



SOIL, WATER AND PLANT TESTING LABORATORY

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Analytical Services Provided

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ANALYTICAL SERVICES PROVIDED

Soil, Overburden, Waste Materials and Amendments

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Plants and Forages

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SOIL, OVERBURDEN, WASTE MATERIAL AND AMENDMENTS

Packages

PLEASE CALL FOR PRICING INFORMATION

*Volume Discounts Available upon request

Soil and Overburden

Routine

pH, electrical conductivity, organic matter, nitrate-nitrogen, phosphorus, potassium, zinc, iron, manganese, copper, and lime and texture estimates and fertilizer suggestions for agricultural, horticultural or reclamation applications.

Routine + Sodium Evaluation (SAR)

Routine parameters plus sodium adsorption ratio.

Routine + Hydrometer

Routine parameters hydrometer test for % sand, silt and clay with named texture.

Routine + Boron, Molybdenum, Cadmium & Lead

Routine parameters plus boron, molybdenum, cadmium and lead.

Routine + Sulfate-Sulfur

Routine parameters plus sulfate sulfur

Routine + Subsoil Salinity *or* Nitrate-Nitrogen

Routine parameters plus subsoil salinity or nitrate-nitrogen. Requires the submittal of a subsoil sample along with a surface sample to aid in the reclamation of salt affected soil (subsoil salinity) or to evaluate the fertilizer requirements of crops such as sugar beets, winter wheat or corn.

SOIL, OVERBURDEN, WASTE MATERIAL AND AMENDMENTS

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Soil and Overburden (cont'd)

Routine + Subsoil Salinity *and* Nitrate-Nitrogen

Routine parameters plus subsoil salinity and nitrate-nitrogen. Requires the submittal of a subsoil sample along with a surface sample to aid in the reclamation of salt affected soils and evaluate the fertilizer requirements of deep rooted crops such as sugar beets, winter wheat or corn

Magnesium Chloride

Total Organic Carbon

Total Carbon Less CO₃-C

Soil Monitoring where sludges/biosolids have been applied -- please see "waste materials" section below.

Amendments

Manure and Composts

Percent dry matter, pH, electrical conductivity, organic matter by WLOI, ammonium-nitrogen, nitrate-nitrogen, total nitrogen, carbon:nitrogen ratio, total phosphorus and total potassium

Waste Materials Sludges/Biosolids

Total solids, volatile solids, pH, total nitrogen, organic nitrogen, nitrate-nitrogen, ammonium-nitrogen, total elemental analysis of: arsenic, barium, beryllium, cadmium, copper, chromium, mercury, potassium, manganese, molybdenum, phosphorus, lead, nickel, selenium, and zinc

SOIL, OVERBURDEN, WASTE MATERIAL AND AMENDMENTS

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Waste Materials/Soils (cont'd)

Add to tests listed in above sludge/biosolids package: electrical conductivity, total aluminum, total silver and total iron.

Soils that Will Have Sludges/Biosolids Applied

Soil Fertility: pH, electrical conductivity, organic matter, total phosphorus, and plant available phosphorus, nitrate-N, potassium

Soils Where Sludges/Biosolids Applied (cont'd)

Soils Metals and Physical Characteristics: Plant available: arsenic, barium, beryllium, cadmium, copper, chromium, mercury, manganese, molybdenum, nickel, lead, selenium, and zinc

Soils Metals and Physical Characteristics: Plant available and total: arsenic, barium, beryllium, cadmium, copper, chromium, mercury, manganese, molybdenum, nickel, lead, selenium, and zinc

