.70E-05
Chromium (Cr)	<2.339	<6.17E-06	<4.07E-04
Cobalt (Co)	<0.051	<1.30E-07	<8.65E-06
Copper (Cu)	3.403	8.64E-06	5.75E-04
Lead (Pb)	<15.049	<3.82E-05	<2.55E-03
Manganese (Mn)	1.767	4.51E-06	3.00E-04
Mercury (Hg)	<0.133	<3.37E-07	<2.25E-05
Nickel (Ni)	<0.388	<9.82E-07	<6.55E-05
Phosphorus (P)	166.379	4.22E-04	2.81E-02
Selenium (Se)	<1.582	<4.01E-06	<2.67E-04
Vanadium(V)	<0.102	<2.60E-07	<1.73E-05
Zinc (Zn)	16.999	4.32E-05	2.87E-03
<b>Total Selected Metals:</b>	<b>&lt;248.564</b>	<b>&lt;6.32E-04</b>	<b>&lt;4.21E-02</b>

Note: Analytes which were below analytical detection limits and/or blank corrections resulted in a negative value are flagged as a less than value "<".

Selected Metal results were calculated according to ODEQ guidance, which requires that individual metals (or sample fractions) that are below method detection limits be considered present at detection limit for reporting purposes.

## Total Selected Metals - EPA Method 29 Results

---

Client: ORRCO  
 Location: Klamath Falls, OR  
 Source: Auxiliary Boiler  
 Date: Aug. 25, 2020  
 Project No.: 2020.2232

### Test Run: #1

Sample Time:  
 Start: 10:32  
 End: 13:43

Volume Sampled: 114.421 Vmstd  
 3.240 m3

Exhaust Rate: 671 dscfm

Fuel Firing Rate: 0.0150 1000 gal/hr

<u>Analyte</u>	<u>ug/sample</u>	<u>ug/dscfm</u>	<u>lbs/hr</u>	<u>lbs/1000 gal.</u>
Aluminum (Al)	132.3	40.816	1.03E-04	6.87E-03
Antimony (Sb)	<2.24	<0.692	<1.74E-06	<1.16E-04
Arsenic (As)	<2.541	<0.784	<1.97E-06	<1.32E-04
Beryllium (Be)	<0.073	<0.023	<5.67E-08	<3.79E-06
Cadmium (Cd)	<0.133	<0.041	<1.03E-07	<6.90E-06
Chromium (Cr)	<2.28	<0.703	<1.77E-06	<1.18E-04
Cobalt (Co)	<0.181	<0.056	<1.40E-07	<9.40E-06
Copper (Cu)	13.18	4.067	1.02E-05	6.84E-04
Lead (Pb)	<49.6	<15.296	<3.85E-05	<2.57E-03
Manganese (Mn)	5.51	1.700	4.28E-06	2.86E-04
Mercury (Hg)	<0.450	<0.139	<3.49E-07	<2.33E-05
Nickel (Ni)	<2.22	<0.685	<1.72E-06	<1.15E-04
Phosphorus (P)	559.6	172.678	4.34E-04	2.90E-02
Selenium (Se)	<5.45	<1.682	<4.23E-06	<2.83E-04
Vanadium(V)	<0.363	<0.112	<2.82E-07	<1.88E-05
Zinc (Zn)	60.70	18.733	4.71E-05	3.15E-03
<b>Run #1 Total Selected Metals:</b>		<b>&lt;258.205</b>	<b>&lt;6.49E-04</b>	<b>&lt;4.34E-02</b>

**Note:** Analytes which were below analytical detection limits and/or blank corrections resulted in a negative value are flagged as a less than value "<".

Selected Metal results were calculated according to ODEQ guidance, which requires that individual metals (or sample fractions) that are below method detection limits be considered present at detection limit for reporting purposes.

## Selected Metals - EPA Method 29 Results

---

*Client:* ORRCO  
*Location:* Klamath Falls, OR  
*Source:* Auxiliary Boiler  
*Date:* Aug. 25, 2020  
*Project No.:* 2020.2232

