# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012293 Rev. 0

## LUMINA COPPER S.A.C.

EL DERBY 055, TORRE 1, PISO 6 - SURCO

ENV / MO-350619-027

PROCEDENCIA : EL GALENO

Fecha de Recepción SGS : 05-08-2020

Fecha de Ejecución : Del 05-08-2020 al 17-08-2020

Muestreo Realizado Por : Personal de Operaciones de SGS

| Estación de Muestreo |
|---|
| M29 |
| M27 |
| DC-1 |

**Emitido por SGS del Perú S.A.C.**

**Impreso el 17/08/2020**

**Jade C. Huarcaya Soto**
**C.B.P. 8471**
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Este documento es válido solo en entorno electrónico, de imprimirse pierde validez.



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Miembro del Grupo SGS

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012293 Rev. 0

| IDENTIFICACIÓN DE MUESTRA | | | | | M29 | M27 |
|---|---|---|---|---|---|---|
| FECHA DE MUESTREO | | | | | 9231690N / 794787E<br>04/08/2020 | 9229721N / 795919E<br>04/08/2020 |
| HORA DE MUESTREO | | | | | 10:15:00 | 12:50:00 |
| CATEGORIA | | | | | AGUA NATURAL | AGUA NATURAL |
| SUB CATEGORIA | | | | | AGUA SUPERFICIAL | AGUA SUPERFICIAL |
| **Parámetro** | **Referencia** | **Unidad** | **LD** | **LC** | **Resultado ± Incertidumbre** | **Resultado ± Incertidumbre** |
| **Análisis de Campo** | | | | | | |
| Turbidez | EW_APHA2130B_OPE | NTU | 0.10 | 0.20 | 1.46 ± 0.17 | 0.32 ± 0.06 |
| Conductividad | EW_APHA2510B_OPE | µS/cm | -- | -- | 256.00 ± 30.72 | 108.80 ± 13.06 |
| Temperatura | EW_APHA2550B | °C | -- | -- | 15.20 ± 0.55 | 16.40 ± 0.55 |
| Potencial de Hidrógeno. | EW_APHA4500HB_OPE | pH | -- | -- | 8.19 ± 0.06 | 3.67 ± 0.07 |
| Oxígeno Disuelto. | EW_ASTMD888 | mg/L | -- | -- | 7.79 ± 0.93 | 6.47 ± 0.78 |
| **Análisis Fisicoquímicos** | | | | | | |
| Clorofila A | EW_APHA10200H | mg/L | 0.001 | 0.003 | <0.003 | <0.003 |
| Color Verdadero | EW_APHA2120C_DIS_CX | UC | 0.4 | 1.0 | <1.0 | <1.0 |
| Turbidez | EW_APHA2130B_CX | NTU | 0.1 | 0.2 | 0.7 ± 0.1 | 0.5 ± 0.1 |
| Alcalinidad Total | EW_APHA2320B_CX | mgCaCO3/L | 0.5 | 1.0 | 121.5 ± 30.4 | <1.0 |
| Conductividad | EW_APHA2510B_CX | µS/cm | -- | -- | 257.6 ± 51.5 | 115.3 ± 23.1 |
| Sólidos Totales Disueltos | EW_APHA2540C_CX | mg Sólidos Totales Disueltos/L | 1 | 3 | 145 ± 29 | 65 ± 13 |
| Sólidos Totales en Suspensión | EW_APHA2540D_CX | mg Sólidos Totales en Suspensión/L | 1 | 3 | <3 | <3 |
| Cromo Hexavalente Total | EW_APHA3500CRB_CX | mgCr/L | 0.001 | 0.003 | <0.003 | <0.003 |
| Potencial de Hidrógeno | EW_APHA4500HB_CX | pH | -- | -- | 8.29 * ± 2.49 | 3.63 * ± 1.09 |
| Amoníaco | EW_APHA4500NH3D_CX | mg NH3/L | 0.005 | 0.012 | 0.113 ± 0.023 | 0.041 ± 0.008 |
| Nitrógeno Total | EW_APHA4500PJ | mg N/L | 0.04 | 0.10 | 0.26 ± 0.02 | 0.11 ± 0.01 |
| Fósforo Total | EW_APHA4500PJF | mg P/L | 0.005 | 0.010 | 0.017 ± 0.004 | 0.026 ± 0.006 |
| Sulfuro | EW_APHA4500S2D_CX | mgS2-/L | 0.001 | 0.002 | <0.002 | <0.002 |
| Demanda Bioquímica de Oxígeno | EW_APHA5210B_CX | mg/L | 1.0 | 2.6 | <2.6 | <2.6 |
| Aceites y Grasas | EW_ASTMD3921 | mg/L | 0.2 | 0.4 | <0.4 | <0.4 |
| Cianuro Libre | EW_ASTMD7237_CX | mg/L | 0.0003 | 0.0008 | <0.0008 | <0.0008 |
| Fenoles | EW_EPA420_2_4 | mg/L | 0.0002 | 0.0005 | <0.0005 | <0.0005 |
| **Aniones** | | | | | | |
| Bromuro | EW_EPA300_0 | mg/L | 0.013 | 0.042 | <0.042 | <0.042 |
| Cloruro | EW_EPA300_0_CX | mg/L | 0.025 | 0.050 | 0.651 ± 0.189 | 0.061 ± 0.018 |
| Fluoruro | EW_EPA300_0_CX | mg/L | 0.002 | 0.004 | 0.004 ± 0.001 | <0.004 |
| Fosfato | EW_EPA300_0_CX | mg/L | 0.019 | 0.038 | <0.038 | <0.038 |
| Nitrato | EW_EPA300_0_CX | mg/L | 0.018 | 0.062 | 0.093 ± 0.019 | <0.062 |
| Nitrato (como N) | EW_EPA300_0_CX | mg/L | 0.004 | 0.014 | 0.021 ± 0.004 | <0.014 |
| Nitrito | EW_EPA300_0_CX | mg/L | 0.003 | 0.006 | <0.006 | <0.006 |
| Nitrito (como N) | EW_EPA300_0_CX | mg/L | 0.001 | 0.002 | <0.002 | <0.002 |
| Sulfato | EW_EPA300_0_CX | mg/L | 0.01 | 0.03 | 9.55 ± 2.01 | 10.95 ± 2.30 |
| **Análisis Microbiológicos** | | | | | | |
| Numeración de Coliformes Fecales o Termotolerantes | EW_APHA9221E_NMP_CX | NMP/100 mL | -- | -- | <1.8 | <1.8 |
| **Metales Disueltos** | | | | | | |
| Aluminio Disuelto | EW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 | 1.423 ± 0.398 |
| Antimonio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00004 | 0.00013 | <0.00013 | <0.00013 |
| Arsénico Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 | <0.00010 |
| Bario Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | 0.0066 ± 0.0014 | 0.0172 ± 0.0036 |
| Berilio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 | <0.00006 |
| Bismuto Disuelto | EW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 | <0.00003 |
| Boro Disuelto | EW_EPA200_8_DIS | mg/L | 0.002 | 0.006 | <0.006 | <0.006 |
| Cadmio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 | <0.00003 |
| Calcio Disuelto | EW_EPA200_8_DIS | mg/L | 0.003 | 0.009 | 40.062 ± 0.959 | 0.926 ± 0.072 |
| Cerio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00008 | 0.00024 | <0.00024 | <0.00024 |
| Cesio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 | 0.0004 ± 0.0001 |
| Cobalto Disuelto | EW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 | 0.00111 ± 0.00031 |
| Cobre Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 | <0.00009 |
| Cromo Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 | <0.0003 |
| Estaño Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 | <0.00010 |
| Estroncio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | 0.1430 ± 0.0329 | 0.0059 ± 0.0014 |
| Fósforo Disuelto | EW_EPA200_8_DIS | mg/L | 0.015 | 0.047 | <0.047 | <0.047 |
| Galio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00004 | 0.00012 | <0.00012 | <0.00012 |
| Germanio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 | <0.0006 |
| Hafnio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00005 | 0.00015 | <0.00015 | <0.00015 |
| Hierro Disuelto | EW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | 0.0105 ± 0.0016 | 0.7008 ± 0.1051 |
| Lantano Disuelto | EW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 | <0.0015 |
| Litio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 | 0.0010 ± 0.0003 |
| Lutecio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 | <0.00006 |
| Magnesio Disuelto | EW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | 2.837 ± 0.709 | 0.253 ± 0.063 |
| Manganeso Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 | 0.03576 ± 0.00966 |
| Mercurio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 | <0.00009 |
| Molibdeno Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 | <0.00006 |
| Niobio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 | <0.0015 |
| Niquel Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 | 0.0013 ± 0.0003 |

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Ernesto Gunther 275 Parque Industrial Arequipa t (054) 213 506 e Pe.servicios@sgs.com
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| CATEGORIA | | | | | AGUA NATURAL | AGUA NATURAL |
| SUB CATEGORIA | | | | | AGUA SUPERFICIAL | AGUA SUPERFICIAL |
| **Parámetro** | **Referencia** | **Unidad** | **LD** | **LC** | **Resultado ± Incertidumbre** | **Resultado ± Incertidumbre** |
| Plata Disuelto | EW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 | <0.000010 |
| Plomo Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 | 0.0077 ± 0.0018 |
| Potasio Disuelto | EW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | 0.21 ± 0.05 | 0.49 ± 0.11 |
| Rubidio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0003 | 0.0009 | <0.0009 | 0.0017 ± 0.0004 |
| Selenio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | <0.0013 | <0.0013 |
| Silice Disuelto | EW_EPA200_8_DIS | mg/L | 0.09 | 0.27 | 3.36 * ± 0.39 | 5.05 * ± 0.27 |
| Silicio Disuelto | EW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | 1.57 ± 0.36 | 2.36 ± 0.54 |
| Sodio Disuelto | EW_EPA200_8_DIS | mg/L | 0.006 | 0.019 | 0.827 ± 0.174 | 0.195 ± 0.041 |
| **Metales Disueltos** | | | | | | |
| Talio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 | 0.00028 ± 0.00006 |
| Tantalio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0007 | 0.0021 | <0.0021 | <0.0021 |
| Teluro Disuelto | EW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 | <0.003 |
| Thorio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00006 | 0.00019 | <0.00019 | <0.00019 |
| Titanio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | 0.0010 ± 0.0002 | <0.0006 |
| Uranio Disuelto | EW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | 0.000082 ± 0.000017 | <0.000010 |
| Vanadio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 | <0.0003 |
| Wolframio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 | <0.0006 |
| Yterbio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 | <0.00006 |
| Zinc Disuelto | EW_EPA200_8_DIS | mg/L | 0.0008 | 0.0026 | <0.0026 | 0.0655 ± 0.0124 |
| Zirconio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00015 | 0.00045 | <0.00045 | <0.00045 |
| **Metales Totales** | | | | | | |
| Aluminio Total | EW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 | 1.460 ± 0.409 |
| Antimonio Total | EW_EPA200_8 | mg/L | 0.00004 | 0.00013 | <0.00013 | <0.00013 |
| Arsénico Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 | 0.00201 ± 0.00042 |
| Bario Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | 0.0070 ± 0.0015 | 0.0176 ± 0.0037 |
| Berilio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 | <0.00006 |
| Bismuto Total | EW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 | <0.00003 |
| Boro Total | EW_EPA200_8 | mg/L | 0.002 | 0.006 | <0.006 | <0.006 |
| Cadmio Total | EW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 | <0.00003 |
| Calcio Total | EW_EPA200_8 | mg/L | 0.003 | 0.009 | 46.966 ± 12.211 | 0.966 ± 0.251 |
| Cerio Total | EW_EPA200_8 | mg/L | 0.00008 | 0.00024 | <0.00024 | <0.00024 |
| Cesio Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 | 0.0005 ± 0.0001 |
| Cobalto Total | EW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 | 0.00111 ± 0.00031 |
| Cobre Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 | <0.00009 |
| Cromo Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 | <0.0003 |
| Estaño Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 | <0.00010 |
| Estroncio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | 0.1796 ± 0.0413 | 0.0061 ± 0.0014 |
| Fósforo Total | EW_EPA200_8 | mg/L | 0.015 | 0.047 | <0.047 | <0.047 |
| Galio Total | EW_EPA200_8 | mg/L | 0.00004 | 0.00012 | <0.00012 | <0.00012 |
| Germanio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 | <0.0006 |
| Hafnio Total | EW_EPA200_8 | mg/L | 0.00005 | 0.00015 | <0.00015 | <0.00015 |
| Hierro Total | EW_EPA200_8 | mg/L | 0.0004 | 0.0013 | 0.0163 ± 0.0037 | 0.9765 ± 0.2246 |
| Lantano Total | EW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 | <0.0015 |
| Litio Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 | 0.0011 ± 0.0003 |
| Lutecio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 | <0.00006 |
| Magnesio Total | EW_EPA200_8 | mg/L | 0.001 | 0.003 | 3.056 ± 0.764 | 0.265 ± 0.066 |
| Manganeso Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 | 0.03605 ± 0.00973 |
| Mercurio Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 | <0.00009 |
| Molibdeno Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 | <0.00006 |
| Niobio Total | EW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 | <0.0015 |
| Niquel Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 | 0.0014 ± 0.0003 |
| Plata Total | EW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 | <0.000010 |
| Plomo Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | 0.0009 ± 0.0002 | 0.0078 ± 0.0018 |
| Potasio Total | EW_EPA200_8 | mg/L | 0.04 | 0.13 | 0.29 ± 0.07 | 0.54 ± 0.12 |
| Rubidio Total | EW_EPA200_8 | mg/L | 0.0003 | 0.0009 | <0.0009 | 0.0018 ± 0.0004 |
| Selenio Total | EW_EPA200_8 | mg/L | 0.0004 | 0.0013 | <0.0013 | <0.0013 |
| Silice Total | EW_EPA200_8 | mg/L | 0.09 | 0.27 | 4.44 * ± 1.02 | 5.52 * ± 1.27 |
| Silicio Total | EW_EPA200_8 | mg/L | 0.04 | 0.13 | 2.08 ± 0.48 | 2.58 ± 0.59 |
| Sodio Total | EW_EPA200_8 | mg/L | 0.006 | 0.019 | 1.014 ± 0.213 | 0.206 ± 0.043 |
| Talio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 | 0.00037 ± 0.00009 |
| Tantalio Total | EW_EPA200_8 | mg/L | 0.0007 | 0.0021 | <0.0021 | <0.0021 |
| Teluro Total | EW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 | <0.003 |
| Thorio Total | EW_EPA200_8 | mg/L | 0.00006 | 0.00019 | <0.00019 | <0.00019 |
| Titanio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | 0.0010 ± 0.0002 | <0.0006 |
| Uranio Total | EW_EPA200_8 | mg/L | 0.000003 | 0.000010 | 0.000134 ± 0.000028 | <0.000010 |
| Vanadio Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 | <0.0003 |
| Wolframio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 | <0.0006 |
| Yterbio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 | <0.00006 |
| Zinc Total | EW_EPA200_8 | mg/L | 0.0008 | 0.0026 | 0.0033 ± 0.0006 | 0.0657 ± 0.0125 |
| Zirconio Total | EW_EPA200_8 | mg/L | 0.00015 | 0.00045 | <0.00045 | <0.00045 |

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Jr. Arnaldo Márquez Ba. San Antonio Cajamarca t (076) 366 092

Miembro del Grupo SGS

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# MA2012293 Rev. 0

| IDENTIFICACIÓN DE MUESTRA | DC-1 |
|---|---|
| FECHA DE MUESTREO | 04/08/2020 |
| HORA DE MUESTREO | 12:50:00 |
| CATEGORIA | AGUA NATURAL |
| SUB CATEGORIA | AGUA SUPERFICIAL |

| Parámetro | Referencia | Unidad | LD | LC | Resultado ± Incertidumbre |
|---|---|---|---|---|---|
| **Análisis de Campo** | | | | | |
| Turbidez | EW_APHA2130B_OPE | NTU | 0.10 | 0.20 | 0.35 ± 0.07 |
| Conductividad | EW_APHA2510B_OPE | µS/cm | -- | -- | 110.90 ± 13.31 |
| Temperatura | EW_APHA2550B | °C | -- | -- | 15.90 ± 0.55 |
| Potencial de Hidrógeno. | EW_APHA4500HB_OPE | pH | -- | -- | 3.67 ± 0.07 |
| Oxígeno Disuelto. | EW_ASTMD888 | mg/L | -- | -- | 6.46 ± 0.78 |
| **Análisis Fisicoquímicos** | | | | | |
| Clorofila A | EW_APHA10200H | mg/L | 0.001 | 0.003 | <0.003 |
| Color Verdadero | EW_APHA2120C_DIS_CX | UC | 0.4 | 1.0 | <1.0 |
| Turbidez | EW_APHA2130B_CX | NTU | 0.1 | 0.2 | 0.7 ± 0.1 |
| Alcalinidad Total | EW_APHA2320B_CX | mgCaCO3/L | 0.5 | 1.0 | <1.0 |
| Conductividad | EW_APHA2510B_CX | µS/cm | -- | -- | 113.0 ± 22.6 |
| Sólidos Totales Disueltos | EW_APHA2540C_CX | mg Sólidos Totales Disueltos/L | 1 | 3 | 65 ± 13 |
| Sólidos Totales en Suspensión | EW_APHA2540D_CX | mg Sólidos Totales en Suspensión/L | 1 | 3 | <3 |
| Cromo Hexavalente Total | EW_APHA3500CRB_CX | mgCr/L | 0.001 | 0.003 | <0.003 |
| Potencial de Hidrógeno | EW_APHA4500HB_CX | pH | -- | -- | 3.61 * ± 1.08 |
| Amoníaco | EW_APHA4500NH3D_CX | mg NH3/L | 0.005 | 0.012 | 0.044 ± 0.009 |
| Nitrógeno Total | EW_APHA4500PJ | mg N/L | 0.04 | 0.10 | 0.23 ± 0.02 |
| Fósforo Total | EW_APHA4500PJF | mg P/L | 0.005 | 0.010 | 0.026 ± 0.006 |
| Sulfuro | EW_APHA4500S2D_CX | mgS2-/L | 0.001 | 0.002 | <0.002 |
| Demanda Bioquímica de Oxígeno | EW_APHA5210B_CX | mg/L | 1.0 | 2.6 | <2.6 |
| Aceites y Grasas | EW_ASTMD3921 | mg/L | 0.2 | 0.4 | <0.4 |
| Cianuro Libre | EW_ASTMD7237_CX | mg/L | 0.0003 | 0.0008 | <0.0008 |
| Fenoles | EW_EPA420_2_4 | mg/L | 0.0002 | 0.0005 | <0.0005 |
| **Aniones** | | | | | |
| Bromuro | EW_EPA300_0 | mg/L | 0.013 | 0.042 | <0.042 |
| Cloruro | EW_EPA300_0_CX | mg/L | 0.025 | 0.050 | 0.053 ± 0.015 |
| Fluoruro | EW_EPA300_0_CX | mg/L | 0.002 | 0.004 | 0.009 ± 0.002 |
| Fosfato | EW_EPA300_0_CX | mg/L | 0.019 | 0.038 | <0.038 |
| Nitrato | EW_EPA300_0_CX | mg/L | 0.018 | 0.062 | <0.062 |
| Nitrato (como N) | EW_EPA300_0_CX | mg/L | 0.004 | 0.014 | <0.014 |
| Nitrito | EW_EPA300_0_CX | mg/L | 0.003 | 0.006 | <0.006 |
| Nitrito (como N) | EW_EPA300_0_CX | mg/L | 0.001 | 0.002 | <0.002 |
| Sulfato | EW_EPA300_0_CX | mg/L | 0.01 | 0.03 | 10.78 ± 2.26 |
| **Análisis Microbiológicos** | | | | | |
| Numeración de Coliformes Fecales o Termotolerantes | EW_APHA9221E_NMP_CX | NMP/100 mL | -- | -- | <1.8 |
| **Metales Disueltos** | | | | | |
| Aluminio Disuelto | EW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | 1.289 ± 0.361 |
| Antimonio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00004 | 0.00013 | <0.00013 |
| Arsénico Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | 0.00185 ± 0.00039 |
| Bario Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | 0.0161 ± 0.0034 |
| Berilio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Bismuto Disuelto | EW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Boro Disuelto | EW_EPA200_8_DIS | mg/L | 0.002 | 0.006 | <0.006 |
| Cadmio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Calcio Disuelto | EW_EPA200_8_DIS | mg/L | 0.003 | 0.009 | 0.971 ± 0.076 |
| Cerio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00008 | 0.00024 | <0.00024 |
| Cesio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | 0.0004 ± 0.0001 |
| Cobalto Disuelto | EW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | 0.00076 ± 0.00021 |
| Cobre Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Cromo Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Estaño Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Estroncio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | 0.0054 ± 0.0012 |
| Fósforo Disuelto | EW_EPA200_8_DIS | mg/L | 0.015 | 0.047 | <0.047 |
| Galio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00004 | 0.00012 | <0.00012 |
| Germanio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Hafnio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00005 | 0.00015 | <0.00015 |
| Hierro Disuelto | EW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | 0.6288 ± 0.0943 |
| Lantano Disuelto | EW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Litio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | 0.0010 ± 0.0003 |
| Lutecio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Magnesio Disuelto | EW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | 0.201 ± 0.050 |
| Manganeso Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | 0.03563 ± 0.00962 |
| Mercurio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Molibdeno Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Niobio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Niquel Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | 0.0010 ± 0.0002 |

