



SRC Environmental Analytical Laboratories



MUNICIPAL SERVICE GUIDE

Effective April 1, 2017

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General Information

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E-mail: analytical@src.sk.ca
Web address: www.src.sk.ca/analytical
Hours of Operation: Monday - Friday | 7:30 a.m. - 6:00 p.m.
Ensure time critical samples arrive at the lab before 5:30 p.m.

Corporate Overview

For over 50 years, the Saskatchewan Research Council's (SRC) Environmental Analytical Laboratories has provided high-quality testing services for industries and municipalities throughout Saskatchewan and around the world. Our world-class facility provides an extensive range of testing services that are accredited in accordance with international standards (ISO/IEC 17025) by the Canadian Association for Laboratory Accreditation (CALA). A complete list of accredited tests offered by the laboratory is available from the laboratory or on the CALA website at www.cala.ca. Accreditation requires an extensive and comprehensive quality assurance and quality control (QA/QC) program. Contact us if you require additional information about our QA/QC program.

SRC Environmental Analytical Laboratories is located at Innovation Place in Saskatoon, Saskatchewan, in a modern facility with state-of-the-art instruments, equipment and data management systems. All sample information and data are stored in a digital Laboratory Information Management System (LIMS), which is used for sample tracking, reporting and invoicing. In many cases, automated data transfer from instrumentation directly into the LIMS facilitates processing and reduces the chance of error. Data can be readily retrieved and reported in a variety of formats.

The skilled and knowledgeable team at SRC Environmental Analytical Laboratories provides excellent customer service and is available to assist clients with any queries. The laboratory has a long history of providing the municipal sector with high-quality test results and our staff is well-prepared to accommodate the unique requirements of Saskatchewan municipalities.

We welcome your inquiries! Please contact us regarding your analysis requirements.

Billing and Reporting Information

Standard Turnaround

The rates in this price list are for reporting results within a standard turnaround time. For routine samples, the average turnaround time is 5 working days.

Rush Service

A rush service is provided for a 100% surcharge. Samples will be processed as quickly as possible during regular work hours. Turnaround time will depend on the type of analysis required and number of samples submitted, but can generally be reduced to between 1 and 3 days.

Discounts will not apply to rush analyses.

Rush Service - Overtime Authorized

Overtime is authorized to further expedite the sample turnaround time. The 100% surcharge for Rush Service will apply. In addition, any overtime required to expedite the analysis will be charged out at a rate of \$125/hour. Contact the lab directly **in advance** to discuss turnaround time requirements and authorize overtime.

Discounts will not apply to rush analyses.

Fees

Published prices may be subject to change without prior notification. **GST** will be added to the invoice, if applicable.

Late Payment

Late payment charges will be assessed after 30 days, at a rate of 1.5% compounded monthly (19.6% annually).

Minimum Billing

A minimum charge of \$50 may be applied to all analytical work orders.

Volume Discounts

Municipalities that participate in the laboratory's **Permit to Operate** (PTO) program are entitled to a significant discount for many routine tests. Contact the laboratory to enroll in this program.

Results

Final results are reported in PDF format. Results can be uploaded directly into WaterTrax and/or Saskatchewan Ministry of Environment databases, if required. Additional report formats (e.g., Excel, text, etc.) are also available. Please contact the laboratory regarding your specific needs.

Quality Assurance

SRC Environmental Analytical Laboratories maintains an extensive Quality Assurance Program designed to ensure the reliability of analytical data. Key components of the Quality Assurance Program are:

- Accreditation and Proficiency Testing by the Canadian Association for Laboratory Accreditation (CALA)
- Participation in interlaboratory performance assessment programs
- Comprehensive Quality Control program
- Computerized sample and data management

Accreditation and Proficiency Testing by CALA

SRC Environmental Analytical Laboratories is accredited by CALA for specific environmental tests. These tests are listed in the Scope of Accreditation found on the CALA website. Our lab has one of the largest scopes of accreditation for an environmental lab in Western Canada. The accreditation program consists of on-site assessments and proficiency testing. Accreditation ensures that the laboratory management system, facilities, procedures and methods conform to ISO 17025, the internationally recognized standard for testing and calibration laboratories.