**Test Run: #2**

Sample Time:  
 Start: 16:00  
 End: 19:32

Volume Sampled: 135.377 Vmstd  
 3.834 m3

Exhaust Rate: 713 dscfm

Fuel Firing Rate: 0.0152 1000 gal/hr

<u>Analyte</u>	<u>Total ug</u>	<u>ug/dscfm</u>	<u>lbs/hr</u>	<u>lbs/1000 gal.</u>
Aluminum (Al)	146.3	38.152	1.02E-04	6.71E-03
Antimony (Sb)	<1.79	<0.467	<1.25E-06	<8.21E-05
Arsenic (As)	<2.506	<0.654	<1.75E-06	<1.15E-04
Beryllium (Be)	<0.072	<0.019	<5.02E-08	<3.30E-06
Cadmium (Cd)	<0.752	<0.196	<5.24E-07	<3.45E-05
Chromium (Cr)	21.86	5.702	1.52E-05	1.00E-03
Cobalt (Co)	<0.179	<0.047	<1.25E-07	<8.21E-06
Copper (Cu)	11.36	2.963	7.92E-06	5.21E-04
Lead (Pb)	<55.7	<14.539	<3.89E-05	<2.56E-03
Manganese (Mn)	7.61	1.984	5.30E-06	3.49E-04
Mercury (Hg)	<0.493	<0.128	<3.43E-07	<2.26E-05
Nickel (Ni)	0.94	0.245	6.55E-07	4.31E-05
Phosphorus (P)	600.7	156.679	4.19E-04	2.76E-02
Selenium (Se)	<5.37	<1.401	<3.74E-06	<2.46E-04
Vanadium(V)	<0.358	<0.093	<2.50E-07	<1.64E-05
Zinc (Zn)	59.90	15.624	4.18E-05	2.75E-03
<u>Run #2 Total Selected Metals:</u>		<b>&lt;238.892</b>	<b>&lt;6.38E-04</b>	<b>&lt;4.20E-02</b>

**Note:** Analytes which were below analytical detection limits and/or blank corrections resulted in a negative value are flagged as a less than value "<".

Selected Metal results were calculated according to ODEQ guidance, which requires that individual metals (or sample fractions) that are below method detection limits be considered present at detection limit for reporting purposes.

## Total Selected Metals - EPA Method 29 Results

---

*Client:* ORRCO  
*Location:* Klamath Falls, OR  
*Source:* Auxiliary Boiler  
*Date:* Aug. 26, 2020  
*Project No.:* 2020.2232

**Test Run: #3**

Sample Time:

Start: 10:13

End: 13:45

Volume Sampled: 123.930 Vmstd  
3.510 m3

Exhaust Rate: 652 dscfm

Fuel Firing Rate: 0.0149 1000 gal/hr

<u>Analyte</u>	<u>Total uG</u>	<u>ug/dscm</u>	<u>lbs/hr</u>	<u>lbs/1000 gal.</u>
Aluminum (Al)	133.3	37.970	9.27E-05	6.22E-03
Antimony (Sb)	<1.79	<0.510	<1.24E-06	<8.36E-05
Arsenic (As)	<2.506	<0.714	<1.74E-06	<1.17E-04
Beryllium (Be)	<0.072	<0.021	<5.01E-08	<3.36E-06
Cadmium (Cd)	<0.209	<0.060	<1.45E-07	<9.76E-06
Chromium (Cr)	<2.15	<0.613	<1.50E-06	<1.00E-04
Cobalt (Co)	<0.179	<0.051	<1.24E-07	<8.36E-06
Copper (Cu)	11.16	3.180	7.76E-06	5.21E-04
Lead (Pb)	<53.7	<15.312	<3.74E-05	<2.51E-03
Manganese (Mn)	5.68	1.617	3.95E-06	2.65E-04
Mercury (Hg)	<0.460	<0.131	<3.20E-07	<2.15E-05
Nickel (Ni)	0.82	0.233	5.68E-07	3.81E-05
Phosphorus (P)	595.9	169.779	4.14E-04	2.78E-02
Selenium (Se)	<5.84	<1.664	<4.06E-06	<2.73E-04
Vanadium(V)	<0.358	<0.102	<2.49E-07	<1.67E-05
Zinc (Zn)	58.40	16.640	4.06E-05	2.73E-03
<u>Run #3 Total Selected Metals:</u>		<b>&lt;248.595</b>	<b>&lt;6.07E-04</b>	<b>&lt;4.07E-02</b>

*Note:* Analytes which were below analytical detection limits and/or blank corrections resulted in a negative value are flagged as a less than value "<".

Selected Metal results were calculated according to ODEQ guidance, which requires that individual metals (or sample fractions) that are below method detection limits be considered present at detection limit for reporting purposes.





EPA Method 29 Laboratory Results

ORRC

Klamath Falls, OR  
 Auxiliary Boiler  
 Aug. 25 & 26, 2020  
 Project Number: 2020.2232