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# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012293 Rev. 0

| IDENTIFICACIÓN DE MUESTRA | DC-1 |
|---|---|
| FECHA DE MUESTREO | 04/08/2020 |
| HORA DE MUESTREO | 12:50:00 |
| CATEGORIA | AGUA NATURAL |
| SUB CATEGORIA | AGUA SUPERFICIAL |

| Parámetro | Referencia | Unidad | LD | LC | Resultado ± Incertidumbre |
|---|---|---|---|---|---|
| Plata Disuelto | EW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Plomo Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | 0.0066 ± 0.0015 |
| Potasio Disuelto | EW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | 0.51 ± 0.12 |
| Rubidio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0003 | 0.0009 | 0.0016 ± 0.0003 |
| Selenio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Silice Disuelto | EW_EPA200_8_DIS | mg/L | 0.09 | 0.27 | 5.23 * ± 0.27 |
| Silicio Disuelto | EW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | 2.44 ± 0.56 |
| Sodio Disuelto | EW_EPA200_8_DIS | mg/L | 0.006 | 0.019 | 0.357 ± 0.075 |
| Talio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | 0.00030 ± 0.00007 |
| Tantalio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0007 | 0.0021 | <0.0021 |
| Teluro Disuelto | EW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Thorio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00006 | 0.00019 | <0.00019 |
| Titanio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Uranio Disuelto | EW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 |
| **Metales Disueltos** | | | | | |
| Vanadio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Wolframio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Yterbio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Zinc Disuelto | EW_EPA200_8_DIS | mg/L | 0.0008 | 0.0026 | 0.0661 ± 0.0126 |
| Zirconio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00015 | 0.00045 | <0.00045 |
| **Metales Totales** | | | | | |
| Aluminio Total | EW_EPA200_8 | mg/L | 0.001 | 0.003 | 1.350 ± 0.378 |
| Antimonio Total | EW_EPA200_8 | mg/L | 0.00004 | 0.00013 | <0.00013 |
| Arsénico Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00010 | 0.00246 ± 0.00052 |
| Bario Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | 0.0170 ± 0.0036 |
| Berilio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Bismuto Total | EW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Boro Total | EW_EPA200_8 | mg/L | 0.002 | 0.006 | <0.006 |
| Cadmio Total | EW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Calcio Total | EW_EPA200_8 | mg/L | 0.003 | 0.009 | 0.979 ± 0.255 |
| Cerio Total | EW_EPA200_8 | mg/L | 0.00008 | 0.00024 | <0.00024 |
| Cesio Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | 0.0005 ± 0.0001 |
| Cobalto Total | EW_EPA200_8 | mg/L | 0.00001 | 0.00003 | 0.00090 ± 0.00025 |
| Cobre Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Cromo Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Estaño Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Estroncio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | 0.0061 ± 0.0014 |
| Fósforo Total | EW_EPA200_8 | mg/L | 0.015 | 0.047 | <0.047 |
| Galio Total | EW_EPA200_8 | mg/L | 0.00004 | 0.00012 | <0.00012 |
| Germanio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Hafnio Total | EW_EPA200_8 | mg/L | 0.00005 | 0.00015 | <0.00015 |
| Hierro Total | EW_EPA200_8 | mg/L | 0.0004 | 0.0013 | 0.9602 ± 0.2208 |
| Lantano Total | EW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Litio Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | 0.0010 ± 0.0003 |
| Lutecio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Magnesio Total | EW_EPA200_8 | mg/L | 0.001 | 0.003 | 0.206 ± 0.052 |
| Manganeso Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00010 | 0.03618 ± 0.00977 |
| Mercurio Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Molibdeno Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Niobio Total | EW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Niquel Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | 0.0010 ± 0.0002 |
| Plata Total | EW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Plomo Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | 0.0080 ± 0.0018 |
| Potasio Total | EW_EPA200_8 | mg/L | 0.04 | 0.13 | 0.54 ± 0.12 |
| Rubidio Total | EW_EPA200_8 | mg/L | 0.0003 | 0.0009 | 0.0018 ± 0.0004 |
| Selenio Total | EW_EPA200_8 | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Silice Total | EW_EPA200_8 | mg/L | 0.09 | 0.27 | 5.33 * ± 1.23 |
| Silicio Total | EW_EPA200_8 | mg/L | 0.04 | 0.13 | 2.49 ± 0.57 |
| Sodio Total | EW_EPA200_8 | mg/L | 0.006 | 0.019 | 0.363 ± 0.076 |
| Talio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | 0.00035 ± 0.00008 |
| Tantalio Total | EW_EPA200_8 | mg/L | 0.0007 | 0.0021 | <0.0021 |
| Teluro Total | EW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Thorio Total | EW_EPA200_8 | mg/L | 0.00006 | 0.00019 | <0.00019 |
| Titanio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Uranio Total | EW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Vanadio Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Wolframio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Yterbio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Zinc Total | EW_EPA200_8 | mg/L | 0.0008 | 0.0026 | 0.0715 ± 0.0136 |
| Zirconio Total | EW_EPA200_8 | mg/L | 0.00015 | 0.00045 | <0.00045 |

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Notas:
El reporte de tiempo se realiza en el sistema horario de 24 horas.
Las muestras recibidas cumplen con las condiciones necesarias para la realización de los análisis solicitados.
En el caso de análisis de campo la fecha de ejecución del mismo corresponde a la fecha de muestreo.
(*) Los resultados obtenidos corresponden a métodos que no han sido acreditados por el INACAL-DA.



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## INFORME DE ENSAYO CON VALOR OFICIAL
## MA2012293 Rev. 0

# CONTROL DE CALIDAD

**LC:** Limite de cuantificación
**MB:** Blanco del proceso.
**LCS %Recovery:** Porcentaje de recuperación del patrón de proceso.
**MS %Recovery:** Porcentaje de recuperación de la muestra adicionada.
**MSD %RPD:** Diferencia Porcentual Relativa entre los duplicados de la muestra adicionada.
**Dup %RPD:** Diferencia Porcentual Relativa entre los duplicados del proceso.

| Parámetro | Unidad | LC | MB | DUP %RPD | LCS %Recovery | MS %Recovery | MSD %RPD |
|---|---|---|---|---|---|---|---|
| Alcalinidad Total | mgCaCO3/L | 1.0 | <1.0 | 0% | 99% | | |
| Color Verdadero | UC | 1.0 | <1.0 | 0% | 99% | | |
| Conductividad | µS/cm | -- | | 0% | 100 - 101% | | |
| Turbidez | NTU | 0.2 | | 0% | NA | | |
| Cromo Hexavalente Total | mgCr/L | 0.003 | <0.003 | | 91 - 104% | 104 - 105% | 0 - 4% |
| Demanda Bioquímica de Oxígeno | mg/L | 2.6 | <2.6 | 5 - 6% | 96 - 99% | | |
| Fenoles | mg/L | 0.0005 | <0.0005 | | 97% | 94% | 2% |
| Aluminio Total | mg/L | 0.003 | <0.003 | 5% | 91 - 108% | 106% | 1% |
| Antimonio Total | mg/L | 0.00013 | <0.00013 | 0% | 95 - 97% | 94% | 0% |
| Arsénico Total | mg/L | 0.00010 | <0.00010 | 0% | 95 - 102% | 103% | 0% |
| Bario Total | mg/L | 0.0003 | <0.0003 | 3% | 91 - 93% | 92% | 0% |
| Berilio Total | mg/L | 0.00006 | <0.00006 | 0% | 102 - 103% | 102% | 0% |
| Bismuto Total | mg/L | 0.00003 | <0.00003 | 0% | 96 - 97% | 94% | 3% |
| Boro Total | mg/L | 0.006 | <0.006 | 1% | 95 - 100% | 99% | 0% |
| Cadmio Total | mg/L | 0.00003 | <0.00003 | 0% | 97 - 102% | 97% | 1% |
| Calcio Total | mg/L | 0.009 | <0.009 | 2% | 97 - 99% | 100% | 0% |
| Cerio Total | mg/L | 0.00024 | <0.00024 | 0% | 102 - 123% | 101% | 1% |
| Cesio Total | mg/L | 0.0003 | <0.0003 | 2% | 96 - 97% | 95% | 0% |
| Cobalto Total | mg/L | 0.00003 | <0.00003 | 3% | 91 - 93% | 99% | 0% |
| Cobre Total | mg/L | 0.00009 | <0.00009 | 0% | 96 - 98% | 98% | 0% |
| Cromo Total | mg/L | 0.0003 | <0.0003 | 0% | 97 - 98% | 97% | 3% |
| Estaño Total | mg/L | 0.00010 | <0.00010 | 0% | 92 - 102% | 92% | 2% |
| Estroncio Total | mg/L | 0.0006 | <0.0006 | 2% | 107 - 108% | 91% | 0% |
| Fósforo Total | mg/L | 0.047 | <0.047 | 0% | 100 - 102% | 101% | 0% |
| Galio Total | mg/L | 0.00012 | <0.00012 | 1% | 91 - 95% | 100% | 0% |
| Germanio Total | mg/L | 0.0006 | <0.0006 | 0% | 92 - 97% | 98% | 0% |
| Hafnio Total | mg/L | 0.00015 | <0.00015 | 0% | 95% | 102% | 0% |
| Hierro Total | mg/L | 0.0013 | <0.0013 | 0% | 96 - 101% | 100% | 0% |
| Lantano Total | mg/L | 0.0015 | <0.0015 | 0% | 98 - 103% | 97% | 0% |
| Litio Total | mg/L | 0.0003 | <0.0003 | 2% | 93 - 106% | 104% | 3% |
| Lutecio Total | mg/L | 0.00006 | <0.00006 | 0% | 92 - 97% | 95% | 0% |
| Magnesio Total | mg/L | 0.003 | <0.003 | 2% | 99 - 101% | 99% | 0% |
| Manganeso Total | mg/L | 0.00010 | <0.00010 | 4% | 100% | 101% | 0% |
| Mercurio Total | mg/L | 0.00009 | <0.00009 | 0% | 101 - 106% | 102% | 0% |
| Molibdeno Total | mg/L | 0.00006 | <0.00006 | 0% | 95 - 97% | 94% | 1% |
| Niobio Total | mg/L | 0.0015 | <0.0015 | 0% | 100 - 107% | 99% | 1% |
| Niquel Total | mg/L | 0.0006 | <0.0006 | 4% | 95% | 102% | 0% |
| Plata Total | mg/L | 0.000010 | <0.000010 | 0% | 94 - 98% | 92% | 0% |
| Plomo Total | mg/L | 0.0006 | <0.0006 | 0% | 94 - 101% | 98% | 3% |
| Potasio Total | mg/L | 0.13 | <0.13 | 2% | 98 - 102% | 98% | 0% |
| Rubidio Total | mg/L | 0.0009 | <0.0009 | 3% | 99 - 105% | 91% | 0% |
| Selenio Total | mg/L | 0.0013 | <0.0013 | 0% | 99 - 102% | 98% | 1% |
| Silice Total | mg/L | 0.27 | <0.27 | 2% | 96% | 98% | 0% |
| Silicio Total | mg/L | 0.13 | <0.13 | 2% | 96 - 105% | 98% | 0% |
| Sodio Total | mg/L | 0.019 | <0.019 | 0% | 101 - 103% | 101% | 0% |
| Talio Total | mg/L | 0.00006 | <0.00006 | 0% | 95 - 99% | 95% | 1% |
| Tantalio Total | mg/L | 0.0021 | <0.0021 | 0% | 100 - 101% | 100% | 0% |
| Teluro Total | mg/L | 0.003 | <0.003 | 0% | 102% | 101% | 0% |
| Thorio Total | mg/L | 0.00019 | <0.00019 | 0% | 97 - 100% | 96% | 0% |
| Titanio Total | mg/L | 0.0006 | <0.0006 | 2% | 93 - 97% | 94% | 0% |
| Uranio Total | mg/L | 0.000010 | <0.000010 | 0% | 99 - 102% | 99% | 0% |
| Vanadio Total | mg/L | 0.0003 | <0.0003 | 0% | 101 - 102% | 106% | 9% |
| Wolframio Total | mg/L | 0.0006 | <0.0006 | 0% | 92 - 98% | 91% | 0% |
| Yterbio Total | mg/L | 0.00006 | <0.00006 | 0% | 100 - 101% | 100% | 0% |
| Zinc Total | mg/L | 0.0026 | <0.0026 | 1% | 98 - 99% | 96% | 4% |
| Zirconio Total | mg/L | 0.00045 | <0.00045 | 0% | 104 - 106% | 95% | 4% |
| Sulfuro | mgS2-/L | 0.002 | <0.002 | | 97% | 103% | 1% |
| Aceites y Grasas | mg/L | 0.4 | <0.4 | 0% | 93% | 86% | |
| Cloruro | mg/L | 0.050 | <0.050 | | 103% | 101% | 0% |
| Fluoruro | mg/L | 0.004 | <0.004 | | 97% | 97% | 0% |
| Fosfato | mg/L | 0.038 | <0.038 | | 97% | 100% | 0% |
| Nitrato | mg/L | 0.062 | <0.062 | | 99% | 99% | 0% |
| Nitrato (como N) | mg/L | 0.014 | <0.014 | | 99% | 99% | 0% |
| Nitrito | mg/L | 0.006 | <0.006 | | 96% | 97% | 0% |
| Nitrito (como N) | mg/L | 0.002 | <0.002 | | 96% | 97% | 0% |
| Sulfato | mg/L | 0.03 | <0.03 | | 102% | 100% | 0% |
| Fósforo Total | mg P/L | 0.010 | <0.010 | | 93% | 90% | 2% |

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# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012293 Rev. 0