Both Fertility and Metals/Physical Characteristics, reporting both plant available and total metals

~~~ Plant Tissues from Soils Where Sludges/Biosolids Applied

Nitrogen, phosphorus, cadmium, copper, lead, nickel, zinc, and nitrates

Soils, Overburdens, Waste Materials and Amendments

Analyses by CN Furnace

Total Nitrogen and/or Total Carbon

please call

SOIL, OVERBURDEN, WASTE MATERIAL AND AMENDMENTS

<i>Packages</i>

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Soils, Overburdens, Waste Materials and Amendments

Analyses by ICP (Inductively Coupled Plasma-Atomic Emission Spectroscopy)

TCLP Extract

TCLP Extract w/ RCRA metals (Silver, arsenic, barium, cadmium, chromium, mercury, lead and selenium)

Water Extracts of Soil: Calcium, magnesium, sodium, potassium, phosphorus, aluminum, iron, manganese, titanium, copper, zinc, nickel, molybdenum, cadmium, chromium, strontium, boron, barium, lead, silicon and vanadium.

AB-DTPA (NH₄HCO₃-DTPA) Extracts of Soil magnesium, sodium, potassium, phosphorus, aluminum, iron, manganese, titanium, copper, zinc, nickel, molybdenum, cadmium, chromium, strontium, boron, barium, lead, silicon and vanadium

2-Hour DTPA Soil Extracts: Zinc, iron, manganese, copper, lead, nickel, and cadmium.

Exchangeable Bases (NH₄OAc and Water Extracts of Soil), including extractions: Calcium, magnesium, sodium, and potassium

SOIL, OVERBURDEN, WASTE MATERIAL AND AMENDMENTS

<i>Packages</i>

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Soils, Overburdens, Waste Materials and Amendments

Analyses by ICP (Inductively Coupled Plasma-Iris) cont'd:

Total Soil Digests (EPA 3050, Nitric Acid Perchloric Acid, or Perchloric-Hydrofluoric Digests): Calcium, magnesium, sodium, potassium, phosphorus, aluminum, iron, manganese, titanium, copper, zinc, nickel, molybdenum, cadmium, chromium, strontium, barium, lead, vanadium, silver, antimony, tin, thallium, beryllium, and silver.

SOIL, OVERBURDEN, WASTE MATERIAL AND AMENDMENTS

Sample Preparation and Individual Determinations

PLEASE CALL FOR PRICES

*Volume Discounts Available Upon Request

Sample Preparation

Handling and Preparation of Sample:

Soil and Overburden

Waste Materials

Extraction Fee (NaHCO₃, NH₄HCO₃, -DTPA, etc.)

Digestion fee (EPA 3050, Nitric, Nitric Perchloric, Nitric Perchloric Hydrofluoric, or special digests as specified by customer)

Determinations

Buffer pH

pH Ratios (1:1, etc.)

Paste pH (Saturation Paste)

Electrical Conductivity

pH and Electrical Conductivity

pH, Electrical Conductivity, and Sodium

Adsorption Ratio (SAR)

% Saturation (if performed with paste pH or EC analysis)

Texture Estimate

Organic Matter (modified Walkley-Black)

Weight Loss on Ignition / Volatile Solids

Ammonium-Nitrogen, Including Extract

Nitrate-Nitrogen, Including Extract

Nitrite-Nitrogen, Including Extract

Mineralizable Nitrogen

(NOTE: Organic Nitrogen is calculated from Ammonium-Nitrogen, Nitrate-Nitrogen, and Total Nitrogen)

Other Anions (sulfate, chloride, fluoride, orthophosphorus, bromide per anion, including extracts)

SOIL, OVERBURDEN, WASTE MATERIAL AND AMENDMENTS

Sample Preparation and Individual Determinations

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Determinations (cont'd):

Sodium Bicarbonate Phosphorus (Olsen's Phosphorus), Including Extract
Mehlich Phosphorus, Including Extract
Bray Phosphorus, Including Extract
AB-DTPA Phosphorus, Including Extract
Organic Phosphorus
Inorganic Phosphorus by Sequential Extraction

Phosphate Anion Exchange (Phosphorus Fixation Index)

Lime Estimate

% Calcium Carbonate Equivalent

Alkalinity (Carbonate + Bicarbonate)

Exchangeable Acidity

Acid:Base Potential (Total Sulfur + Calcium Carbonate + Pyritic Sulfur (if needed))

Gypsum

Moisture Determination: % Water As Received / Total Solids

Cation Exchange Capacity (CEC)

Exchangeable Sodium

Exchangeable Sodium Percentage (ESP)

Exchangeable Bases (includes handling charge and 2 extractions)

Total Carbon (Also, See Page 9)

SOIL, OVERBURDEN, WASTE MATERIAL AND AMENDMENTS

Sample Preparation and Individual Determinations

PLEASE CALL FOR PRICES

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Determinations (cont'd):

Redox Potential

Pyritic Sulfur

Total Silicon

Total Organic Carbon (Total Carbon less CO₃-C)

Single Element Determinations in Appropriate Extract or Digest by ICP-AES (Inductively Coupled Plasma-Atomic Emission Spectroscopy):

NOTES: Prices do **NOT** include charge for extraction or digest. Information about specific detection limits available upon request.

Calcium, Magnesium, Sodium, Potassium, Zinc, Iron, Copper, Manganese Nickel, Lead, Chromium, Cadmium, Molybdenum, Vanadium, Boron, Barium Phosphorus, Strontium, Titanium, Aluminum, Beryllium, Thallium, Tin, Antimony, Silver

Single Element Determinations for Levels Below the ICP Direct Reading Detection Limit:

Total Arsenic (ICP-Hydride Generation), includes digest

Total Selenium (ICP-Hydride Generation), includes digest

Plant Available Arsenic (ICP-Hydride Generation), includes extract

Plant Available Selenium (ICP-Hydride Generation), includes extract

SOIL, OVERBURDEN, WASTE MATERIAL AND AMENDMENTS

Sample Preparation and Individual Determinations

PLEASE CALL FOR PRICES

*Volume Discounts Available Upon Request

Single Element Determinations for Levels Below the ICP Direct Reading Detection Limit cont'd:

Total Mercury (AA--Cold Vapor),
includes digest
Plant Available Mercury (AA--Cold Vapor),
includes extract

Particle Size Analysis:

Hydrometer (% Sand, Silt, Clay, and Texture
Classification)

Pipet (% Sand, Silt Fractions, Clay Fractions, and
Texture Classification)

Sand Fractions -- Price per Fraction (Sieve)
Very Fine Sand Fraction (Sieve)
Gravel Content (Total % > 2 mm) (Sieve)
Gravel Fractions -- Price per Fraction (Sieve)

NOTE: Sieve Sizes available from 20 μm (#635) to 4"

Physical Characteristics

Color / Classification

Bulk Density (Clod)
Bulk Density (Graduated Cylinder)
Bulk Density (Intact Cylinder)

Hydraulic Conductivity

Porosity

Specific Surface Area

SOIL, OVERBURDEN, WASTE MATERIAL AND AMENDMENTS

Sample Preparation and Individual Determinations

PLEASE CALL FOR PRICES

*Volume Discounts Available Upon Request

Moisture Tension Determination:

NOTES: Available from 0 BAR through 15 BAR
Common Tensions Are: 0, 1/10, 1/3, 5 and 15 BAR
~ 5 Points are recommended to produce a moisture retention curve.

Setup Fee per Tension (1 to 15 samples per
setup)

Determination of Moisture for Each Sample/
Tension

Percent Saturation (0 BAR)

Available Water Capacity (1/3 Bar and 15 Bar)

PLANT TISSUE

Forage Section Follows

Forage Section Follows

Packages

PLEASE CALL FOR PRICES

*Volume Discounts Available Upon Request

Routine

Nitrogen, Phosphorus, Potassium, Zinc, Iron, Copper,
Manganese, Calcium, Magnesium, Sodium, Boron,
and Nitrates