Run #3 Sample Sample Description Front-half, PIN & Filler (Container #1 & #3) Sample ID: 2020.2232.M29.13&.14	Aluminum Results, ug 111.0	Antimony Results, ug DL 1.25 1.25	Arsenic Results, ug DL 1.750 1.750	Beryllium Results, ug DL 0.050 0.050	Cadmium Results, ug 0.678	Chromium Results, ug 1.32	Cobalt Results, ug DL 0.125	Copper Results, ug 9.44	Lead Results, ug 53.2	Manganese Results, ug 7.26	Mercury Results, ug DL 0.0219	Nickel Results, ug 3.80	Phosphorus Results, ug 536.00	Selenium Results, ug DL 3.75	Vanadium Results, ug DL 0.250	Zinc Results, ug 56.10
# Lab Result is Detection Limit (DL)																
Detection Limit	111.0	1.25	1.750	0.050	0.678	1.32	0.125	9.44	53.2	7.26	0.0219	3.80	536.00	3.75	0.250	56.10
Front-half, Result	99.3	1.25	1.750	0.050	0.166	-0.42	0.125	9.44	53.2	5.57	N/A	0.70	525.30	3.75	0.250	53.06
Front-half, Less Blank	99.3	1.25	1.750	0.050	0.166	1.32	0.125	9.44	53.2	5.57	0.0219	0.70	525.30	3.75	0.250	53.06
Front-half, Total	99.3	1.25	1.750	0.050	0.166	1.32	0.125	9.44	53.2	5.57	0.0219	0.70	525.30	3.75	0.250	53.06
Back-half, Imp #1, #2, #3 (Container #4) Sample ID: 2020.2232.M29.15	35.8	DL 0.540	DL 0.756	DL 0.022	DL 0.043	0.832	DL 0.054	1.720	DL 0.540	0.528	0.219	0.721	74.3	2.09	DL 0.108	5.710
# Lab Result is Detection Limit (DL)																
Detection Limit	35.8	0.540	0.756	0.022	0.043	0.832	0.054	1.720	0.540	0.528	0.219	0.721	74.3	2.09	0.108	5.710
Back-half, CH4 Result	34.0	0.540	0.756	0.022	0.043	-0.168	0.054	1.720	0.540	0.105	N/A	0.117	70.6	2.09	0.108	5.343
Back-half, CH4 Total	34.0	0.540	0.756	0.022	0.043	-0.168	0.054	1.720	0.540	0.105	0.219	0.117	70.6	2.09	0.108	5.343
Back-half, Imp #4 KO (Container #5g) Sample ID: 2020.2232.M29.16																
# Lab Result is Detection Limit (DL)																
Detection Limit																
Back-half, CH5g Result																
Back-half, Imp #5&#6; KMnO4 (Container #5b) Sample ID: 2020.2232.M29.17																
# Lab Result is Detection Limit (DL)																
Detection Limit																
Back-half, CH5b Result																
Back-half, HOI Rinse (Container #5c) Sample ID: 2020.2232.M29.18																
# Lab Result is Detection Limit (DL)																
Detection Limit																
Back-half, CH5c Result																
DL Check	No	DL	DL	DL	DL	No	DL	No	DL	No	DL	No	No	DL	DL	No
Negative Result Check	Blank Done	No	No	No	No	Negative	No	Blank Done	No	Blank Done	No	Blank Done	Blank Done	No	No	Blank Done
Run #3 Total, ug:	133.3	<1.79	<2.506	<0.072	<0.209	<2.15	<0.179	11.16	<53.7	5.68	<0.460	0.82	595.9	<5.84	<0.358	58.40

**EPA Method 29 Laboratory Results**

**ORRCO**

Klamath Falls, OR  
 Auxiliary Boiler  
 Aug. 25 & 26, 2020  
 Project Number: 2020.2232

Blank Correction Sample Description	Aluminum Results, ug	Antimony Results, ug	Arsenic Results, ug	Beryllium Results, ug	Cadmium Results, ug	Chromium Results, ug	Cobalt Results, ug	Copper Results, ug	Lead Results, ug	Manganese Results, ug	Mercury Results, ug	Nickel Results, ug	Phosphorus Results, ug	Selenium Results, ug	Vanadium Results, ug	Zinc Results, ug
Front-half (Container #12; Filter Blank) Sample ID: 2020.2232.M29.24 0.1 N HNO <sub>3</sub> , Blank Vol 300ml	94.7				0.712	1.74				1.69		3.10	10.70			3.04
Back-half (Container #8A; 0.1N HNO <sub>3</sub> , Blank) Sample ID: 2020.2232.M29.19 HNO <sub>3</sub> /H <sub>2</sub> O <sub>2</sub> , Blank Vol 200ml (Container #9) Sample ID: 2020.2232.M29.21	13.2					1.94				0.181		0.604	22.50			0.367
Front-half (Container #12; Filter Blank) Sample ID: 2020.2232.M29.24 0.1 N HNO <sub>3</sub> , Blank Vol 300ml	94.7				0.712	1.74				1.69		3.10	10.70			3.04
Back-half (Container #8A; 0.1N HNO <sub>3</sub> , Blank) Sample ID: 2020.2232.M29.19 HNO <sub>3</sub> /H <sub>2</sub> O <sub>2</sub> , Blank Vol 200ml (Container #9) Sample ID: 2020.2232.M29.21	13.2					1.94				0.181		0.604	22.50			0.367
Blank Total, ug	107.9				0.712	4.34				2.11		3.70	33.20			3.41

NOTE: Blank corrections were made using the Filter Blanks, HNO<sub>3</sub> and HNO<sub>3</sub>/H<sub>2</sub>O<sub>2</sub> Reagent Blank.