## CONTROL DE CALIDAD

**LC:** Limite de cuantificación
**MB:** Blanco del proceso.
**LCS %Recovery:** Porcentaje de recuperación del patrón de proceso.
**MS %Recovery:** Porcentaje de recuperación de la muestra adicionada.
**MSD %RPD:** Diferencia Porcentual Relativa entre los duplicados de la muestra adicionada.
**Dup %RPD:** Diferencia Porcentual Relativa entre los duplicados del proceso.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Aluminio Disuelto | mg/L | 0.003 | <0.003 | 0% | 91 - 108% | 100% | 0% |
| Antimonio Disuelto | mg/L | 0.00013 | <0.00013 | 0% | 95% | 94% | 0% |
| Arsénico Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 91 - 102% | 93% | 2% |
| Bario Disuelto | mg/L | 0.0003 | <0.0003 | 1% | 93 - 96% | 101% | 0% |
| Berilio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 93% | 99% | 5% |
| Bismuto Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 102 - 103% | 96% | 4% |
| Boro Disuelto | mg/L | 0.006 | <0.006 | 1% | 95 - 102% | 107% | 1% |

| Parámetro | Unidad | LC | MB | DUP %RPD | LCS %Recovery | MS %Recovery | MSD %RPD |
|---|---|---|---|---|---|---|---|
| Cadmio Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 95 - 101% | 95% | 0% |
| Calcio Disuelto | mg/L | 0.009 | <0.009 | 1% | 99 - 100% | 100% | 0% |
| Cerio Disuelto | mg/L | 0.00024 | <0.00024 | 0% | 99 - 106% | 104% | 0% |
| Cesio Disuelto | mg/L | 0.0003 | <0.0003 | 1% | 98 - 100% | 92% | 3% |
| Cobalto Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 100 - 104% | 95% | 2% |
| Cobre Disuelto | mg/L | 0.00009 | <0.00009 | 0% | 95 - 105% | 92% | 3% |
| Cromo Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 95 - 105% | 102% | 7% |
| Estaño Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 98 - 103% | 96% | 2% |
| Estroncio Disuelto | mg/L | 0.0006 | <0.0006 | 1% | 100 - 104% | 99% | 0% |
| Fósforo Disuelto | mg/L | 0.047 | <0.047 | 0% | 100 - 101% | 101% | 0% |
| Galio Disuelto | mg/L | 0.00012 | <0.00012 | 0% | 95 - 97% | 94% | 0% |
| Germanio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 92 - 97% | 98% | 0% |
| Hafnio Disuelto | mg/L | 0.00015 | <0.00015 | 0% | 95 - 106% | 102% | 0% |
| Hierro Disuelto | mg/L | 0.0013 | <0.0013 | 1% | 99 - 100% | 98% | 5% |
| Lantano Disuelto | mg/L | 0.0015 | <0.0015 | 0% | 95 - 101% | 94% | 4% |
| Litio Disuelto | mg/L | 0.0003 | <0.0003 | 2% | 94 - 107% | 95% | 0% |
| Lutecio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 101 - 103% | 101% | 4% |
| Magnesio Disuelto | mg/L | 0.003 | <0.003 | 1% | 99 - 101% | 99% | 0% |
| Manganeso Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 95 - 105% | 101% | 0% |
| Mercurio Disuelto | mg/L | 0.00009 | <0.00009 | 0% | 100 - 106% | 102% | 1% |
| Molibdeno Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 94 - 99% | 93% | 0% |
| Niobio Disuelto | mg/L | 0.0015 | <0.0015 | 0% | 94 - 99% | 99% | 0% |
| Niquel Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 99 - 100% | 97% | 0% |
| Plata Disuelto | mg/L | 0.000010 | <0.000010 | 0% | 92 - 100% | 99% | 0% |
| Plomo Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 102 - 105% | 97% | 0% |
| Potasio Disuelto | mg/L | 0.13 | <0.13 | 1% | 98 - 102% | 98% | 0% |
| Rubidio Disuelto | mg/L | 0.0009 | <0.0009 | 3% | 103 - 106% | 91% | 0% |
| Selenio Disuelto | mg/L | 0.0013 | <0.0013 | 0% | 92 - 99% | 93% | 0% |
| Silice Disuelto | mg/L | 0.27 | <0.27 | 1% | 97% | 93% | 0% |
| Silicio Disuelto | mg/L | 0.13 | <0.13 | 1% | 97 - 105% | 93% | 0% |
| Sodio Disuelto | mg/L | 0.019 | <0.019 | 1% | 101 - 103% | 101% | 0% |
| Talio Disuelto | mg/L | 0.00006 | <0.00006 | 6% | 99 - 103% | 95% | 4% |
| Tantalio Disuelto | mg/L | 0.0021 | <0.0021 | 0% | 95 - 102% | 94% | 0% |
| Teluro Disuelto | mg/L | 0.003 | <0.003 | 0% | 102% | 101% | 0% |
| Thorio Disuelto | mg/L | 0.00019 | <0.00019 | 0% | 97 - 100% | 96% | 0% |
| Titanio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 97 - 102% | 94% | 0% |
| Uranio Disuelto | mg/L | 0.000010 | <0.000010 | 0% | 101 - 104% | 98% | 4% |
| Vanadio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 96 - 110% | 102% | 3% |
| Wolframio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 100 - 103% | 99% | 5% |
| Yterbio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 97 - 104% | 93% | 6% |
| Zinc Disuelto | mg/L | 0.0026 | <0.0026 | 1% | 93 - 99% | 98% | 0% |
| Zirconio Disuelto | mg/L | 0.00045 | <0.00045 | 0% | 97 - 98% | 92% | 0% |
| Amoníaco | mg NH3/L | 0.012 | <0.012 | | 99% | 98% | 2% |
| Potencial de Hidrógeno | pH | -- | | 0% | 99 - 100% | | |
| Sólidos Totales Disueltos | mg Sólidos Totales Disueltos/L | 3 | <3 | 0% | 100% | | |
| Sólidos Totales en Suspensión | mg Sólidos Totales en Suspensión/L | 3 | <3 | 1 - 2% | 99 - 100% | | |
| Cianuro Libre | mg/L | 0.0008 | <0.0008 | | 99% | 102% | 1% |
| Clorofila A | mg/L | 0.003 | <0.003 | 0% | 98% | | |
| Nitrógeno Total | mg N/L | 0.10 | <0.10 | | 101% | 100% | 1% |
| Bromuro | mg/L | 0.042 | <0.042 | | 95 - 106% | 102 - 104% | 0% |



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Miembro del Grupo SGS

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012293 Rev. 0

## REFERENCIAS DE MÉTODOS DE ENSAYO

| Referencia | Sede | Parámetro | Método de Ensayo |
|---|---|---|---|
| EW_APHA10200H | Callao | Clorofila A | SMEWW-APHA-AWWA-WEF Part 10200 H,Item 2, 23rd Ed.:2017. Plankton. Chlorophyll |
| EW_APHA2120C_DIS_CX | Cajamarca | Color Verdadero | SMEWW-APHA-AWWA-WEF Part 2120 C, 23rd Ed.: 2017. Color. Spectrophotometric-Single-Wavelenght Method (Proposed) |
| EW_APHA2130B_CX | Cajamarca | Turbidez | SMEWW-APHA-AWWA-WEF Part 2130 B, 23rd Ed.: 2017. Turbidity. Nephelometric Method |
| EW_APHA2130B_OPE | Callao | Turbidez | SMEWW-APHA-AWWA-WEF Part 2130 B, 23rd Ed.: 2017. Turbidity. Nephelometric Method |
| EW_APHA2320B_CX | Cajamarca | Alcalinidad Total | SMEWW-APHA-AWWA-WEF Part 2320 B, 23rd Ed: 2017. Alkalinity Titration Method |
| EW_APHA2510B_CX | Cajamarca | Conductividad | SMEWW-APHA-AWWA-WEF Part 2510-B, 23rd Ed: 2017. Conductivity: Laboratory Method |
| EW_APHA2510B_OPE | Callao | Conductividad. | SMEWW-APHA-AWWA-WEF Part 2510-B, 23rd Ed: 2017. Conductivity: Laboratory Method |
| EW_APHA2540C_CX | Cajamarca | Sólidos Disueltos Totales | SMEWW-APHA-AWWA-WEF Part 2540-C, 23rd Ed.:2017. Solids:Total Dissolved Solid dried at 180°C |
| EW_APHA2540D_CX | Cajamarca | Sólidos Totales en Suspensión | SMEWW-APHA-AWWA-WEF Part 2540-D; 23rd Ed: 2017. Solids: Total Suspended Solids dried at 103-105 °C |
| EW_APHA2550B | Callao | Temperatura | SMEWW-APHA-AWWA-WEF Part 2550-B; 23rd Ed: 2017. Temperature, Laboratory and Field Method |
| EW_APHA3500CRB_CX | Cajamarca | Cromo Hexavalente Total | SMEWW-APHA-AWWA-WEF Part 3500-CR-B; 23rd Ed: 2017. Chromium. Colorimetric Method |
| EW_APHA4500HB_CX | Cajamarca | Potencial de Hidrógeno | SMEWW-APHA-AWWA-WEF Part 4500-H+-B; 23rd Ed: 2017. pH Value: Electrometric Method. |
| EW_APHA4500HB_OPE | Callao | Potencial de Hidrógeno. | SMEWW-APHA-AWWA-WEF Part 4500-H+ B, 2017; 23rd Ed. pH Value. Electrometric Method. |
| EW_APHA4500NH3D_CX | Cajamarca | Amoníaco | SMEWW-APHA-AWWA-WEF Part 4500-NH3 D; 23rd Ed: 2017. Nitrogen (Ammonia). Ammonia-Selective Electrode Method |
| EW_APHA4500PJ | Callao | Nitrógeno Total | SMEWW-APHA-AWWA-WEF Part 4500-P J; 23rd Ed: 2017. Persulfate Method for Simultaneous Determination of Total Nitrogen and Total(Validado)2017 |
| EW_APHA4500PJF | Callao | Fósforo Total | SMEWW-APHA-AWWA-WEF Part 4500-P. F,J; 23rd.:2017 Phosphorus. Automated Ascorbic Acid Reduction Method. Persulfate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus |
| EW_APHA4500S2D_CX | Cajamarca | Sulfuro | SMEWW-APHA-AWWA-WEF Part 4500 S2 - D; 23rd Ed: 2017. Sulfide. Methylene Blue Method |
| EW_APHA5210B_CX | Cajamarca | Demanda Bioquímica de Oxígeno | SMEWW-APHA-AWWA-WEF Part 5210 B ;23rd Ed: 2017. Biochemical Oxygen Demand (BOD): 5-Day BOD test |
| EW_APHA9221E_NMP_CX | Cajamarca | Numeración de Coliformes Fecales o Termotolerantes | SMEWW-APHA-AWWA-WEF Part 9221E.1, 23rd Ed; 2017; Multiple-tube Fermentation Technique for Members of the Coliform Group. Fecal Coliform Procedure. Thermotolerant Coliform Test (EC Medium). |
| EW_ASTMD3921 | Callao | Aceites y Grasas | ASTM D3921 - 96 (Reapproved 2011).Standard Test Method for Oil and Grease and Petroleum Hydrocarbons in Water -(Validado)2014 |
| EW_ASTMD7237_CX | Cajamarca | Cianuro Libre | ASTM D7237-18. 2018. Standard Test Method for Free Cyanide and Aquatic Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection. |
| EW_ASTMD888 | Callao | Oxígeno Disuelto. | ASTM D888 - 18 Test Method C; Standard Test Methods for Dissolved Oxygen in Water. Instrumental Probe Procedure Luminescence Based Sensor |



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# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012293 Rev. 0

## REFERENCIAS DE MÉTODOS DE ENSAYO

| Referencia | Sede | Parámetro | Método de Ensayo |
|---|---|---|---|
| EW_EPA200_8 | Callao | Metales Totales | EPA 200.8, Rev 5.4: 1994. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry. |
| EW_EPA200_8_DIS | Callao | Metales Disueltos | EPA 200.8, Rev 5.4:1994. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry. |
| EW_EPA300_0 | Callao | Bromuro | EPA 300.0. Rev. 2.1:1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Cloruro | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Fluoruro | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrato (como N) | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrito (como N) | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrito | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Fosfato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Sulfato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA420_2_4 | Callao | Fenoles | EPA Method 420.2:1974 Phenolics- Colorimetric, Automated 4-AAPWith Distillation // EPA Method 420.4 Rev. 01:1993 Determination of Total Recoverable Phenolics By Semi-Automated Colorimetry. Validado 2013. |

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# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012293 Rev. 0

## REFERENCIA DE LOS MÉTODOS DE MUESTREO

| Tipo de Muestra | Procedimiento de Muestreo | Descripción | Plan de Muestreo |
|---|---|---|---|
| AGUA SUPERFICIAL | INS-P-EHS.1 | Muestreo y Medición de la Calidad del Agua | 350619-1 /2020 |

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# LABORATORIO DE ENSAYO ACREDITADO POR EL ORGANISMO PERUANO DE ACREDITACIÓN INACAL - DA CON REGISTRO N° LE - 002

## INFORME DE ENSAYO CON VALOR OFICIAL
## MA2012295 Rev. 0

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## LUMINA COPPER S.A.C.

EL DERBY 055, TORRE 1, PISO 6 - SURCO

ENV / MO-350619-028

PROCEDENCIA : EL GALENO

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Fecha de Recepción SGS : 05-08-2020

Fecha de Ejecución : Del 05-08-2020 al 11-08-2020

Muestreo Realizado Por : Personal de Operaciones de SGS

| Estación de Muestreo |
|---|
| S27 |

**Emitido por SGS del Perú S.A.C.**

**Impreso el 11/08/2020**

**Jade C. Huarcaya Soto**
**C.B.P. 8471**
**Jefe de Oficina**

# LABORATORIO DE ENSAYO ACREDITADO POR EL ORGANISMO PERUANO DE ACREDITACIÓN INACAL - DA CON REGISTRO N° LE - 002

INACAL DA - Perú Laboratorio de Ensayo Acreditado

Registro N°LE - 002

## INFORME DE ENSAYO CON VALOR OFICIAL
## MA2012295 Rev. 0

| | |
|---|---|
| IDENTIFICACIÓN DE MUESTRA | S27 |
| | 9229795N / 796607E |
| FECHA DE MUESTREO | 04/08/2020 |
| HORA DE MUESTREO | 14:40:00 |
| CATEGORIA | AGUA NATURAL |
| SUB CATEGORIA | AGUA SUPERFICIAL |

| Parámetro | Referencia | Unidad | LD | LC | Resultado ± Incertidumbre |
|---|---|---|---|---|---|
| **Análisis de Campo** | | | | | |
| Turbidez | EW_APHA2130B_OPE | NTU | 0.10 | 0.20 | <0.20 |
| Conductividad | EW_APHA2510B_OPE | µS/cm | -- | -- | 141.00 ± 16.92 |
| Temperatura | EW_APHA2550B | °C | -- | -- | 12.80 ± 0.56 |
| Potencial de Hidrógeno. | EW_APHA4500HB_OPE | pH | -- | -- | 7.10 ± 0.04 |
| Medición de Caudal | EW_ASTMD3858 | m³/s | -- | -- | 0.00004 * |
| Oxígeno Disuelto. | EW_ASTMD888 | mg/L | -- | -- | 6.44 ± 0.77 |
| **Análisis Fisicoquímicos** | | | | | |
| Color Verdadero | EW_APHA2120C_DIS_CX | UC | 0.4 | 1.0 | <1.0 |
| Turbidez | EW_APHA2130B_CX | NTU | 0.1 | 0.2 | <0.2 |
| Alcalinidad Total | EW_APHA2320B_CX | mgCaCO3/L | 0.5 | 1.0 | 122.2 ± 30.6 |
| Dureza Total | EW_APHA2340C_CX | mgCaCO3/L | 0.5 | 1.1 | 135.4 ± 39.3 |
| Conductividad | EW_APHA2510B_CX | µS/cm | -- | -- | 252.6 ± 50.5 |
| Sólidos Totales Disueltos | EW_APHA2540C_CX | mg Sólidos Totales Disueltos/L | 1 | 3 | 139 ± 28 |
| Potencial de Hidrógeno | EW_APHA4500HB_CX | pH | -- | -- | 7.11 * ± 2.13 |
| Nitrógeno Amoniacal | EW_APHA4500NH3D_CX | mg NH3-N/L | 0.004 | 0.010 | 0.019 ± 0.004 |
| Fósforo Total | EW_APHA4500PJF | mg P/L | 0.005 | 0.010 | 0.015 ± 0.003 |
| Demanda Bioquímica de Oxígeno | EW_APHA5210B_CX | mg/L | 1.0 | 2.6 | <2.6 |
| Demanda Química de Oxígeno | EW_APHA5220D_CX | mgO2/L | 1.8 | 4.5 | <4.5 |
| Aceites y Grasas | EW_ASTMD3921 | mg/L | 0.2 | 0.4 | <0.4 |
| Cianuro total | EW_ASTMD7511_CX | mg/L | 0.0003 | 0.0008 | <0.0008 |
| Fenoles | EW_EPA420_2_4 | mg/L | 0.0002 | 0.0005 | <0.0005 |
| **Aniones** | | | | | |
| Bromuro | EW_EPA300_0 | mg/L | 0.013 | 0.042 | <0.042 |
| Cloruro | EW_EPA300_0_CX | mg/L | 0.025 | 0.050 | 0.605 ± 0.175 |
| Fluoruro | EW_EPA300_0_CX | mg/L | 0.002 | 0.004 | <0.004 |
| Fosfato | EW_EPA300_0_CX | mg/L | 0.019 | 0.038 | <0.038 |
| Nitrato | EW_EPA300_0_CX | mg/L | 0.018 | 0.062 | 1.151 ± 0.230 |
| Nitrato (como N) | EW_EPA300_0_CX | mg/L | 0.004 | 0.014 | 0.260 ± 0.052 |
| Nitrito | EW_EPA300_0_CX | mg/L | 0.003 | 0.006 | <0.006 |
| Nitrito (como N) | EW_EPA300_0_CX | mg/L | 0.001 | 0.002 | <0.002 |
| Sulfato | EW_EPA300_0_CX | mg/L | 0.01 | 0.03 | 16.00 ± 3.36 |
| **Análisis Microbiológicos** | | | | | |
| Numeración de Coliformes totales | EW_APHA9221B_CX | NMP/100 mL | -- | -- | <1.8 |
| Numeración de Coliformes Fecales o Termotolerantes | EW_APHA9221E_NMP_CX | NMP/100 mL | -- | -- | <1.8 |
| Numeración de Escherichia coli | EW_APHA9221F_CX | NMP/100 mL | -- | -- | <1.8 |
| Detección de Vibrio Cholerae | EW_APHA9260H_CX | en 1 L | -- | -- | Ausencia |
| Formas Parasitarias | EW_OPS_CX | Organismo/L | -- | -- | 0 * ± 0 |
| Giardia duodenalis | EW_OPS_CX | Organismo/L | -- | -- | Ausencia * |
| Larvas De Helminto | EW_OPS_CX | Larvas/L | -- | -- | 0 * |
| Nematodes Intestinales | EW_OPS_CX | Organismo/L | -- | -- | 0 * |
| Quistes y Ooquistes de Protozoarios No Patógenos | EW_OPS_CX | Organismo/L | -- | -- | 0 * |
| Quistes y Ooquistes de Protozoarios Patógenos | EW_OPS_CX | Organismo/L | -- | -- | 0 * |
| Algas | EW_STM_CX | Organismo/L | -- | -- | 0 |
| Copépodos | EW_STM_CX | Organismo/L | -- | -- | 0 |
| Nematodos en todos sus Estadios Evolutivos | EW_STM_CX | Organismo/L | -- | -- | 0 |
| Organismos de Vida Libre | EW_STM_CX | Organismo/L | -- | -- | 0 ± 0 |
| Protozoarios | EW_STM_CX | Organismo/L | -- | -- | 0 |
| Rotíferos | EW_STM_CX | Organismo/L | -- | -- | 0 |
| **Metales Disueltos** | | | | | |
| Aluminio Disuelto | EW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Antimonio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00004 | 0.00013 | <0.00013 |
| Arsénico Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Bario Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | 0.0036 ± 0.0008 |
| Berilio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Bismuto Disuelto | EW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Boro Disuelto | EW_EPA200_8_DIS | mg/L | 0.002 | 0.006 | <0.006 |
| Cadmio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Calcio Disuelto | EW_EPA200_8_DIS | mg/L | 0.003 | 0.009 | 46.848 ± 1.121 |
| Cerio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00008 | 0.00024 | <0.00024 |
| Cesio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Cobalto Disuelto | EW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Cobre Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Cromo Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Estaño Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Estroncio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | 0.0694 ± 0.0160 |
| Fósforo Disuelto | EW_EPA200_8_DIS | mg/L | 0.015 | 0.047 | <0.047 |
| Galio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00004 | 0.00012 | <0.00012 |
| Germanio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012295 Rev. 0