~~~ Plant Tissue Monitoring

Nitrogen, Phosphorus, Cadmium, Copper, Lead,
Nickel, Zinc, and Nitrates

Magnesium Chloride

Analyses by CN Furnace

Total Nitrogen and/or Total Carbon

Analyses by ICP (Inductively Coupled Plasma- Atomic Emission Spectroscopy)

Plant Digest Solutions

Calcium, Magnesium, Sodium, Potassium,
Phosphorus, Aluminum, Iron, Manganese, Titanium,
Copper, Zinc, Nickel, Molybdenum, Cadmium,
Chromium, Strontium, Boron, Barium, Lead, Silicon
and Vanadium

PLANT TISSUE

Forage Section Follows

Forage Section Follows

Sample Preparation and Individual Determinations

PLEASE CALL FOR PRICES

*Volume Discounts Available Upon Request

Preparation

Handling Charge
Digestion (Nitric, Nitric Perchloric, etc.)

Determinations

Bromide (includes extraction)
Fluoride (includes extraction)
Phosphate, Sulfate, Chloride -- per anion
(includes extraction)
Total Sulfur
Total Nitrogen (includes handling charge)
Nitrate (includes handling charge and extraction)

Single Element Determinations in Appropriate Extract, by Inductively Couple Plasma-Atomic Emission Spectroscopy

NOTES: Prices do NOT include charge for extraction or digest. Information about specific detection limits available upon request.

Calcium, magnesium, sodium, potassium, zinc, iron, copper, manganese, nickel, lead, chromium, cadmium, molybdenum, vanadium, silicon, boron, phosphorus, barium, strontium, titanium, and aluminum.

