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40 West Louise Ave., Salt Lake City, UT 84115
Phone: (801) 485-1800 Fax: (801) 484-9211
Email: utlab@advancedlabsinc.com
**FDA Registration #3006423386**

# *Test Certificate*

Description: Fulvic-Humic Minerals
Sample ID: MSM-1-00319B
Lot No: MSM-1-00319B
Part Code:
Location:
PO No:
Received: 1/7/2019

Client: Morningstar Minerals
P.O. Box 9
Farmington, NM 87499

Lab No: 164030-01
Completed: 1/17/2019

| Analysis | Result | Per Unit | Method |
|---|---|---|---|
| Aluminum | 13.95 | ppm | ICP-OES USP <730> |
| Antimony | 0.566 | ppm | ICP-OES USP <730> |
| Arsenic | 0.006 | ppm | ICP-MS USP <730> |
| Barium | 0.711 | ppm | ICP-OES USP <730> |
| Beryllium | 0.724 | ppm | ICP-OES USP <730> |
| Bismuth | <0.5 | ppm | ICP-OES USP <730> |
| Boron | 8.59 | ppm | ICP-OES USP <730> |
| Cadmium | 0.001 | ppm | ICP-MS USP <730> |
| Calcium | 115 | ppm | ICP-OES USP <730> |
| Cerium | 0.030 | ppm | ICP-MS USP <730> |
| Cesium | <0.001 | ppm | ICP-MS USP <730> |
| †Chloride | 102 | ppm | USP <221> Titration |
| Chromium | <0.5 | ppm | ICP-OES USP <730> |
| Cobalt | <0.5 | ppm | ICP-OES USP <730> |
| Copper | <0.5 | ppm | ICP-OES USP <730> |
| Dysprosium | 0.002 | ppm | ICP-MS USP <730> |
| Erbium | 0.001 | ppm | ICP-MS USP <730> |
| Europium | 0.001 | ppm | ICP-MS USP <730> |
| †Fluoride | 0.24 | ppm | AOAC 939.11 |



**Results Approved By:** Alisa Farnsworth-Quality Technician **Dated:** 1/17/2019

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|---|---|---|---|
| Gadolinium | 0.003 | ppm | ICP-MS USP <730> |
| Gallium | 0.072 | ppm | ICP-MS USP <730> |
| Germanium | 0.007 | ppm | ICP-MS USP <730> |
| Gold | <0.5 | ppm | ICP-OES USP <730> |
| Hafnium | <0.001 | ppm | ICP-MS USP <730> |
| Holmium | <0.001 | ppm | ICP-MS USP <730> |
| Indium | <0.001 | ppm | ICP-MS USP <730> |
| †Iodine | 0.09 | ppm | Titration |
| Iridium | <0.001 | ppm | ICP-MS USP <730> |
| Iron | 6.76 | ppm | ICP-OES USP <730> |
| Lanthanum | <0.5 | ppm | ICP-OES USP <730> |
| Lead | 0.024 | ppm | ICP-MS USP <730> |
| Lithium | <0.5 | ppm | ICP-OES USP <730> |
| Lutetium | <0.001 | ppm | ICP-MS USP <730> |
| Magnesium | 11.25 | ppm | ICP-OES USP <730> |
| Manganese | <0.5 | ppm | ICP-OES USP <730> |
| Mercury | 0.001 | ppm | ICP-MS USP <730> |
| Molybdenum | <0.5 | ppm | ICP-OES USP <730> |
| Neodymium | 0.013 | ppm | ICP-MS USP <730> |



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|---|---|---|---|
| Nickel | <0.5 | ppm | ICP-OES USP <730> |
| Niobium | 0.715 | ppm | ICP-OES USP <730> |
| Osmium | 0.001 | ppm | ICP-MS USP <730> |
| Palladium | 0.092 | ppm | ICP-MS USP <730> |
| Phosphorus | <0.5 | ppm | ICP-OES USP <730> |
| Platinum | <0.001 | ppm | ICP-MS USP <730> |
| Potassium | 289 | ppm | ICP-OES USP <730> |
| Praseodymium | 0.003 | ppm | ICP-MS USP <730> |
| Rhenium | <0.001 | ppm | ICP-MS USP <730> |
| Rhodium | <0.001 | ppm | ICP-MS USP <730> |
| Rubidium | 0.046 | ppm | ICP-MS USP <730> |
| Ruthenium | <0.001 | ppm | ICP-MS USP <730> |
| Samarium | 0.002 | ppm | ICP-MS USP <730> |
| Scandium | <0.001 | ppm | ICP-MS USP <730> |
| Selenium | <0.5 | ppm | ICP-OES USP <730> |
| Silicon | <0.5 | ppm | ICP-OES USP <730> |
| Silver | 5.08 | ppm | ICP-OES USP <730> |
| Sodium | 17.46 | ppm | ICP-OES USP <730> |
| Strontium | <0.5 | ppm | ICP-OES USP <730> |



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|---|---|---|---|
| Sulfur | 62.1 | ppm | ICP-OES USP <730> |
| Tantalum | <0.001 | ppm | ICP-MS USP <730> |
| Tellurium | <0.5 | ppm | ICP-OES USP <730> |
| Terbium | <0.001 | ppm | ICP-MS USP <730> |
| Thallium | <0.5 | ppm | ICP-OES USP <730> |
| Thorium | <0.5 | ppm | ICP-OES USP <730> |
| Thulium | <0.001 | ppm | ICP-MS USP <730> |
| Tin | 0.012 | ppm | ICP-MS USP <730> |
| Titanium | 1.43 | ppm | ICP-OES USP <730> |
| Tungsten | 1.47 | ppm | ICP-OES USP <730> |
| Vanadium | <0.5 | ppm | ICP-OES USP <730> |
| Ytterbium | 0.002 | ppm | ICP-MS USP <730> |
| Yttrium | <0.5 | ppm | ICP-OES USP <730> |
| Zinc | 0.675 | ppm | ICP-OES USP <730> |
| Zirconium | <0.5 | ppm | ICP-OES USP <730> |
| †Fulvic Acid | 0.864 | % | Modified Larry G. Butler |
| †Humic Acid | 0.225 | % | Modified Larry G. Butler |



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Humic Acid analysis performed pre and post hydrolysis on a SEC column with isocratic mobile phase of 5 mM boric acid (pH 7.0 adjusted by 10 mM NaOH) and elution on a TSKgel G3000SWXL (300 x 8.5 mm) with PDA detection. Authentic humic acid reference material obtained from Sigma-Aldrich
Fulvic Acid analyzed as total vanillin-catechin conjugates using modified methodology of Larry G.Butler et al., "Vanillin Assay for Proanthocyanidins [Condensed Tannins]: Modification of the solvent for Estimation of the degree of Polymerization" as published in J. Agric. Food Chem., 30, 1087-1089, vanillin reagent prepared as 750ml with 15g ammonium iron sulfate in n-butanol/hydrochloric acid (95:5). For the determination of total catechin on 2% sol of initial extract in a 50ml volumetric flask containing 25ml of methanol; 2.5ml of Vanillin reagent added and heated to 95°C for 40mins after cooling diluted to volume with methanol, the absorbance of both the standard solutions and sample is measured at 550nm. Authentic reference material obtained from Sigma-Aldrich.
Chloride <221> titration procedure with AgNO3 precipitation reaction.
Fluoride AOAC 939.11.
Iodine analysis performed by sodium 0.1N thiosulfate titration of acidified digest centrifuged supernatant. Starch indicator solution was used to determine the end-point of the titration. Reagents employed were obtained from Sigma-Aldrich.



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