| | |
|---|---|
| IDENTIFICACIÓN DE MUESTRA | S27 |
| FECHA DE MUESTREO | 9229795N / 796607E<br>04/08/2020 |
| HORA DE MUESTREO | 14:40:00 |
| CATEGORIA | AGUA NATURAL |
| SUB CATEGORIA | AGUA SUPERFICIAL |

| Parámetro | Referencia | Unidad | LD | LC | Resultado ± Incertidumbre |
|---|---|---|---|---|---|
| Hafnio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00005 | 0.00015 | <0.00015 |
| Hierro Disuelto | EW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Lantano Disuelto | EW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Litio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Lutecio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Magnesio Disuelto | EW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | 1.217 ± 0.304 |
| Manganeso Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Mercurio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Molibdeno Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Niobio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Niquel Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Plata Disuelto | EW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Plomo Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Potasio Disuelto | EW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | 0.78 ± 0.18 |
| Rubidio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0003 | 0.0009 | 0.0022 ± 0.0005 |
| Selenio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Silice Disuelto | EW_EPA200_8_DIS | mg/L | 0.09 | 0.27 | 7.90 * ± 0.32 |
| Silicio Disuelto | EW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | 3.69 ± 0.85 |
| Sodio Disuelto | EW_EPA200_8_DIS | mg/L | 0.006 | 0.019 | 0.763 ± 0.160 |
| Talio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Tantalio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0007 | 0.0021 | <0.0021 |
| Teluro Disuelto | EW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Thorio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00006 | 0.00019 | <0.00019 |
| Titanio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | 0.0008 ± 0.0002 |
| Uranio Disuelto | EW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Vanadio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Wolframio Disuelto | EW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Yterbio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Zinc Disuelto | EW_EPA200_8_DIS | mg/L | 0.0008 | 0.0026 | 0.0151 ± 0.0029 |
| Zirconio Disuelto | EW_EPA200_8_DIS | mg/L | 0.00015 | 0.00045 | <0.00045 |
| **Metales Totales** | | | | | |
| Aluminio Total | EW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Antimonio Total | EW_EPA200_8 | mg/L | 0.00004 | 0.00013 | <0.00013 |
| Arsénico Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Bario Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | 0.0038 ± 0.0008 |
| Berilio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Bismuto Total | EW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Boro Total | EW_EPA200_8 | mg/L | 0.002 | 0.006 | <0.006 |
| Cadmio Total | EW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Calcio Total | EW_EPA200_8 | mg/L | 0.003 | 0.009 | 53.811 ± 13.991 |
| Cerio Total | EW_EPA200_8 | mg/L | 0.00008 | 0.00024 | <0.00024 |
| Cesio Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Cobalto Total | EW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Cobre Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Cromo Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Estaño Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Estroncio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | 0.0819 ± 0.0188 |
| Fósforo Total | EW_EPA200_8 | mg/L | 0.015 | 0.047 | <0.047 |
| Galio Total | EW_EPA200_8 | mg/L | 0.00004 | 0.00012 | <0.00012 |
| Germanio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Hafnio Total | EW_EPA200_8 | mg/L | 0.00005 | 0.00015 | <0.00015 |
| Hierro Total | EW_EPA200_8 | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Lantano Total | EW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Litio Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Lutecio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Magnesio Total | EW_EPA200_8 | mg/L | 0.001 | 0.003 | 1.293 ± 0.323 |
| Manganeso Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Mercurio Total | EW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Molibdeno Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Niobio Total | EW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Niquel Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Plata Total | EW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Plomo Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Potasio Total | EW_EPA200_8 | mg/L | 0.04 | 0.13 | 0.93 ± 0.21 |
| Rubidio Total | EW_EPA200_8 | mg/L | 0.0003 | 0.0009 | 0.0033 ± 0.0007 |
| Selenio Total | EW_EPA200_8 | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Silice Total | EW_EPA200_8 | mg/L | 0.09 | 0.27 | 8.49 * ± 1.95 |
| Silicio Total | EW_EPA200_8 | mg/L | 0.04 | 0.13 | 3.97 ± 0.91 |
| Sodio Total | EW_EPA200_8 | mg/L | 0.006 | 0.019 | 0.851 ± 0.179 |
| Talio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Tantalio Total | EW_EPA200_8 | mg/L | 0.0007 | 0.0021 | <0.0021 |
| Teluro Total | EW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Thorio Total | EW_EPA200_8 | mg/L | 0.00006 | 0.00019 | <0.00019 |
| Titanio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | 0.0008 ± 0.0002 |
| Uranio Total | EW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Vanadio Total | EW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Wolframio Total | EW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Yterbio Total | EW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012295 Rev. 0

| | | | | | |
|---|---|---|---|---|---|
| IDENTIFICACIÓN DE MUESTRA | | | | | S27 |
| | | | | | 9229795N / 796607E |
| FECHA DE MUESTREO | | | | | 04/08/2020 |
| HORA DE MUESTREO | | | | | 14:40:00 |
| CATEGORIA | | | | | AGUA NATURAL |
| SUB CATEGORIA | | | | | AGUA SUPERFICIAL |
| **Parámetro** | **Referencia** | **Unidad** | **LD** | **LC** | **Resultado ± Incertidumbre** |
| Zinc Total | EW_EPA200_8 | mg/L | 0.0008 | 0.0026 | 0.0171 ± 0.0032 |
| Zirconio Total | EW_EPA200_8 | mg/L | 0.00015 | 0.00045 | <0.00045 |
| **Microcistina-LR** | | | | | |
| Microcistina-LR | EW_EPA544 | mg/L | 0.0003 | 0.0008 | <0.0008 |

Notas:
El reporte de tiempo se realiza en el sistema horario de 24 horas.
Las muestras recibidas cumplen con las condiciones necesarias para la realización de los análisis solicitados.
En el caso de análisis de campo la fecha de ejecución del mismo corresponde a la fecha de muestreo.
(*) Los resultados obtenidos corresponden a métodos que no han sido acreditados por el INACAL-DA.
Cero es equivalente a <1 e indica la no presencia de los analitos requeridos.

## INFORME DE ENSAYO CON VALOR OFICIAL
## MA2012295 Rev. 0

# CONTROL DE CALIDAD

**LC:** Limite de cuantificación
**MB:** Blanco del proceso.
**LCS %Recovery:** Porcentaje de recuperación del patrón de proceso.
**MS %Recovery:** Porcentaje de recuperación de la muestra adicionada.
**MSD %RPD:** Diferencia Porcentual Relativa entre los duplicados de la muestra adicionada.
**Dup %RPD:** Diferencia Porcentual Relativa entre los duplicados del proceso.

| Parámetro | Unidad | LC | MB | DUP %RPD | LCS %Recovery | MS %Recovery | MSD %RPD |
|---|---|---|---|---|---|---|---|
| Alcalinidad Total | mgCaCO3/L | 1.0 | <1.0 | 0% | 99% | | |
| Color Verdadero | UC | 1.0 | <1.0 | 0% | 99% | | |
| Conductividad | µS/cm | -- | | 0% | 100 - 101% | | |
| Dureza Total | mgCaCO3/L | 1.1 | <1.1 | 0% | 103% | | |
| Turbidez | NTU | 0.2 | | 0% | NA | | |
| Demanda Bioquímica de Oxígeno | mg/L | 2.6 | <2.6 | 5 - 6% | 96 - 99% | | |
| Fenoles | mg/L | 0.0005 | <0.0005 | | 97% | 94% | 2% |
| Aluminio Total | mg/L | 0.003 | <0.003 | 5% | 91 - 108% | 106% | 1% |
| Antimonio Total | mg/L | 0.00013 | <0.00013 | 0% | 95 - 97% | 94% | 0% |
| Arsénico Total | mg/L | 0.00010 | <0.00010 | 0% | 95 - 102% | 103% | 0% |
| Bario Total | mg/L | 0.0003 | <0.0003 | 3% | 91 - 93% | 92% | 0% |
| Berilio Total | mg/L | 0.00006 | <0.00006 | 0% | 102 - 103% | 102% | 0% |
| Bismuto Total | mg/L | 0.00003 | <0.00003 | 0% | 96 - 97% | 94% | 3% |
| Boro Total | mg/L | 0.006 | <0.006 | 1% | 95 - 100% | 99% | 0% |
| Cadmio Total | mg/L | 0.00003 | <0.00003 | 0% | 97 - 102% | 97% | 1% |
| Calcio Total | mg/L | 0.009 | <0.009 | 2% | 97 - 99% | 100% | 0% |
| Cerio Total | mg/L | 0.00024 | <0.00024 | 0% | 102 - 123% | 101% | 1% |
| Cesio Total | mg/L | 0.0003 | <0.0003 | 2% | 96 - 97% | 95% | 0% |
| Cobalto Total | mg/L | 0.00003 | <0.00003 | 3% | 91 - 93% | 99% | 0% |
| Cobre Total | mg/L | 0.00009 | <0.00009 | 0% | 96 - 98% | 98% | 0% |
| Cromo Total | mg/L | 0.0003 | <0.0003 | 0% | 97 - 98% | 97% | 3% |
| Estaño Total | mg/L | 0.00010 | <0.00010 | 0% | 92 - 102% | 92% | 2% |
| Estroncio Total | mg/L | 0.0006 | <0.0006 | 2% | 107 - 108% | 91% | 0% |
| Fósforo Total | mg/L | 0.047 | <0.047 | 0% | 100 - 102% | 101% | 0% |
| Galio Total | mg/L | 0.00012 | <0.00012 | 1% | 91 - 95% | 100% | 0% |
| Germanio Total | mg/L | 0.0006 | <0.0006 | 0% | 92 - 97% | 98% | 0% |
| Hafnio Total | mg/L | 0.00015 | <0.00015 | 0% | 95% | 102% | 0% |
| Hierro Total | mg/L | 0.0013 | <0.0013 | 0% | 96 - 101% | 100% | 0% |
| Lantano Total | mg/L | 0.0015 | <0.0015 | 0% | 98 - 103% | 97% | 0% |
| Litio Total | mg/L | 0.0003 | <0.0003 | 2% | 93 - 106% | 104% | 3% |
| Lutecio Total | mg/L | 0.00006 | <0.00006 | 0% | 92 - 97% | 95% | 0% |
| Magnesio Total | mg/L | 0.003 | <0.003 | 2% | 99 - 101% | 99% | 0% |
| Manganeso Total | mg/L | 0.00010 | <0.00010 | 4% | 100% | 101% | 0% |
| Mercurio Total | mg/L | 0.00009 | <0.00009 | 0% | 101 - 106% | 102% | 0% |
| Molibdeno Total | mg/L | 0.00006 | <0.00006 | 0% | 95 - 97% | 94% | 1% |
| Niobio Total | mg/L | 0.0015 | <0.0015 | 0% | 100 - 107% | 99% | 1% |
| Niquel Total | mg/L | 0.0006 | <0.0006 | 4% | 95% | 102% | 0% |
| Plata Total | mg/L | 0.000010 | <0.000010 | 0% | 94 - 98% | 92% | 0% |
| Plomo Total | mg/L | 0.0006 | <0.0006 | 0% | 94 - 101% | 98% | 3% |
| Potasio Total | mg/L | 0.13 | <0.13 | 2% | 98 - 102% | 98% | 0% |
| Rubidio Total | mg/L | 0.0009 | <0.0009 | 3% | 99 - 105% | 91% | 0% |
| Selenio Total | mg/L | 0.0013 | <0.0013 | 0% | 99 - 102% | 98% | 1% |
| Silice Total | mg/L | 0.27 | <0.27 | 2% | 96% | 98% | 0% |
| Silicio Total | mg/L | 0.13 | <0.13 | 2% | 96 - 105% | 98% | 0% |
| Sodio Total | mg/L | 0.019 | <0.019 | 0% | 101 - 103% | 101% | 0% |
| Talio Total | mg/L | 0.00006 | <0.00006 | 0% | 95 - 99% | 95% | 1% |
| Tantalio Total | mg/L | 0.0021 | <0.0021 | 0% | 100 - 101% | 100% | 0% |
| Teluro Total | mg/L | 0.003 | <0.003 | 0% | 102% | 101% | 0% |
| Thorio Total | mg/L | 0.00019 | <0.00019 | 0% | 97 - 100% | 96% | 0% |
| Titanio Total | mg/L | 0.0006 | <0.0006 | 2% | 93 - 97% | 94% | 0% |
| Uranio Total | mg/L | 0.000010 | <0.000010 | 0% | 99 - 102% | 99% | 0% |
| Vanadio Total | mg/L | 0.0003 | <0.0003 | 0% | 101 - 102% | 106% | 9% |
| Wolframio Total | mg/L | 0.0006 | <0.0006 | 0% | 92 - 98% | 91% | 0% |
| Yterbio Total | mg/L | 0.00006 | <0.00006 | 0% | 100 - 101% | 100% | 0% |
| Zinc Total | mg/L | 0.0026 | <0.0026 | 1% | 98 - 99% | 96% | 4% |
| Zirconio Total | mg/L | 0.00045 | <0.00045 | 0% | 104 - 106% | 95% | 4% |
| Microcistina-LR | mg/L | 0.0008 | <0.0008 | | 82% | 95% | 11% |
| Aceites y Grasas | mg/L | 0.4 | <0.4 | 0% | 93% | 86% | |
| Cloruro | mg/L | 0.050 | <0.050 | | 103% | 101% | 0% |
| Fluoruro | mg/L | 0.004 | <0.004 | | 97% | 97% | 0% |
| Fosfato | mg/L | 0.038 | <0.038 | | 97% | 100% | 0% |
| Nitrato | mg/L | 0.062 | <0.062 | | 99% | 99% | 0% |
| Nitrato (como N) | mg/L | 0.014 | <0.014 | | 99% | 99% | 0% |
| Nitrito | mg/L | 0.006 | <0.006 | | 96% | 97% | 0% |
| Nitrito (como N) | mg/L | 0.002 | <0.002 | | 96% | 97% | 0% |
| Sulfato | mg/L | 0.03 | <0.03 | | 102% | 100% | 0% |
| Cianuro total | mg/L | 0.0008 | <0.0008 | | 100% | 101% | 2% |
| Fósforo Total | mg P/L | 0.010 | <0.010 | | 93% | 90% | 2% |
| Aluminio Disuelto | mg/L | 0.003 | <0.003 | 0% | 91 - 108% | 100% | 0% |
| Antimonio Disuelto | mg/L | 0.00013 | <0.00013 | 0% | 95% | 94% | 0% |
| Arsénico Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 91 - 102% | 93% | 2% |
| Bario Disuelto | mg/L | 0.0003 | <0.0003 | 1% | 93 - 96% | 101% | 0% |
| Berilio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 93% | 99% | 5% |
| Bismuto Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 102 - 103% | 96% | 4% |

# INFORME DE ENSAYO CON VALOR OFICIAL
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## CONTROL DE CALIDAD

**LC:** Limite de cuantificación
**MB:** Blanco del proceso.
**LCS %Recovery:** Porcentaje de recuperación del patrón de proceso.
**MS %Recovery:** Porcentaje de recuperación de la muestra adicionada.
**MSD %RPD:** Diferencia Porcentual Relativa entre los duplicados de la muestra adicionada.
**Dup %RPD:** Diferencia Porcentual Relativa entre los duplicados del proceso.

| Parámetro | Unidad | LC | MB | DUP %RPD | LCS %Recovery | MS %Recovery | MSD %RPD |
|---|---|---|---|---|---|---|---|
| Boro Disuelto | mg/L | 0.006 | <0.006 | 1% | 95 - 102% | 107% | 1% |
| Cadmio Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 95 - 101% | 95% | 0% |
| Calcio Disuelto | mg/L | 0.009 | <0.009 | 1% | 99 - 100% | 100% | 0% |
| Cerio Disuelto | mg/L | 0.00024 | <0.00024 | 0% | 99 - 106% | 104% | 0% |
| Cesio Disuelto | mg/L | 0.0003 | <0.0003 | 1% | 98 - 100% | 92% | 3% |
| Cobalto Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 100 - 104% | 95% | 2% |
| Cobre Disuelto | mg/L | 0.00009 | <0.00009 | 0% | 95 - 105% | 92% | 3% |
| Cromo Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 95 - 105% | 102% | 7% |
| Estaño Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 98 - 103% | 96% | 2% |
| Estroncio Disuelto | mg/L | 0.0006 | <0.0006 | 1% | 100 - 104% | 99% | 0% |
| Fósforo Disuelto | mg/L | 0.047 | <0.047 | 0% | 100 - 101% | 101% | 0% |
| Galio Disuelto | mg/L | 0.00012 | <0.00012 | 0% | 95 - 97% | 94% | 0% |
| Germanio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 92 - 97% | 98% | 0% |
| Hafnio Disuelto | mg/L | 0.00015 | <0.00015 | 0% | 95 - 106% | 102% | 0% |
| Hierro Disuelto | mg/L | 0.0013 | <0.0013 | 1% | 99 - 100% | 98% | 5% |
| Lantano Disuelto | mg/L | 0.0015 | <0.0015 | 0% | 95 - 101% | 94% | 4% |
| Litio Disuelto | mg/L | 0.0003 | <0.0003 | 2% | 94 - 107% | 95% | 0% |
| Lutecio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 101 - 103% | 101% | 4% |
| Magnesio Disuelto | mg/L | 0.003 | <0.003 | 1% | 99 - 101% | 99% | 0% |
| Manganeso Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 95 - 105% | 101% | 0% |
| Mercurio Disuelto | mg/L | 0.00009 | <0.00009 | 0% | 100 - 106% | 102% | 1% |
| Molibdeno Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 94 - 99% | 93% | 0% |
| Niobio Disuelto | mg/L | 0.0015 | <0.0015 | 0% | 94 - 99% | 99% | 0% |
| Niquel Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 99 - 100% | 97% | 0% |
| Plata Disuelto | mg/L | 0.000010 | <0.000010 | 0% | 92 - 100% | 99% | 0% |
| Plomo Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 102 - 105% | 97% | 0% |
| Potasio Disuelto | mg/L | 0.13 | <0.13 | 1% | 98 - 102% | 98% | 0% |
| Rubidio Disuelto | mg/L | 0.0009 | <0.0009 | 3% | 103 - 106% | 91% | 0% |
| Selenio Disuelto | mg/L | 0.0013 | <0.0013 | 0% | 92 - 99% | 93% | 0% |
| Silice Disuelto | mg/L | 0.27 | <0.27 | 1% | 97% | 93% | 0% |
| Silicio Disuelto | mg/L | 0.13 | <0.13 | 1% | 97 - 105% | 93% | 0% |
| Sodio Disuelto | mg/L | 0.019 | <0.019 | 1% | 101 - 103% | 101% | 0% |
| Talio Disuelto | mg/L | 0.00006 | <0.00006 | 6% | 99 - 103% | 95% | 4% |
| Tantalio Disuelto | mg/L | 0.0021 | <0.0021 | 0% | 95 - 102% | 94% | 0% |
| Teluro Disuelto | mg/L | 0.003 | <0.003 | 0% | 102% | 101% | 0% |
| Thorio Disuelto | mg/L | 0.00019 | <0.00019 | 0% | 97 - 100% | 96% | 0% |
| Titanio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 97 - 102% | 94% | 0% |
| Uranio Disuelto | mg/L | 0.000010 | <0.000010 | 0% | 101 - 104% | 98% | 4% |
| Vanadio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 96 - 110% | 102% | 3% |
| Wolframio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 100 - 103% | 99% | 5% |
| Yterbio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 97 - 104% | 93% | 6% |
| Zinc Disuelto | mg/L | 0.0026 | <0.0026 | 1% | 93 - 99% | 98% | 0% |
| Zirconio Disuelto | mg/L | 0.00045 | <0.00045 | 0% | 97 - 98% | 92% | 0% |
| Nitrógeno Amoniacal | mg NH3-N/L | 0.010 | <0.010 | | 99% | 99% | 0% |
| Potencial de Hidrógeno | pH | -- | | 0% | 99 - 100% | | |
| Sólidos Totales Disueltos | mg Sólidos Totales Disueltos/L | 3 | <3 | 0% | 100% | | |
| Demanda Química de Oxígeno | mgO2/L | 4.5 | <4.5 | | 98% | | |
| Bromuro | mg/L | 0.042 | <0.042 | | 95 - 106% | 102 - 104% | 0% |