Single Element Determinations for Levels Below the ICP Direct Reading Detection Limits

Total Arsenic (ICP-Hydride Generation)
(includes digest)
Total Selenium (ICP-Hydride Generation)
(includes digest)
Total Mercury (AA-Cold Vapor)
(includes digest)

FORAGE

Plant Tissue Section Precedes

Plant Tissue Section Precedes

Packages

PLEASE CALL FOR PRICES

*Volume Discounts Available Upon Request

Routine Package (by wet chemistry)

Moisture, Dry Matter (DM), Ash, Crude Protein (CP), Crude Fiber (CF), Acid Detergent Fiber (AD), Neutral Detergent Fiber (NDF), Digestible Energy (DE), Net Energy/Lactation (NEL), Net Energy/Maintenance (NEM), Net Energy/Gain (NEG), Metabolizable Energy (ME), Total Digestible Nutrients (TDN), and Relative Feed Value Index (RFV).

Minerals Package (by wet chemistry)

Phosphorus, Potassium, Calcium, Magnesium, Iron, Manganese, Zinc, Copper, Sodium, Boron, and Molybdenum

Routine + Minerals Package

Moisture, Dry Matter (DM), Ash, Crude Protein (CP), Crude Fiber (CF), Acid Detergent Fiber (ADF), Neutral Detergent Fiber (NDF), Digestible Energy (DE), Net Energy/Lactation (NEL), Net Energy/Maintenance (NEM), Net Energy/Gain (NEG), Metabolizable Energy (ME), Total Digestible Nutrients (TDN), Relative Feed Value Index (RFV), Phosphorus, Potassium, Calcium, Magnesium, Iron, Manganese, Zinc, Copper, Sodium, Boron, and Molybdenum.

Nitrates

Ammonium (from Acetic Acid Extract)

Moisture / Dry Matter

Selenium

Crude Protein

WATERS

Packages

PLEASE CALL FOR PRICES

*Volume Discounts Available Upon Request

Routine Package

pH, Conductivity, Calcium, Magnesium, Sodium,
Potassium, Carbonates, Bicarbonates, Chloride,
Sulfate, Nitrate, and Boron

Metals Package

Phosphorus, Aluminum, Iron, Manganese, Copper,
Zinc, Nickel, Molybdenum, Cadmium, Chromium,
and Lead

Anions Package

(from IC): Nitrates, Chloride, Sulfate, Fluoride,
Bromide, Phosphate

Analyses by CN Furnace

Total Nitrogen and/or Total Carbon

Analyses by ICP (Inductively Coupled Plasma- Atomic Emission Spectroscopy)

ICP Package

Calcium, Magnesium, Sodium, Potassium,
Phosphorus, Aluminum, Iron, Manganese, Titanium,
Copper, Zinc, Nickel, Molybdenum, Cadmium,
Chromium, Strontium, Boron, Barium, Silicon, Lead
and Vanadium

WATERS

Individual Determinations

PLEASE CALL FOR PRICES

*Volume Discounts Available Upon Request

Determinations

pH

Electrical Conductivity

Sodium Adsorption Ratio (SAR)

Adjusted SAR

Alkalinity

Hardness

Turbidity

Gran Titration Alkalinity

Sulfide

Sulfate

Chloride

Fluoride

Bromide

Arsenic

Selenium

Mercury

Carbonate

Bicarbonate

Ammonium

Nitrate

Nitrite

Total Dissolved Solids (Gravimetric)

Volatile Solids

Total Suspended Solids

Total Solids

Total Nitrogen (by combustion)

Total Phosphorus

Ortho Phosphorus (PO₄)

Hexavalent Chromium

Cyanide

WATERS

Individual Determinations

PLEASE CALL FOR PRICES

*Volume Discounts Available Upon Request

Determinations (cont'd)

Color Test

Redox Potential (eh)

Chlorophyll a

Chlorophyll b

Tannins

Single Element Determinations in Appropriate Extract, by Inductively Couple Plasma-Atomic Emission Spectroscopy

NOTES: Prices do **NOT** include charge for digest.
Information about specific detection
limits available upon request.

Calcium, magnesium, sodium, potassium, zinc,
iron, copper, manganese, nickel, lead, chromium,
cadmium, molybdenum, vanadium, silicon, boron,
phosphorus, barium, strontium, titanium, and
aluminum.

Individual Determination by Furnace

Total Nitrogen and/or Total Carbon

Total Organic Carbon (TOC)

Dissolved Organic Carbon (DOC)