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# MA2012295 Rev. 0

## REFERENCIAS DE MÉTODOS DE ENSAYO

| Referencia | Sede | Parámetro | Método de Ensayo |
|---|---|---|---|
| EW_APHA2120C_DIS_CX | Cajamarca | Color Verdadero | SMEWW-APHA-AWWA-WEF Part 2120 C, 23rd Ed.: 2017. Color. Spectrophotometric-Single-Wavelenght Method (Proposed) |
| EW_APHA2130B_CX | Cajamarca | Turbidez | SMEWW-APHA-AWWA-WEF Part 2130 B, 23rd Ed.: 2017. Turbidity. Nephelometric Method |
| EW_APHA2130B_OPE | Callao | Turbidez | SMEWW-APHA-AWWA-WEF Part 2130 B, 23rd Ed.: 2017. Turbidity. Nephelometric Method |
| EW_APHA2320B_CX | Cajamarca | Alcalinidad Total | SMEWW-APHA-AWWA-WEF Part 2320 B, 23rd Ed: 2017. Alkalinity Titration Method |
| EW_APHA2340C_CX | Cajamarca | Dureza Total | SMEWW-APHA-AWWA-WEF Part 2340-C,23rd Ed: 2017. Hardness: EDTA Titrimetric Method. |
| EW_APHA2510B_CX | Cajamarca | Conductividad | SMEWW-APHA-AWWA-WEF Part 2510-B, 23rd Ed: 2017. Conductivity: Laboratory Method |
| EW_APHA2510B_OPE | Callao | Conductividad. | SMEWW-APHA-AWWA-WEF Part 2510-B, 23rd Ed: 2017. Conductivity: Laboratory Method |
| EW_APHA2540C_CX | Cajamarca | Sólidos Disueltos Totales | SMEWW-APHA-AWWA-WEF Part 2540-C, 23rd Ed.:2017. Solids:Total Dissolved Solid dried at 180°C |
| EW_APHA2550B | Callao | Temperatura | SMEWW-APHA-AWWA-WEF Part 2550-B; 23rd Ed: 2017. Temperature, Laboratory and Field Method |
| EW_APHA4500HB_CX | Cajamarca | Potencial de Hidrógeno | SMEWW-APHA-AWWA-WEF Part 4500-H+-B; 23rd Ed: 2017. pH Value: Electrometric Method. |
| EW_APHA4500HB_OPE | Callao | Potencial de Hidrógeno. | SMEWW-APHA-AWWA-WEF Part 4500-H+ B, 2017; 23rd Ed. pH Value. Electrometric Method. |
| EW_APHA4500NH3D_CX | Cajamarca | Nitrógeno Amoniacal | SMEWW-APHA-AWWA-WEF Part 4500-NH3 D; 23rd Ed: 2017. Nitrogen (Ammonia). Ammonia-Selective Electrode Method |
| EW_APHA4500PJF | Callao | Fósforo Total | SMEWW-APHA-AWWA-WEF Part 4500-P. F,J; 23rd.:2017 Phosphorus. Automated Ascorbic Acid Reduction Method. Persulfate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus |
| EW_APHA5210B_CX | Cajamarca | Demanda Bioquímica de Oxígeno | SMEWW-APHA-AWWA-WEF Part 5210 B ;23rd Ed: 2017. Biochemical Oxygen Demand (BOD): 5-Day BOD test |
| EW_APHA5220D_CX | Cajamarca | Demanda Química de Oxígeno | SMEWW-APHA-AWWA-WEF Part 5220 D; 23rd Ed: 2017. Chemical Oxygen Demand, Closed Reflux, Colorimetric Method |
| EW_APHA9221B_CX | Cajamarca | Numeración de Coliformes totales | SMEWW-APHA-AWWA-WEF Part 9221B; 23rd Ed; 2017. Multiple-Tube Fermentation Technique for Members of the Coliform Group. Standard Total Coliform Fermentation Technique |
| EW_APHA9221E_NMP_CX | Cajamarca | Numeración de Coliformes Fecales o Termotolerantes | SMEWW-APHA-AWWA-WEF Part 9221E.1, 23rd Ed; 2017; Multiple-tube Fermentation Technique for Members of the Coliform Group. Fecal Coliform Procedure. Thermotolerant Coliform Test (EC Medium). |
| EW_APHA9221F_CX | Cajamarca | Numeración de Escherichia coli (EC-MUG) | SMEWW-APHA-AWWA-WEF Part 9221 F. Item 1, 23rd Ed. 2017. Multiple-Tube Fermentation Technique for Members of the Coliform Group. Escherichia coli Procedure Using Fluorogenic Substrate. Escherichia coli test (EC-MUG Medium). |
| EW_APHA9260H_CX | Cajamarca | Detección de Vibrio Cholerae | SMEWW-APHA-AWWA-WEF Part 9260 H, 3.d(1.a,1.b)6,7.Sin Identificación del serogrupo O139. 23rd Ed; 2017 . Detección of Pathogenic Bacteria: Vibrio Enrichment. Procedures for Vibrio species, V.cholerae.Enrichment. Tentative Identification. Biochemical Identification(Table 9260:IV).Serological Iden |
| EW_ASTMD3858 | Callao | Medición de caudal | ASTM D3858-95 (2003) Standard Test Method For Open Channed Flow Measurement Of Water By Velocity –Area Method. |
| EW_ASTMD3921 | Callao | Aceites y Grasas | ASTM D3921 - 96 (Reapproved 2011).Standard Test Method for Oil and Grease and Petroleum Hydrocarbons in Water -(Validado)2014 |
| EW_ASTMD7511_CX | Cajamarca | Cianuro total | ASTM D7511-12: (Reapproved 2017) E01.Standard Test Method for Total Cyanide by Segmented Flow Injection Analysis, In-Line Ultraviolet Digestion and Amperometric Detection (Validado).2017 |
| EW_ASTMD888 | Callao | Oxígeno Disuelto. | ASTM D888 - 18 Test Method C; Standard Test Methods for Dissolved Oxygen in Water. Instrumental Probe Procedure Luminescence Based Sensor |

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012295 Rev. 0

## REFERENCIAS DE MÉTODOS DE ENSAYO

| Referencia | Sede | Parámetro | Método de Ensayo |
|---|---|---|---|
| EW_EPA200_8 | Callao | Metales Totales | EPA 200.8, Rev 5.4: 1994. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry. |
| EW_EPA200_8_DIS | Callao | Metales Disueltos | EPA 200.8, Rev 5.4:1994. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry. |
| EW_EPA300_0 | Callao | Bromuro | EPA 300.0. Rev. 2.1:1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Cloruro | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Fluoruro | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrato (como N) | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrito (como N) | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrito | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Fosfato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Sulfato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA420_2_4 | Callao | Fenoles | EPA Method 420.2:1974 Phenolics- Colorimetric, Automated 4-AAPWith Distillation // EPA Method 420.4 Rev. 01:1993 Determination of Total Recoverable Phenolics By Semi-Automated Colorimetry. Validado 2013. |
| EW_EPA544 | Callao | Microcistina-LR | EPA Method 544, Rev.1:2015. Determination of Microcystins and nodularin in drinking water by solid phase extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS). |
| EW_OPS_CX | Cajamarca | Determinación de Parásitos | OPS/CEPIS.Lima-Perú.1983. Métodos simplificados de análisis de aguas.Detección, identificación y Cuantificación de Protozoarios y Helmintos. |
| EW_STM_CX | Cajamarca | Organismos de vida libre | SMEWW-APHA-AWWA-WEF Part 10200 C.1; F.2.a.c.1, 23rd Ed.2017 (VALIDADO). Referenciado en Reglamento de Calidad del Agua para consumo Humano (D.S. N°031-2010-S.A.). 2016. Plankton. Concentration Techniques. Phytoplankton Counting Techniques. |

## REFERENCIA DE LOS MÉTODOS DE MUESTREO

| Tipo de Muestra | Procedimiento de Muestreo | Descripción | Plan de Muestreo |
|---|---|---|---|
| AGUA SUPERFICIAL | INS-P-EHS.1 | Muestreo y Medición de la Calidad del Agua | 350619-1 /2020 |

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Última Revisión Julio 2015

# LABORATORIO DE ENSAYO ACREDITADO POR EL ORGANISMO PERUANO DE ACREDITACIÓN INACAL - DA CON REGISTRO N° LE - 002

## INFORME DE ENSAYO CON VALOR OFICIAL
## MA2012572 Rev. 0

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## LUMINA COPPER S.A.C.

EL DERBY 055, TORRE 1, PISO 6 - SURCO

ENV / MO-350619-035

PROCEDENCIA : EL GALENO

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Fecha de Recepción SGS : 07-08-2020

Fecha de Ejecución : Del 07-08-2020 al 21-08-2020

Muestreo Realizado Por : Personal de Operaciones de SGS

| Estación de Muestreo |
|---|
| BK-Campo2 |

**Emitido por SGS del Perú S.A.C.**

**Impreso el 21/08/2020**

**Jade C. Huarcaya Soto**
**C.B.P. 8471**
**Jefe de Oficina**

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012572 Rev. 0

| IDENTIFICACIÓN DE MUESTRA | BK-Campo2 |
|---|---|
| FECHA DE MUESTREO | 06/08/2020 |
| HORA DE MUESTREO | 13:20:00 |
| CATEGORIA | AGUA DE PROCESO |
| SUB CATEGORIA | AGUA PURIFICADA |

| Parámetro | Referencia | Unidad | LD | LC | Resultado |
|---|---|---|---|---|---|
| **Aniones** | | | | | |
| Bromuro | EW_EPA300_0 | mg/L | 0.013 | 0.042 | <0.042 |
| Cloruro | EW_EPA300_0_CX | mg/L | 0.025 | 0.050 | <0.050 |
| Fluoruro | EW_EPA300_0_CX | mg/L | 0.002 | 0.004 | <0.004 |
| Fosfato | EW_EPA300_0_CX | mg/L | 0.019 | 0.038 | <0.038 |
| Nitrato | EW_EPA300_0_CX | mg/L | 0.018 | 0.062 | <0.062 |
| Nitrato (como N) | EW_EPA300_0_CX | mg/L | 0.004 | 0.014 | <0.014 |
| Nitrito | EW_EPA300_0_CX | mg/L | 0.003 | 0.006 | <0.006 |
| Nitrito (como N) | EW_EPA300_0_CX | mg/L | 0.001 | 0.002 | <0.002 |
| Sulfato | EW_EPA300_0_CX | mg/L | 0.01 | 0.03 | <0.03 |
| **Metales Disueltos** | | | | | |
| Aluminio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Antimonio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00004 | 0.00013 | <0.00013 |
| Arsénico Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Bario Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Berilio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Bismuto Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Boro Disuelto | EPW_EPA200_8_DIS | mg/L | 0.002 | 0.006 | <0.006 |
| Cadmio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Calcio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.003 | 0.009 | <0.009 |
| Cerio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00008 | 0.00024 | <0.00024 |
| Cesio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Cobalto Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Cobre Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Cromo Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Estaño Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Estroncio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Fósforo Disuelto | EPW_EPA200_8_DIS | mg/L | 0.015 | 0.047 | <0.047 |
| Galio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00004 | 0.00012 | <0.00012 |
| Germanio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Hafnio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00005 | 0.00015 | <0.00015 |
| Hierro Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Lantano Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Litio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Lutecio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Magnesio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Manganeso Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Mercurio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Molibdeno Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Niobio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Niquel Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Plata Disuelto | EPW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Plomo Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Potasio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | <0.13 |
| Rubidio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0003 | 0.0009 | <0.0009 |
| Selenio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Silice Disuelto | EPW_EPA200_8_DIS | mg/L | 0.09 | 0.27 | <0.27 * |
| Silicio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | <0.13 |
| Sodio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.006 | 0.019 | <0.019 |
| Talio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Tantalio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0007 | 0.0021 | <0.0021 |
| Teluro Disuelto | EPW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Thorio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00006 | 0.00019 | <0.00019 |
| Titanio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Uranio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Vanadio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Wolframio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Yterbio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Zinc Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0008 | 0.0026 | <0.0026 |
| Zirconio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00015 | 0.00045 | <0.00045 |
| **Metales Totales** | | | | | |
| Aluminio Total | EPW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Antimonio Total | EPW_EPA200_8 | mg/L | 0.00004 | 0.00013 | <0.00013 |
| Arsénico Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Bario Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Berilio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Bismuto Total | EPW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Boro Total | EPW_EPA200_8 | mg/L | 0.002 | 0.006 | <0.006 |
| Cadmio Total | EPW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Calcio Total | EPW_EPA200_8 | mg/L | 0.003 | 0.009 | <0.009 |
| Cerio Total | EPW_EPA200_8 | mg/L | 0.00008 | 0.00024 | <0.00024 |
| Cesio Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Cobalto Total | EPW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Cobre Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Cromo Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Estaño Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Estroncio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Fósforo Total | EPW_EPA200_8 | mg/L | 0.015 | 0.047 | <0.047 |
| Galio Total | EPW_EPA200_8 | mg/L | 0.00004 | 0.00012 | <0.00012 |
| Germanio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012572 Rev. 0

| | |
|---|---|
| IDENTIFICACIÓN DE MUESTRA | BK-Campo2 |
| FECHA DE MUESTREO | 06/08/2020 |
| HORA DE MUESTREO | 13:20:00 |
| CATEGORIA | AGUA DE PROCESO |
| SUB CATEGORIA | AGUA PURIFICADA |

| Parámetro | Referencia | Unidad | LD | LC | Resultado |
|---|---|---|---|---|---|
| **Metales Totales** | | | | | |
| Hafnio Total | EPW_EPA200_8 | mg/L | 0.00005 | 0.00015 | <0.00015 |
| Hierro Total | EPW_EPA200_8 | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Lantano Total | EPW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Litio Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Lutecio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Magnesio Total | EPW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Manganeso Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Mercurio Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Molibdeno Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Niobio Total | EPW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Niquel Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Plata Total | EPW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Plomo Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Potasio Total | EPW_EPA200_8 | mg/L | 0.04 | 0.13 | <0.13 |
| Rubidio Total | EPW_EPA200_8 | mg/L | 0.0003 | 0.0009 | <0.0009 |
| Selenio Total | EPW_EPA200_8 | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Silice Total | EPW_EPA200_8 | mg/L | 0.09 | 0.27 | <0.27 * |
| Silicio Total | EPW_EPA200_8 | mg/L | 0.04 | 0.13 | <0.13 |
| Sodio Total | EPW_EPA200_8 | mg/L | 0.006 | 0.019 | <0.019 |
| Talio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Tantalio Total | EPW_EPA200_8 | mg/L | 0.0007 | 0.0021 | <0.0021 |
| Teluro Total | EPW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Thorio Total | EPW_EPA200_8 | mg/L | 0.00006 | 0.00019 | <0.00019 |
| Titanio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Uranio Total | EPW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Vanadio Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Wolframio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Yterbio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Zinc Total | EPW_EPA200_8 | mg/L | 0.0008 | 0.0026 | <0.0026 |
| Zirconio Total | EPW_EPA200_8 | mg/L | 0.00015 | 0.00045 | <0.00045 |

Notas:
El reporte de tiempo se realiza en el sistema horario de 24 horas.
Las muestras recibidas cumplen con las condiciones necesarias para la realización de los análisis solicitados.
(*) Los resultados obtenidos corresponden a métodos que no han sido acreditados por el INACAL-DA.

## INFORME DE ENSAYO CON VALOR OFICIAL
## MA2012572 Rev. 0

# CONTROL DE CALIDAD

**LC:** Limite de cuantificación
**MB:** Blanco del proceso.
**LCS %Recovery:** Porcentaje de recuperación del patrón de proceso.
**MS %Recovery:** Porcentaje de recuperación de la muestra adicionada.
**MSD %RPD:** Diferencia Porcentual Relativa entre los duplicados de la muestra adicionada.
**Dup %RPD:** Diferencia Porcentual Relativa entre los duplicados del proceso.

| Parámetro | Unidad | LC | MB | DUP %RPD | LCS %Recovery | MS %Recovery | MSD %RPD |
|---|---|---|---|---|---|---|---|
| Aluminio Disuelto | mg/L | 0.003 | <0.003 | 0% | 101 - 102% | 103% | 0% |
| Antimonio Disuelto | mg/L | 0.00013 | <0.00013 | 0% | 93 - 100% | 96% | 1% |
| Arsénico Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 95 - 99% | 100% | 0% |
| Bario Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 99 - 106% | 102% | 2% |
| Berilio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 92 - 95% | 92% | 0% |
| Bismuto Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 94% | 97% | 1% |
| Boro Disuelto | mg/L | 0.006 | <0.006 | 0% | 96 - 98% | 102% | 0% |
| Cadmio Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 98 - 102% | 94% | 0% |
| Calcio Disuelto | mg/L | 0.009 | <0.009 | 0% | 98 - 99% | 102% | 0% |
| Cerio Disuelto | mg/L | 0.00024 | <0.00024 | 0% | 101 - 122% | 103% | 3% |
| Cesio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 102 - 107% | 102% | 3% |
| Cobalto Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 91 - 92% | 95% | 0% |
| Cobre Disuelto | mg/L | 0.00009 | <0.00009 | 0% | 94 - 96% | 100% | 0% |
| Cromo Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 103 - 106% | 92% | 0% |
| Estaño Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 101 - 106% | 104% | 1% |
| Estroncio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 96 - 107% | 100% | 3% |
| Fósforo Disuelto | mg/L | 0.047 | <0.047 | 0% | 97 - 101% | 101% | 0% |
| Galio Disuelto | mg/L | 0.00012 | <0.00012 | 0% | 103% | 94% | 5% |
| Germanio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 97% | 96% | 4% |
| Hafnio Disuelto | mg/L | 0.00015 | <0.00015 | 0% | 97 - 104% | 102% | 0% |
| Hierro Disuelto | mg/L | 0.0013 | <0.0013 | 0% | 99% | 107% | 2% |
| Lantano Disuelto | mg/L | 0.0015 | <0.0015 | 0% | 97 - 102% | 100% | 1% |
| Litio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 92 - 104% | 95% | 1% |
| Lutecio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 95 - 98% | 93% | 3% |
| Magnesio Disuelto | mg/L | 0.003 | <0.003 | 0% | 99 - 100% | 100% | 0% |
| Manganeso Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 102% | 98% | 0% |
| Mercurio Disuelto | mg/L | 0.00009 | <0.00009 | 0% | 102 - 110% | 100% | 1% |
| Molibdeno Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 101 - 108% | 97% | 3% |
| Niobio Disuelto | mg/L | 0.0015 | <0.0015 | 0% | 98 - 106% | 101% | 1% |
| Niquel Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 94% | 91% | 0% |
| Plata Disuelto | mg/L | 0.000010 | <0.000010 | 0% | 93 - 101% | 99% | 0% |
| Plomo Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 99 - 102% | 103% | 0% |
| Potasio Disuelto | mg/L | 0.13 | <0.13 | 0% | 102 - 104% | 99% | 7% |
| Rubidio Disuelto | mg/L | 0.0009 | <0.0009 | 0% | 101 - 108% | 104% | 1% |
| Selenio Disuelto | mg/L | 0.0013 | <0.0013 | 0% | 97 - 106% | 100% | 1% |
| Silice Disuelto | mg/L | 0.27 | <0.27 | 0% | 99% | 101% | 0% |
| Silicio Disuelto | mg/L | 0.13 | <0.13 | 0% | 99 - 104% | 101% | 0% |
| Sodio Disuelto | mg/L | 0.019 | <0.019 | 0% | 101 - 102% | 102% | 0% |
| Talio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 93 - 96% | 95% | 2% |
| Tantalio Disuelto | mg/L | 0.0021 | <0.0021 | 0% | 98 - 104% | 101% | 1% |
| Teluro Disuelto | mg/L | 0.003 | <0.003 | 0% | 100 - 106% | 103% | 1% |
| Thorio Disuelto | mg/L | 0.00019 | <0.00019 | 0% | 94 - 104% | 97% | 1% |
| Titanio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 95 - 106% | 98% | 1% |
| Uranio Disuelto | mg/L | 0.000010 | <0.000010 | 0% | 104% | 97% | 6% |
| Vanadio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 106 - 108% | 94% | 3% |
| Wolframio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 96 - 104% | 99% | 1% |
| Yterbio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 98 - 104% | 101% | 1% |
| Zinc Disuelto | mg/L | 0.0026 | <0.0026 | 4% | 97 - 99% | 99% | 0% |
| Zirconio Disuelto | mg/L | 0.00045 | <0.00045 | 0% | 105 - 107% | 98% | 6% |
| Aluminio Total | mg/L | 0.003 | <0.003 | 0% | 96 - 106% | 103% | 1% |
| Antimonio Total | mg/L | 0.00013 | <0.00013 | 0% | 96 - 106% | 94% | 2% |
| Arsénico Total | mg/L | 0.00010 | <0.00010 | 0% | 96 - 101% | 102% | 2% |
| Bario Total | mg/L | 0.0003 | <0.0003 | 0% | 102 - 103% | 105% | 2% |
| Berilio Total | mg/L | 0.00006 | <0.00006 | 0% | 95 - 104% | 102% | 0% |
| Bismuto Total | mg/L | 0.00003 | <0.00003 | 0% | 95 - 103% | 100% | 0% |
| Boro Total | mg/L | 0.006 | <0.006 | 4% | 100% | 102% | 1% |
| Cadmio Total | mg/L | 0.00003 | <0.00003 | 0% | 91 - 103% | 96% | 0% |
| Calcio Total | mg/L | 0.009 | <0.009 | 0% | 98 - 101% | 103% | 0% |
| Cerio Total | mg/L | 0.00024 | <0.00024 | 0% | 103 - 123% | 101% | 0% |
| Cesio Total | mg/L | 0.0003 | <0.0003 | 0% | 101% | 101% | 0% |
| Cobalto Total | mg/L | 0.00003 | <0.00003 | 0% | 93 - 96% | 94% | 0% |
| Cobre Total | mg/L | 0.00009 | <0.00009 | 0% | 99 - 101% | 101% | 2% |
| Cromo Total | mg/L | 0.0003 | <0.0003 | 0% | 92 - 93% | 93% | 1% |
| Estaño Total | mg/L | 0.00010 | <0.00010 | 0% | 103% | 104% | 0% |
| Estroncio Total | mg/L | 0.0006 | <0.0006 | 0% | 99 - 110% | 101% | 1% |
| Fósforo Total | mg/L | 0.047 | <0.047 | 0% | 99 - 106% | 103% | 1% |
| Galio Total | mg/L | 0.00012 | <0.00012 | 0% | 101 - 102% | 97% | 1% |
| Germanio Total | mg/L | 0.0006 | <0.0006 | 0% | 98 - 103% | 98% | 0% |
| Hafnio Total | mg/L | 0.00015 | <0.00015 | 0% | 94 - 106% | 103% | 0% |
| Hierro Total | mg/L | 0.0013 | <0.0013 | 0% | 104 - 106% | 102% | 2% |
| Lantano Total | mg/L | 0.0015 | <0.0015 | 0% | 92 - 95% | 99% | 2% |
| Litio Total | mg/L | 0.0003 | <0.0003 | 0% | 95 - 101% | 93% | 2% |
| Lutecio Total | mg/L | 0.00006 | <0.00006 | 0% | 99% | 106% | 5% |
| Magnesio Total | mg/L | 0.003 | <0.003 | 0% | 102 - 103% | 98% | 1% |

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012572 Rev. 0

## CONTROL DE CALIDAD

**LC:** Limite de cuantificación
**MB:** Blanco del proceso.
**LCS %Recovery:** Porcentaje de recuperación del patrón de proceso.
**MS %Recovery:** Porcentaje de recuperación de la muestra adicionada.
**MSD %RPD:** Diferencia Porcentual Relativa entre los duplicados de la muestra adicionada.
**Dup %RPD:** Diferencia Porcentual Relativa entre los duplicados del proceso.

| Parámetro | Unidad | LC | MB | DUP %RPD | LCS %Recovery | MS %Recovery | MSD %RPD |
|---|---|---|---|---|---|---|---|
| Manganeso Total | mg/L | 0.00010 | <0.00010 | 0% | 95 - 97% | 104% | 1% |
| Mercurio Total | mg/L | 0.00009 | <0.00009 | 0% | 96 - 104% | 98% | 0% |
| Molibdeno Total | mg/L | 0.00006 | <0.00006 | 1% | 100 - 106% | 94% | 0% |
| Niobio Total | mg/L | 0.0015 | <0.0015 | 0% | 102 - 107% | 100% | 0% |
| Niquel Total | mg/L | 0.0006 | <0.0006 | 1% | 95 - 101% | 102% | 0% |
| Plata Total | mg/L | 0.000010 | <0.000010 | 0% | 92 - 94% | 99% | 0% |
| Plomo Total | mg/L | 0.0006 | <0.0006 | 0% | 94 - 95% | 104% | 2% |
| Potasio Total | mg/L | 0.13 | <0.13 | 0% | 103 - 105% | 97% | 0% |
| Rubidio Total | mg/L | 0.0009 | <0.0009 | 0% | 105% | 103% | 0% |
| Selenio Total | mg/L | 0.0013 | <0.0013 | 0% | 101 - 103% | 99% | 2% |
| Silice Total | mg/L | 0.27 | <0.27 | 8% | 95 - 102% | 94% | 0% |
| Silicio Total | mg/L | 0.13 | <0.13 | 8% | 95 - 100% | 94% | 0% |
| Sodio Total | mg/L | 0.019 | <0.019 | 0% | 102 - 104% | 104% | 0% |
| Talio Total | mg/L | 0.00006 | <0.00006 | 0% | 93 - 98% | 102% | 1% |
| Tantalio Total | mg/L | 0.0021 | <0.0021 | 0% | 100 - 101% | 100% | 8% |
| Teluro Total | mg/L | 0.003 | <0.003 | 0% | 91 - 99% | 102% | 0% |
| Thorio Total | mg/L | 0.00019 | <0.00019 | 0% | 101 - 103% | 97% | 0% |
| Titanio Total | mg/L | 0.0006 | <0.0006 | 0% | 93 - 101% | 97% | 2% |
| Uranio Total | mg/L | 0.000010 | <0.000010 | 0% | 100 - 109% | 99% | 2% |
| Vanadio Total | mg/L | 0.0003 | <0.0003 | 0% | 97% | 96% | 1% |
| Wolframio Total | mg/L | 0.0006 | <0.0006 | 0% | 95 - 101% | 98% | 0% |
| Yterbio Total | mg/L | 0.00006 | <0.00006 | 0% | 91 - 93% | 100% | 1% |
| Zinc Total | mg/L | 0.0026 | <0.0026 | 0% | 99% | 102% | 1% |
| Zirconio Total | mg/L | 0.00045 | <0.00045 | 0% | 99 - 104% | 102% | 1% |
| Cloruro | mg/L | 0.050 | <0.050 | | 103% | 101% | 0% |
| Fluoruro | mg/L | 0.004 | <0.004 | | 97% | 97% | 0% |
| Fosfato | mg/L | 0.038 | <0.038 | | 97% | 100% | 0% |
| Nitrato | mg/L | 0.062 | <0.062 | | 99% | 99% | 0% |
| Nitrato (como N) | mg/L | 0.014 | <0.014 | | 99% | 99% | 0% |
| Nitrito | mg/L | 0.006 | <0.006 | | 96% | 97% | 0% |
| Nitrito (como N) | mg/L | 0.002 | <0.002 | | 96% | 97% | 0% |
| Sulfato | mg/L | 0.03 | <0.03 | | 102% | 101% | 0% |
| Bromuro | mg/L | 0.042 | <0.042 | | 99 - 105% | 105% | 0% |

## REFERENCIAS DE MÉTODOS DE ENSAYO

| Referencia | Sede | Parámetro | Método de Ensayo |
|---|---|---|---|
| EPW_EPA200_8 | Callao | Metales Totales | EPA 200.8: Rev 5.4: 1994. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry. (Validado) 2015 |
| EPW_EPA200_8_DIS | Callao | Metales Disueltos | EPA 200.8: Rev 5.4: 1994. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry. (Validado) 2015 |
| EW_EPA300_0 | Callao | Bromuro | EPA 300.0. Rev. 2.1:1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Cloruro | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Fluoruro | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrato (como N) | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrito (como N) | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrito | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Fosfato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Sulfato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012572 Rev. 0

## REFERENCIA DE LOS MÉTODOS DE MUESTREO

| Tipo de Muestra | Procedimiento de Muestreo | Descripción | Plan de Muestreo |
|---|---|---|---|
| AGUA PURIFICADA | INS-P-EHS.1 | Muestreo y Medición de la Calidad del Agua | 350619-1 /2020 |

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Última Revisión Julio 2015

**LABORATORIO DE ENSAYO ACREDITADO POR EL ORGANISMO PERUANO DE ACREDITACIÓN INACAL - DA CON REGISTRO N° LE - 002**

INACAL DA - Perú Laboratorio de Ensayo Acreditado

Registro N°LE - 002

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012623 Rev. 0

## LUMINA COPPER S.A.C.

EL DERBY 055, TORRE 1, PISO 6 - SURCO

ENV / MO-350619-039

PROCEDENCIA : EL GALENO

Fecha de Recepción SGS : 03-08-2020

Fecha de Ejecución : Del 03-08-2020 al 21-08-2020

Muestreo Realizado Por : Personal de Operaciones de SGS

| Estación de Muestreo |
|---|
| BK-Campo1 |

**Emitido por SGS del Perú S.A.C.**

**Impreso el 21/08/2020**

**Jade C. Huarcaya Soto**
**C.B.P. 8471**
**Jefe de Oficina**

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012623 Rev. 0

| IDENTIFICACIÓN DE MUESTRA | BK-Campo1 |
|---|---|
| FECHA DE MUESTREO | 01/08/2020 |
| HORA DE MUESTREO | 11:40:00 |
| CATEGORIA | AGUA DE PROCESO |
| SUB CATEGORIA | AGUA PURIFICADA |

| Parámetro | Referencia | Unidad | LD | LC | Resultado |
|---|---|---|---|---|---|
| **Aniones** | | | | | |
| Bromuro | EW_EPA300_0 | mg/L | 0.013 | 0.042 | <0.042 |
| Cloruro | EW_EPA300_0_CX | mg/L | 0.025 | 0.050 | <0.050 |
| Fluoruro | EW_EPA300_0_CX | mg/L | 0.002 | 0.004 | <0.004 |
| Fosfato | EW_EPA300_0_CX | mg/L | 0.019 | 0.038 | <0.038 |
| Nitrato | EW_EPA300_0_CX | mg/L | 0.018 | 0.062 | <0.062 |
| Nitrato (como N) | EW_EPA300_0_CX | mg/L | 0.004 | 0.014 | <0.014 |
| Nitrito | EW_EPA300_0_CX | mg/L | 0.003 | 0.006 | <0.006 |
| Nitrito (como N) | EW_EPA300_0_CX | mg/L | 0.001 | 0.002 | <0.002 |
| Sulfato | EW_EPA300_0_CX | mg/L | 0.01 | 0.03 | <0.03 |
| **Metales Disueltos** | | | | | |
| Aluminio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Antimonio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00004 | 0.00013 | <0.00013 |
| Arsénico Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Bario Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Berilio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Bismuto Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Boro Disuelto | EPW_EPA200_8_DIS | mg/L | 0.002 | 0.006 | <0.006 |
| Cadmio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Calcio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.003 | 0.009 | <0.009 |
| Cerio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00008 | 0.00024 | <0.00024 |
| Cesio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Cobalto Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Cobre Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Cromo Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Estaño Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Estroncio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Fósforo Disuelto | EPW_EPA200_8_DIS | mg/L | 0.015 | 0.047 | <0.047 |
| Galio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00004 | 0.00012 | <0.00012 |
| Germanio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Hafnio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00005 | 0.00015 | <0.00015 |
| Hierro Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Lantano Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Litio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Lutecio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Magnesio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Manganeso Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Mercurio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Molibdeno Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Niobio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Niquel Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Plata Disuelto | EPW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Plomo Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Potasio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | <0.13 |
| Rubidio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0003 | 0.0009 | <0.0009 |
| Selenio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Silice Disuelto | EPW_EPA200_8_DIS | mg/L | 0.09 | 0.27 | <0.27 * |
| Silicio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | <0.13 |
| Sodio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.006 | 0.019 | <0.019 |
| Talio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Tantalio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0007 | 0.0021 | <0.0021 |
| Teluro Disuelto | EPW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Thorio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00006 | 0.00019 | <0.00019 |
| Titanio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Uranio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Vanadio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Wolframio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Yterbio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Zinc Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0008 | 0.0026 | <0.0026 |
| Zirconio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00015 | 0.00045 | <0.00045 |
| **Metales Totales** | | | | | |
| Aluminio Total | EPW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Antimonio Total | EPW_EPA200_8 | mg/L | 0.00004 | 0.00013 | <0.00013 |
| Arsénico Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Bario Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Berilio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Bismuto Total | EPW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Boro Total | EPW_EPA200_8 | mg/L | 0.002 | 0.006 | <0.006 |
| Cadmio Total | EPW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Calcio Total | EPW_EPA200_8 | mg/L | 0.003 | 0.009 | <0.009 |
| Cerio Total | EPW_EPA200_8 | mg/L | 0.00008 | 0.00024 | <0.00024 |
| Cesio Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Cobalto Total | EPW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Cobre Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Cromo Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Estaño Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Estroncio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Fósforo Total | EPW_EPA200_8 | mg/L | 0.015 | 0.047 | <0.047 |
| Galio Total | EPW_EPA200_8 | mg/L | 0.00004 | 0.00012 | <0.00012 |
| Germanio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012623 Rev. 0

| | |
|---|---|
| IDENTIFICACIÓN DE MUESTRA | BK-Campo1 |
| FECHA DE MUESTREO | 01/08/2020 |
| HORA DE MUESTREO | 11:40:00 |
| CATEGORIA | AGUA DE PROCESO |
| SUB CATEGORIA | AGUA PURIFICADA |

| Parámetro | Referencia | Unidad | LD | LC | Resultado |
|---|---|---|---|---|---|
| **Metales Totales** | | | | | |
| Hafnio Total | EPW_EPA200_8 | mg/L | 0.00005 | 0.00015 | <0.00015 |
| Hierro Total | EPW_EPA200_8 | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Lantano Total | EPW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Litio Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Lutecio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Magnesio Total | EPW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Manganeso Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Mercurio Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Molibdeno Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Niobio Total | EPW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Niquel Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Plata Total | EPW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Plomo Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Potasio Total | EPW_EPA200_8 | mg/L | 0.04 | 0.13 | <0.13 |
| Rubidio Total | EPW_EPA200_8 | mg/L | 0.0003 | 0.0009 | <0.0009 |
| Selenio Total | EPW_EPA200_8 | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Silice Total | EPW_EPA200_8 | mg/L | 0.09 | 0.27 | <0.27 * |
| Silicio Total | EPW_EPA200_8 | mg/L | 0.04 | 0.13 | <0.13 |
| Sodio Total | EPW_EPA200_8 | mg/L | 0.006 | 0.019 | <0.019 |
| Talio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Tantalio Total | EPW_EPA200_8 | mg/L | 0.0007 | 0.0021 | <0.0021 |
| Teluro Total | EPW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Thorio Total | EPW_EPA200_8 | mg/L | 0.00006 | 0.00019 | <0.00019 |
| Titanio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Uranio Total | EPW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Vanadio Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Wolframio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Yterbio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Zinc Total | EPW_EPA200_8 | mg/L | 0.0008 | 0.0026 | <0.0026 |
| Zirconio Total | EPW_EPA200_8 | mg/L | 0.00015 | 0.00045 | <0.00045 |

Notas:
El reporte de tiempo se realiza en el sistema horario de 24 horas.
Las muestras recibidas cumplen con las condiciones necesarias para la realización de los análisis solicitados.
(*) Los resultados obtenidos corresponden a métodos que no han sido acreditados por el INACAL-DA.

## INFORME DE ENSAYO CON VALOR OFICIAL
## MA2012623 Rev. 0

# CONTROL DE CALIDAD

**LC:** Limite de cuantificación
**MB:** Blanco del proceso.
**LCS %Recovery:** Porcentaje de recuperación del patrón de proceso.
**MS %Recovery:** Porcentaje de recuperación de la muestra adicionada.
**MSD %RPD:** Diferencia Porcentual Relativa entre los duplicados de la muestra adicionada.
**Dup %RPD:** Diferencia Porcentual Relativa entre los duplicados del proceso.

| Parámetro | Unidad | LC | MB | DUP %RPD | LCS %Recovery | MS %Recovery | MSD %RPD |
|---|---|---|---|---|---|---|---|
| Aluminio Disuelto | mg/L | 0.003 | <0.003 | 0% | 101 - 102% | 103% | 0% |
| Antimonio Disuelto | mg/L | 0.00013 | <0.00013 | 0% | 93 - 100% | 96% | 1% |
| Arsénico Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 95 - 99% | 100% | 0% |
| Bario Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 99 - 106% | 102% | 2% |
| Berilio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 92 - 95% | 92% | 0% |
| Bismuto Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 94% | 97% | 1% |
| Boro Disuelto | mg/L | 0.006 | <0.006 | 0% | 96 - 98% | 102% | 0% |
| Cadmio Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 98 - 102% | 94% | 0% |
| Calcio Disuelto | mg/L | 0.009 | <0.009 | 0% | 98 - 99% | 102% | 0% |
| Cerio Disuelto | mg/L | 0.00024 | <0.00024 | 0% | 101 - 122% | 103% | 3% |
| Cesio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 102 - 107% | 102% | 3% |
| Cobalto Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 91 - 92% | 95% | 0% |
| Cobre Disuelto | mg/L | 0.00009 | <0.00009 | 0% | 94 - 96% | 100% | 0% |
| Cromo Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 103 - 106% | 92% | 0% |
| Estaño Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 101 - 106% | 104% | 1% |
| Estroncio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 96 - 107% | 100% | 3% |
| Fósforo Disuelto | mg/L | 0.047 | <0.047 | 0% | 97 - 101% | 101% | 0% |
| Galio Disuelto | mg/L | 0.00012 | <0.00012 | 0% | 103% | 94% | 5% |
| Germanio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 97% | 96% | 4% |
| Hafnio Disuelto | mg/L | 0.00015 | <0.00015 | 0% | 97 - 104% | 102% | 0% |
| Hierro Disuelto | mg/L | 0.0013 | <0.0013 | 0% | 99% | 107% | 2% |
| Lantano Disuelto | mg/L | 0.0015 | <0.0015 | 0% | 97 - 102% | 100% | 1% |
| Litio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 92 - 104% | 95% | 1% |
| Lutecio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 95 - 98% | 93% | 3% |
| Magnesio Disuelto | mg/L | 0.003 | <0.003 | 0% | 99 - 100% | 100% | 0% |
| Manganeso Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 102% | 98% | 0% |
| Mercurio Disuelto | mg/L | 0.00009 | <0.00009 | 0% | 102 - 110% | 100% | 1% |
| Molibdeno Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 101 - 108% | 97% | 3% |
| Niobio Disuelto | mg/L | 0.0015 | <0.0015 | 0% | 98 - 106% | 101% | 1% |
| Niquel Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 94% | 91% | 0% |
| Plata Disuelto | mg/L | 0.000010 | <0.000010 | 0% | 93 - 101% | 99% | 0% |
| Plomo Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 99 - 102% | 103% | 0% |
| Potasio Disuelto | mg/L | 0.13 | <0.13 | 0% | 102 - 104% | 99% | 7% |
| Rubidio Disuelto | mg/L | 0.0009 | <0.0009 | 0% | 101 - 108% | 104% | 1% |
| Selenio Disuelto | mg/L | 0.0013 | <0.0013 | 0% | 97 - 106% | 100% | 1% |
| Silice Disuelto | mg/L | 0.27 | <0.27 | 0% | 99% | 101% | 0% |
| Silicio Disuelto | mg/L | 0.13 | <0.13 | 0% | 99 - 104% | 101% | 0% |
| Sodio Disuelto | mg/L | 0.019 | <0.019 | 0% | 101 - 102% | 102% | 0% |
| Talio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 93 - 96% | 95% | 2% |
| Tantalio Disuelto | mg/L | 0.0021 | <0.0021 | 0% | 98 - 104% | 101% | 1% |
| Teluro Disuelto | mg/L | 0.003 | <0.003 | 0% | 100 - 106% | 103% | 1% |
| Thorio Disuelto | mg/L | 0.00019 | <0.00019 | 0% | 94 - 104% | 97% | 1% |
| Titanio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 95 - 106% | 98% | 1% |
| Uranio Disuelto | mg/L | 0.000010 | <0.000010 | 0% | 104% | 97% | 6% |
| Vanadio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 106 - 108% | 94% | 3% |
| Wolframio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 96 - 104% | 99% | 1% |
| Yterbio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 98 - 104% | 101% | 1% |
| Zinc Disuelto | mg/L | 0.0026 | <0.0026 | 4% | 97 - 99% | 99% | 0% |
| Zirconio Disuelto | mg/L | 0.00045 | <0.00045 | 0% | 105 - 107% | 98% | 6% |
| Aluminio Total | mg/L | 0.003 | <0.003 | 0% | 96 - 106% | 103% | 1% |
| Antimonio Total | mg/L | 0.00013 | <0.00013 | 0% | 96 - 106% | 94% | 2% |
| Arsénico Total | mg/L | 0.00010 | <0.00010 | 0% | 96 - 101% | 102% | 2% |
| Bario Total | mg/L | 0.0003 | <0.0003 | 0% | 102 - 103% | 105% | 2% |
| Berilio Total | mg/L | 0.00006 | <0.00006 | 0% | 95 - 104% | 102% | 0% |
| Bismuto Total | mg/L | 0.00003 | <0.00003 | 0% | 95 - 103% | 100% | 0% |
| Boro Total | mg/L | 0.006 | <0.006 | 4% | 100% | 102% | 1% |
| Cadmio Total | mg/L | 0.00003 | <0.00003 | 0% | 91 - 103% | 96% | 0% |
| Calcio Total | mg/L | 0.009 | <0.009 | 0% | 98 - 101% | 103% | 0% |
| Cerio Total | mg/L | 0.00024 | <0.00024 | 0% | 103 - 123% | 101% | 0% |
| Cesio Total | mg/L | 0.0003 | <0.0003 | 0% | 101% | 101% | 0% |
| Cobalto Total | mg/L | 0.00003 | <0.00003 | 0% | 93 - 96% | 94% | 0% |
| Cobre Total | mg/L | 0.00009 | <0.00009 | 0% | 99 - 101% | 101% | 2% |
| Cromo Total | mg/L | 0.0003 | <0.0003 | 0% | 92 - 93% | 93% | 1% |
| Estaño Total | mg/L | 0.00010 | <0.00010 | 0% | 103% | 104% | 0% |
| Estroncio Total | mg/L | 0.0006 | <0.0006 | 0% | 99 - 110% | 101% | 1% |
| Fósforo Total | mg/L | 0.047 | <0.047 | 0% | 99 - 106% | 103% | 1% |
| Galio Total | mg/L | 0.00012 | <0.00012 | 0% | 101 - 102% | 97% | 1% |
| Germanio Total | mg/L | 0.0006 | <0.0006 | 0% | 98 - 103% | 98% | 0% |
| Hafnio Total | mg/L | 0.00015 | <0.00015 | 0% | 94 - 106% | 103% | 0% |
| Hierro Total | mg/L | 0.0013 | <0.0013 | 0% | 104 - 106% | 102% | 2% |
| Lantano Total | mg/L | 0.0015 | <0.0015 | 0% | 92 - 95% | 99% | 2% |
| Litio Total | mg/L | 0.0003 | <0.0003 | 0% | 95 - 101% | 93% | 2% |
| Lutecio Total | mg/L | 0.00006 | <0.00006 | 0% | 99% | 106% | 5% |
| Magnesio Total | mg/L | 0.003 | <0.003 | 0% | 102 - 103% | 98% | 1% |

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# CONTROL DE CALIDAD

**LC:** Limite de cuantificación
**MB:** Blanco del proceso.
**LCS %Recovery:** Porcentaje de recuperación del patrón de proceso.
**MS %Recovery:** Porcentaje de recuperación de la muestra adicionada.
**MSD %RPD:** Diferencia Porcentual Relativa entre los duplicados de la muestra adicionada.
**Dup %RPD:** Diferencia Porcentual Relativa entre los duplicados del proceso.

| Parámetro | Unidad | LC | MB | DUP %RPD | LCS %Recovery | MS %Recovery | MSD %RPD |
|---|---|---|---|---|---|---|---|
| Manganeso Total | mg/L | 0.00010 | <0.00010 | 0% | 95 - 97% | 104% | 1% |
| Mercurio Total | mg/L | 0.00009 | <0.00009 | 0% | 96 - 104% | 98% | 0% |
| Molibdeno Total | mg/L | 0.00006 | <0.00006 | 1% | 100 - 106% | 94% | 0% |
| Niobio Total | mg/L | 0.0015 | <0.0015 | 0% | 102 - 107% | 100% | 0% |
| Niquel Total | mg/L | 0.0006 | <0.0006 | 1% | 95 - 101% | 102% | 0% |
| Plata Total | mg/L | 0.000010 | <0.000010 | 0% | 92 - 94% | 99% | 0% |
| Plomo Total | mg/L | 0.0006 | <0.0006 | 0% | 94 - 95% | 104% | 2% |
| Potasio Total | mg/L | 0.13 | <0.13 | 0% | 103 - 105% | 97% | 0% |
| Rubidio Total | mg/L | 0.0009 | <0.0009 | 0% | 105% | 103% | 0% |
| Selenio Total | mg/L | 0.0013 | <0.0013 | 0% | 101 - 103% | 99% | 2% |
| Silice Total | mg/L | 0.27 | <0.27 | 8% | 95 - 102% | 94% | 0% |
| Silicio Total | mg/L | 0.13 | <0.13 | 8% | 95 - 100% | 94% | 0% |
| Sodio Total | mg/L | 0.019 | <0.019 | 0% | 102 - 104% | 104% | 0% |
| Talio Total | mg/L | 0.00006 | <0.00006 | 0% | 93 - 98% | 102% | 1% |
| Tantalio Total | mg/L | 0.0021 | <0.0021 | 0% | 100 - 101% | 100% | 8% |
| Teluro Total | mg/L | 0.003 | <0.003 | 0% | 91 - 99% | 102% | 0% |
| Thorio Total | mg/L | 0.00019 | <0.00019 | 0% | 101 - 103% | 97% | 0% |
| Titanio Total | mg/L | 0.0006 | <0.0006 | 0% | 93 - 101% | 97% | 2% |
| Uranio Total | mg/L | 0.000010 | <0.000010 | 0% | 100 - 109% | 99% | 2% |
| Vanadio Total | mg/L | 0.0003 | <0.0003 | 0% | 97% | 96% | 1% |
| Wolframio Total | mg/L | 0.0006 | <0.0006 | 0% | 95 - 101% | 98% | 0% |
| Yterbio Total | mg/L | 0.00006 | <0.00006 | 0% | 91 - 93% | 100% | 1% |
| Zinc Total | mg/L | 0.0026 | <0.0026 | 0% | 99% | 102% | 1% |
| Zirconio Total | mg/L | 0.00045 | <0.00045 | 0% | 99 - 104% | 102% | 1% |
| Cloruro | mg/L | 0.050 | <0.050 | | 103 - 104% | 101% | 0% |
| Fluoruro | mg/L | 0.004 | <0.004 | | 97 - 100% | 97% | 0% |
| Fosfato | mg/L | 0.038 | <0.038 | | 97 - 100% | 100% | 0% |
| Nitrato | mg/L | 0.062 | <0.062 | | 99 - 100% | 99% | 0% |
| Nitrato (como N) | mg/L | 0.014 | <0.014 | | 99 - 100% | 99% | 0% |
| Nitrito | mg/L | 0.006 | <0.006 | | 96 - 100% | 97% | 0% |
| Nitrito (como N) | mg/L | 0.002 | <0.002 | | 96 - 100% | 97% | 0% |
| Sulfato | mg/L | 0.03 | <0.03 | | 102 - 104% | 100% | 0% |
| Bromuro | mg/L | 0.042 | <0.042 | | 97% | 95 - 101% | 0% |

## REFERENCIAS DE MÉTODOS DE ENSAYO

| Referencia | Sede | Parámetro | Método de Ensayo |
|---|---|---|---|
| EPW_EPA200_8 | Callao | Metales Totales | EPA 200.8: Rev 5.4: 1994. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry. (Validado) 2015 |
| EPW_EPA200_8_DIS | Callao | Metales Disueltos | EPA 200.8: Rev 5.4: 1994. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry. (Validado) 2015 |
| EW_EPA300_0 | Callao | Bromuro | EPA 300.0. Rev. 2.1:1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Cloruro | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Fluoruro | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrato (como N) | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrito (como N) | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrito | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Fosfato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Sulfato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |

# INFORME DE ENSAYO CON VALOR OFICIAL
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## REFERENCIA DE LOS MÉTODOS DE MUESTREO

| Tipo de Muestra | Procedimiento de Muestreo | Descripción | Plan de Muestreo |
|---|---|---|---|
| AGUA PURIFICADA | INS-P-EHS.1 | Muestreo y Medición de la Calidad del Agua | 350619-1 /2020 |

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Última Revisión Julio 2015

# LABORATORIO DE ENSAYO ACREDITADO POR EL ORGANISMO PERUANO DE ACREDITACIÓN INACAL - DA CON REGISTRO N° LE - 002

## INFORME DE ENSAYO CON VALOR OFICIAL
## MA2012628 Rev. 0

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## LUMINA COPPER S.A.C.

EL DERBY 055, TORRE 1, PISO 6 - SURCO

ENV / MO-350619-040

PROCEDENCIA : EL GALENO

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Fecha de Recepción SGS : 29-07-2020

Fecha de Ejecución : Del 29-07-2020 al 21-08-2020

Muestreo Realizado Por : Personal de Operaciones de SGS

| Estación de Muestreo |
|---|
| BK-Viajero |

**Emitido por SGS del Perú S.A.C.**

**Impreso el 21/08/2020**

**Jade C. Huarcaya Soto**
**C.B.P. 8471**
**Jefe de Oficina**

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012628 Rev. 0

| IDENTIFICACIÓN DE MUESTRA | BK-Viajero |
|---|---|
| FECHA DE MUESTREO | 27/07/2020 |
| HORA DE MUESTREO | 10:00:00 |
| CATEGORIA | AGUA DE PROCESO |
| SUB CATEGORIA | AGUA PURIFICADA |

| Parámetro | Referencia | Unidad | LD | LC | Resultado |
|---|---|---|---|---|---|
| **Aniones** | | | | | |
| Bromuro | EW_EPA300_0 | mg/L | 0.013 | 0.042 | <0.042 |
| Cloruro | EW_EPA300_0_CX | mg/L | 0.025 | 0.050 | <0.050 |
| Fluoruro | EW_EPA300_0_CX | mg/L | 0.002 | 0.004 | <0.004 |
| Fosfato | EW_EPA300_0_CX | mg/L | 0.019 | 0.038 | <0.038 |
| Nitrato | EW_EPA300_0_CX | mg/L | 0.018 | 0.062 | <0.062 |
| Nitrato (como N) | EW_EPA300_0_CX | mg/L | 0.004 | 0.014 | <0.014 |
| Nitrito | EW_EPA300_0_CX | mg/L | 0.003 | 0.006 | <0.006 |
| Nitrito (como N) | EW_EPA300_0_CX | mg/L | 0.001 | 0.002 | <0.002 |
| Sulfato | EW_EPA300_0_CX | mg/L | 0.01 | 0.03 | <0.03 |
| **Análisis Microbiológicos** | | | | | |
| Numeración de Heterótrofos | EW_APHA9215B_CX | UFC/mL | -- | -- | <1 (**) |
| **Metales Disueltos** | | | | | |
| Aluminio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Antimonio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00004 | 0.00013 | <0.00013 |
| Arsénico Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Bario Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Berilio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Bismuto Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Boro Disuelto | EPW_EPA200_8_DIS | mg/L | 0.002 | 0.006 | <0.006 |
| Cadmio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Calcio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.003 | 0.009 | <0.009 |
| Cerio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00008 | 0.00024 | <0.00024 |
| Cesio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Cobalto Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Cobre Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Cromo Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Estaño Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Estroncio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Fósforo Disuelto | EPW_EPA200_8_DIS | mg/L | 0.015 | 0.047 | <0.047 |
| Galio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00004 | 0.00012 | <0.00012 |
| Germanio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Hafnio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00005 | 0.00015 | <0.00015 |
| Hierro Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Lantano Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Litio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Lutecio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Magnesio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Manganeso Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Mercurio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Molibdeno Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Niobio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Niquel Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Plata Disuelto | EPW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Plomo Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Potasio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | <0.13 |
| Rubidio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0003 | 0.0009 | <0.0009 |
| Selenio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Silice Disuelto | EPW_EPA200_8_DIS | mg/L | 0.09 | 0.27 | <0.27 * |
| Silicio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.04 | 0.13 | <0.13 |
| Sodio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.006 | 0.019 | <0.019 |
| Talio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Tantalio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0007 | 0.0021 | <0.0021 |
| Teluro Disuelto | EPW_EPA200_8_DIS | mg/L | 0.001 | 0.003 | <0.003 |
| Thorio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00006 | 0.00019 | <0.00019 |
| Titanio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Uranio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Vanadio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Wolframio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Yterbio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Zinc Disuelto | EPW_EPA200_8_DIS | mg/L | 0.0008 | 0.0026 | <0.0026 |
| Zirconio Disuelto | EPW_EPA200_8_DIS | mg/L | 0.00015 | 0.00045 | <0.00045 |
| **Metales Totales** | | | | | |
| Aluminio Total | EPW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Antimonio Total | EPW_EPA200_8 | mg/L | 0.00004 | 0.00013 | <0.00013 |
| Arsénico Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Bario Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Berilio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Bismuto Total | EPW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Boro Total | EPW_EPA200_8 | mg/L | 0.002 | 0.006 | <0.006 |
| Cadmio Total | EPW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Calcio Total | EPW_EPA200_8 | mg/L | 0.003 | 0.009 | <0.009 |
| Cerio Total | EPW_EPA200_8 | mg/L | 0.00008 | 0.00024 | <0.00024 |
| Cesio Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Cobalto Total | EPW_EPA200_8 | mg/L | 0.00001 | 0.00003 | <0.00003 |
| Cobre Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Cromo Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Estaño Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Estroncio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Fósforo Total | EPW_EPA200_8 | mg/L | 0.015 | 0.047 | <0.047 |

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012628 Rev. 0

| | |
|---|---|
| IDENTIFICACIÓN DE MUESTRA | BK-Viajero |
| FECHA DE MUESTREO | 27/07/2020 |
| HORA DE MUESTREO | 10:00:00 |
| CATEGORIA | AGUA DE PROCESO |
| SUB CATEGORIA | AGUA PURIFICADA |

| Parámetro | Referencia | Unidad | LD | LC | Resultado |
|---|---|---|---|---|---|
| **Metales Totales** | | | | | |
| Galio Total | EPW_EPA200_8 | mg/L | 0.00004 | 0.00012 | <0.00012 |
| Germanio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Hafnio Total | EPW_EPA200_8 | mg/L | 0.00005 | 0.00015 | <0.00015 |
| Hierro Total | EPW_EPA200_8 | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Lantano Total | EPW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Litio Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Lutecio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Magnesio Total | EPW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Manganeso Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00010 | <0.00010 |
| Mercurio Total | EPW_EPA200_8 | mg/L | 0.00003 | 0.00009 | <0.00009 |
| Molibdeno Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Niobio Total | EPW_EPA200_8 | mg/L | 0.0005 | 0.0015 | <0.0015 |
| Niquel Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Plata Total | EPW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Plomo Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Potasio Total | EPW_EPA200_8 | mg/L | 0.04 | 0.13 | <0.13 |
| Rubidio Total | EPW_EPA200_8 | mg/L | 0.0003 | 0.0009 | <0.0009 |
| Selenio Total | EPW_EPA200_8 | mg/L | 0.0004 | 0.0013 | <0.0013 |
| Silice Total | EPW_EPA200_8 | mg/L | 0.09 | 0.27 | <0.27 * |
| Silicio Total | EPW_EPA200_8 | mg/L | 0.04 | 0.13 | <0.13 |
| Sodio Total | EPW_EPA200_8 | mg/L | 0.006 | 0.019 | <0.019 |
| Talio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Tantalio Total | EPW_EPA200_8 | mg/L | 0.0007 | 0.0021 | <0.0021 |
| Teluro Total | EPW_EPA200_8 | mg/L | 0.001 | 0.003 | <0.003 |
| Thorio Total | EPW_EPA200_8 | mg/L | 0.00006 | 0.00019 | <0.00019 |
| Titanio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Uranio Total | EPW_EPA200_8 | mg/L | 0.000003 | 0.000010 | <0.000010 |
| Vanadio Total | EPW_EPA200_8 | mg/L | 0.0001 | 0.0003 | <0.0003 |
| Wolframio Total | EPW_EPA200_8 | mg/L | 0.0002 | 0.0006 | <0.0006 |
| Yterbio Total | EPW_EPA200_8 | mg/L | 0.00002 | 0.00006 | <0.00006 |
| Zinc Total | EPW_EPA200_8 | mg/L | 0.0008 | 0.0026 | <0.0026 |
| Zirconio Total | EPW_EPA200_8 | mg/L | 0.00015 | 0.00045 | <0.00045 |

Notas:
El reporte de tiempo se realiza en el sistema horario de 24 horas.
Las muestras recibidas cumplen con las condiciones necesarias para la realización de los análisis solicitados.
(*) Los resultados obtenidos corresponden a métodos que no han sido acreditados por el INACAL-DA.
(**) Los resultados del ensayo no se encuentran dentro del marco de la acreditación otorgada por INACAL - DA debido a que la muestra no es idónea para el ensayo solicitado. Los resultados se emiten a solicitud del cliente.

## INFORME DE ENSAYO CON VALOR OFICIAL
## MA2012628 Rev. 0

# CONTROL DE CALIDAD

**LC:** Limite de cuantificación
**MB:** Blanco del proceso.
**LCS %Recovery:** Porcentaje de recuperación del patrón de proceso.
**MS %Recovery:** Porcentaje de recuperación de la muestra adicionada.
**MSD %RPD:** Diferencia Porcentual Relativa entre los duplicados de la muestra adicionada.
**Dup %RPD:** Diferencia Porcentual Relativa entre los duplicados del proceso.

| Parámetro | Unidad | LC | MB | DUP %RPD | LCS %Recovery | MS %Recovery | MSD %RPD |
|---|---|---|---|---|---|---|---|
| Aluminio Disuelto | mg/L | 0.003 | <0.003 | 0% | 101 - 102% | 103% | 0% |
| Antimonio Disuelto | mg/L | 0.00013 | <0.00013 | 0% | 93 - 100% | 96% | 1% |
| Arsénico Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 95 - 99% | 100% | 0% |
| Bario Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 99 - 106% | 102% | 2% |
| Berilio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 92 - 95% | 92% | 0% |
| Bismuto Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 94% | 97% | 1% |
| Boro Disuelto | mg/L | 0.006 | <0.006 | 0% | 96 - 98% | 102% | 0% |
| Cadmio Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 98 - 102% | 94% | 0% |
| Calcio Disuelto | mg/L | 0.009 | <0.009 | 0% | 98 - 99% | 102% | 0% |
| Cerio Disuelto | mg/L | 0.00024 | <0.00024 | 0% | 101 - 122% | 103% | 3% |
| Cesio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 102 - 107% | 102% | 3% |
| Cobalto Disuelto | mg/L | 0.00003 | <0.00003 | 0% | 91 - 92% | 95% | 0% |
| Cobre Disuelto | mg/L | 0.00009 | <0.00009 | 0% | 94 - 96% | 100% | 0% |
| Cromo Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 103 - 106% | 92% | 0% |
| Estaño Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 101 - 106% | 104% | 1% |
| Estroncio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 96 - 107% | 100% | 3% |
| Fósforo Disuelto | mg/L | 0.047 | <0.047 | 0% | 97 - 101% | 101% | 0% |
| Galio Disuelto | mg/L | 0.00012 | <0.00012 | 0% | 103% | 94% | 5% |
| Germanio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 97% | 96% | 4% |
| Hafnio Disuelto | mg/L | 0.00015 | <0.00015 | 0% | 97 - 104% | 102% | 0% |
| Hierro Disuelto | mg/L | 0.0013 | <0.0013 | 0% | 99% | 107% | 2% |
| Lantano Disuelto | mg/L | 0.0015 | <0.0015 | 0% | 97 - 102% | 100% | 1% |
| Litio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 92 - 104% | 95% | 1% |
| Lutecio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 95 - 98% | 93% | 3% |
| Magnesio Disuelto | mg/L | 0.003 | <0.003 | 0% | 99 - 100% | 100% | 0% |
| Manganeso Disuelto | mg/L | 0.00010 | <0.00010 | 0% | 102% | 98% | 0% |
| Mercurio Disuelto | mg/L | 0.00009 | <0.00009 | 0% | 102 - 110% | 100% | 1% |
| Molibdeno Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 101 - 108% | 97% | 3% |
| Niobio Disuelto | mg/L | 0.0015 | <0.0015 | 0% | 98 - 106% | 101% | 1% |
| Niquel Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 94% | 91% | 0% |
| Plata Disuelto | mg/L | 0.000010 | <0.000010 | 0% | 93 - 101% | 99% | 0% |
| Plomo Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 99 - 102% | 103% | 0% |
| Potasio Disuelto | mg/L | 0.13 | <0.13 | 0% | 102 - 104% | 99% | 7% |
| Rubidio Disuelto | mg/L | 0.0009 | <0.0009 | 0% | 101 - 108% | 104% | 1% |
| Selenio Disuelto | mg/L | 0.0013 | <0.0013 | 0% | 97 - 106% | 100% | 1% |
| Silice Disuelto | mg/L | 0.27 | <0.27 | 0% | 99% | 101% | 0% |
| Silicio Disuelto | mg/L | 0.13 | <0.13 | 0% | 99 - 104% | 101% | 0% |
| Sodio Disuelto | mg/L | 0.019 | <0.019 | 0% | 101 - 102% | 102% | 0% |
| Talio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 93 - 96% | 95% | 2% |
| Tantalio Disuelto | mg/L | 0.0021 | <0.0021 | 0% | 98 - 104% | 101% | 1% |
| Teluro Disuelto | mg/L | 0.003 | <0.003 | 0% | 100 - 106% | 103% | 1% |
| Thorio Disuelto | mg/L | 0.00019 | <0.00019 | 0% | 94 - 104% | 97% | 1% |
| Titanio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 95 - 106% | 98% | 1% |
| Uranio Disuelto | mg/L | 0.000010 | <0.000010 | 0% | 104% | 97% | 6% |
| Vanadio Disuelto | mg/L | 0.0003 | <0.0003 | 0% | 106 - 108% | 94% | 3% |
| Wolframio Disuelto | mg/L | 0.0006 | <0.0006 | 0% | 96 - 104% | 99% | 1% |
| Yterbio Disuelto | mg/L | 0.00006 | <0.00006 | 0% | 98 - 104% | 101% | 1% |
| Zinc Disuelto | mg/L | 0.0026 | <0.0026 | 4% | 97 - 99% | 99% | 0% |
| Zirconio Disuelto | mg/L | 0.00045 | <0.00045 | 0% | 105 - 107% | 98% | 6% |
| Aluminio Total | mg/L | 0.003 | <0.003 | 0% | 96 - 106% | 103% | 1% |
| Antimonio Total | mg/L | 0.00013 | <0.00013 | 0% | 96 - 106% | 94% | 2% |
| Arsénico Total | mg/L | 0.00010 | <0.00010 | 0% | 96 - 101% | 102% | 2% |
| Bario Total | mg/L | 0.0003 | <0.0003 | 0% | 102 - 103% | 105% | 2% |
| Berilio Total | mg/L | 0.00006 | <0.00006 | 0% | 95 - 104% | 102% | 0% |
| Bismuto Total | mg/L | 0.00003 | <0.00003 | 0% | 95 - 103% | 100% | 0% |
| Boro Total | mg/L | 0.006 | <0.006 | 4% | 100% | 102% | 1% |
| Cadmio Total | mg/L | 0.00003 | <0.00003 | 0% | 91 - 103% | 96% | 0% |
| Calcio Total | mg/L | 0.009 | <0.009 | 0% | 98 - 101% | 103% | 0% |
| Cerio Total | mg/L | 0.00024 | <0.00024 | 0% | 103 - 123% | 101% | 0% |
| Cesio Total | mg/L | 0.0003 | <0.0003 | 0% | 101% | 101% | 0% |
| Cobalto Total | mg/L | 0.00003 | <0.00003 | 0% | 93 - 96% | 94% | 0% |
| Cobre Total | mg/L | 0.00009 | <0.00009 | 0% | 99 - 101% | 101% | 2% |
| Cromo Total | mg/L | 0.0003 | <0.0003 | 0% | 92 - 93% | 93% | 1% |
| Estaño Total | mg/L | 0.00010 | <0.00010 | 0% | 103% | 104% | 0% |
| Estroncio Total | mg/L | 0.0006 | <0.0006 | 0% | 99 - 110% | 101% | 1% |
| Fósforo Total | mg/L | 0.047 | <0.047 | 0% | 99 - 106% | 103% | 1% |
| Galio Total | mg/L | 0.00012 | <0.00012 | 0% | 101 - 102% | 97% | 1% |
| Germanio Total | mg/L | 0.0006 | <0.0006 | 0% | 98 - 103% | 98% | 0% |
| Hafnio Total | mg/L | 0.00015 | <0.00015 | 0% | 94 - 106% | 103% | 0% |
| Hierro Total | mg/L | 0.0013 | <0.0013 | 0% | 104 - 106% | 102% | 2% |
| Lantano Total | mg/L | 0.0015 | <0.0015 | 0% | 92 - 95% | 99% | 2% |
| Litio Total | mg/L | 0.0003 | <0.0003 | 0% | 95 - 101% | 93% | 2% |
| Lutecio Total | mg/L | 0.00006 | <0.00006 | 0% | 99% | 106% | 5% |
| Magnesio Total | mg/L | 0.003 | <0.003 | 0% | 102 - 103% | 98% | 1% |

## INFORME DE ENSAYO CON VALOR OFICIAL
## MA2012628 Rev. 0

# CONTROL DE CALIDAD

**LC:** Limite de cuantificación
**MB:** Blanco del proceso.
**LCS %Recovery:** Porcentaje de recuperación del patrón de proceso.
**MS %Recovery:** Porcentaje de recuperación de la muestra adicionada.
**MSD %RPD:** Diferencia Porcentual Relativa entre los duplicados de la muestra adicionada.
**Dup %RPD:** Diferencia Porcentual Relativa entre los duplicados del proceso.

| Parámetro | Unidad | LC | MB | DUP %RPD | LCS %Recovery | MS %Recovery | MSD %RPD |
|---|---|---|---|---|---|---|---|
| Manganeso Total | mg/L | 0.00010 | <0.00010 | 0% | 95 - 97% | 104% | 1% |
| Mercurio Total | mg/L | 0.00009 | <0.00009 | 0% | 96 - 104% | 98% | 0% |
| Molibdeno Total | mg/L | 0.00006 | <0.00006 | 1% | 100 - 106% | 94% | 0% |
| Niobio Total | mg/L | 0.0015 | <0.0015 | 0% | 102 - 107% | 100% | 0% |
| Niquel Total | mg/L | 0.0006 | <0.0006 | 1% | 95 - 101% | 102% | 0% |
| Plata Total | mg/L | 0.000010 | <0.000010 | 0% | 92 - 94% | 99% | 0% |
| Plomo Total | mg/L | 0.0006 | <0.0006 | 0% | 94 - 95% | 104% | 2% |
| Potasio Total | mg/L | 0.13 | <0.13 | 0% | 103 - 105% | 97% | 0% |
| Rubidio Total | mg/L | 0.0009 | <0.0009 | 0% | 105% | 103% | 0% |
| Selenio Total | mg/L | 0.0013 | <0.0013 | 0% | 101 - 103% | 99% | 2% |
| Silice Total | mg/L | 0.27 | <0.27 | 8% | 95 - 102% | 94% | 0% |
| Silicio Total | mg/L | 0.13 | <0.13 | 8% | 95 - 100% | 94% | 0% |
| Sodio Total | mg/L | 0.019 | <0.019 | 0% | 102 - 104% | 104% | 0% |
| Talio Total | mg/L | 0.00006 | <0.00006 | 0% | 93 - 98% | 102% | 1% |
| Tantalio Total | mg/L | 0.0021 | <0.0021 | 0% | 100 - 101% | 100% | 8% |
| Teluro Total | mg/L | 0.003 | <0.003 | 0% | 91 - 99% | 102% | 0% |
| Thorio Total | mg/L | 0.00019 | <0.00019 | 0% | 101 - 103% | 97% | 0% |
| Titanio Total | mg/L | 0.0006 | <0.0006 | 0% | 93 - 101% | 97% | 2% |
| Uranio Total | mg/L | 0.000010 | <0.000010 | 0% | 100 - 109% | 99% | 2% |
| Vanadio Total | mg/L | 0.0003 | <0.0003 | 0% | 97% | 96% | 1% |
| Wolframio Total | mg/L | 0.0006 | <0.0006 | 0% | 95 - 101% | 98% | 0% |
| Yterbio Total | mg/L | 0.00006 | <0.00006 | 0% | 91 - 93% | 100% | 1% |
| Zinc Total | mg/L | 0.0026 | <0.0026 | 0% | 99% | 102% | 1% |
| Zirconio Total | mg/L | 0.00045 | <0.00045 | 0% | 99 - 104% | 102% | 1% |
| Cloruro | mg/L | 0.050 | <0.050 | | 103 - 104% | 101% | 0% |
| Fluoruro | mg/L | 0.004 | <0.004 | | 97 - 100% | 97% | 0% |
| Fosfato | mg/L | 0.038 | <0.038 | | 97 - 100% | 100% | 0% |
| Nitrato | mg/L | 0.062 | <0.062 | | 99 - 100% | 99% | 0% |
| Nitrato (como N) | mg/L | 0.014 | <0.014 | | 99 - 100% | 99% | 0% |
| Nitrito | mg/L | 0.006 | <0.006 | | 96 - 100% | 97% | 0% |
| Nitrito (como N) | mg/L | 0.002 | <0.002 | | 96 - 100% | 97% | 0% |
| Sulfato | mg/L | 0.03 | <0.03 | | 102 - 104% | 100% | 0% |
| Bromuro | mg/L | 0.042 | <0.042 | | 97% | 95 - 101% | 0% |

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## REFERENCIAS DE MÉTODOS DE ENSAYO

| Referencia | Sede | Parámetro | Método de Ensayo |
|---|---|---|---|
| EPW_EPA200_8 | Callao | Metales Totales | EPA 200.8: Rev 5.4: 1994. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry. (Validado) 2015 |
| EPW_EPA200_8_DIS | Callao | Metales Disueltos | EPA 200.8: Rev 5.4: 1994. Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma - Mass Spectrometry. (Validado) 2015 |
| EW_APHA9215B_CX | Cajamarca | Numeración de Heterótrofos | SMEWW-APHA-AWWA-WEF Part 9215A,B, 23rd Ed., 2017. Heterotrophic plate count. Pour plate method |
| EW_EPA300_0 | Callao | Bromuro | EPA 300.0. Rev. 2.1:1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Cloruro | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Fluoruro | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrato (como N) | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrito (como N) | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Nitrito | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Fosfato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |
| EW_EPA300_0_CX | Cajamarca | Sulfato | EPA 300.0. Rev. 2.1. 1993. Determination Of Inorganic Anions By Ion Chromatography. |

# INFORME DE ENSAYO CON VALOR OFICIAL
# MA2012628 Rev. 0

## REFERENCIA DE LOS MÉTODOS DE MUESTREO

| Tipo de Muestra | Procedimiento de Muestreo | Descripción | Plan de Muestreo |
|---|---|---|---|
| AGUA PURIFICADA | INS-P-EHS.1 | Muestreo y Medición de la Calidad del Agua | 350619-1 /2020 |

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