Interlaboratory Performance Assessment

In addition to the proficiency testing program offered by CALA, we participate in several other interlaboratory performance assessment programs, including (but not limited to):

- Environment Canada National Water Research Institute (NWRI)
- Environmental Resource Associates (ERA)
- International Atomic Energy Agency (IAEA)
- Health Canada

Quality Control

A variety of techniques, such as the analysis of reference materials, control samples, duplicates and spike recovery measurements are used to ensure the validity of the analytical results. If a problem is identified, the samples are re-analyzed, or other corrective action is undertaken, to demonstrate that the analytical results are acceptable. If this is not possible, then the client is notified. Quality control data obtained during the analysis of samples can also be reported to the client.

Quality Assurance

Quality Assurance staff at SRC Environmental Analytical Laboratories manage all aspects of the quality system. This includes reviews of quality control data, method validation and quality audits.

Drinking Water

PTO Program

PTO Program Benefits

Participating in SRC Environmental Analytical Laboratories' Permit to Operate (PTO) program for Saskatchewan municipalities is an easy way to stay compliant with your Water Security Agency permit. The program provides participants several unique benefits, including:

- **Preferred pricing** for program participants: save significantly on all your analytical costs, not just testing related to the PTO.
- Weekend surcharges are waived for bacteria samples received on Fridays or days preceding statutory holidays.
- Coolers and ice packs are supplied and returned regularly.

PTO Program Requirements

A PTO program participant agrees to send all their routine testing samples for their Permit to Operate to SRC Environmental Analytical Laboratories for analysis. Routine tests consist of the following types of tests, but will vary for different communities, depending on each community's Permit to Operate:

- Routine bacteria analysis (Total Coliform and E. coli)
- Annual or biannual determination of General Chemistry
- Annual or biannual determination of Chemical Health and Toxicity
- Trihalomethane tests
- Haloacetic acid tests
- Ammonia testing
- Lagoon discharge testing
- Piezometer testing

Drinking Water

Packages for Drinking Water

Major Ions Package

Includes: Calcium, Magnesium, Sodium, Potassium, Chloride, Sulfate, Fluoride, pH, Specific conductivity, Nitrate, Alkalinity, Bicarbonate, Carbonate, Hydroxide, Total Hardness, Sum of Ions

General Chemical Package

Includes: Calcium, Magnesium, Sodium, Potassium, Chloride, Sulfate, Fluoride, pH, Specific conductivity, Nitrate, Alkalinity, Bicarbonate, Carbonate, Hydroxide, Total Hardness, Sum of Ions and Total Dissolved Solids (TDS)

Source Water Package

Includes all parameters in the General Chemical Package, plus Iron and Manganese

Water Quality Package, Basic

Includes: Calcium, Magnesium, Sodium, Potassium, Chloride, Sulfate, Fluoride, pH, Specific Conductivity, Nitrate, Alkalinity, Bicarbonate, Carbonate, Hydroxide, Total Hardness, Sum of Ions, Iron and Manganese

Water Quality Package, Extensive

Includes: Calcium, Magnesium, Sodium, Potassium, Chloride, Sulfate, Fluoride, pH, Specific Conductivity, Nitrate, Alkalinity, Bicarbonate, Carbonate, Hydroxide, Total Hardness, Sum of ions, Total Dissolved Solids, Full ICP-MS metal package

Chemical Health & Toxicity Package (CHT)

Additional parameters, such as cyanide and mercury, are extra.

Includes: Aluminum, Antimony, Arsenic, Barium, Boron, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Selenium, Silver, Uranium, Zinc

Water Potability Package (WP)

Includes: Total Coliforms, Nitrates

Trace Metals Package

Includes: Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc

Haloacetic Acids (HAA)

Includes: Monochloroacetic acid, Monobromoacetic acid, Dichloroacetic acid, Trichloroacetic acid, Dibromoacetic acid, HAA-5 total, Bromochloroacetic acid

Trihalomethanes (THM)

Includes: Chloroform, Bromodichloromethane, Dibromochloromethane, Bromoform, THM total

Municipal Water Quality Organic Chemicals

Includes: Chlorophenols, Organic Volatiles, Pesticides, Phenoxy Acid Herbicides, Benzo(a)pyrene

Chlorophenols (Phenols)

Includes: 2,4-Dichlorophenol, 2,4,6-Trichlorophenol, 2,3,4,6-Tetrachlorophenol, Pentachlorophenol

Organic Volatiles (VOCs)

Includes: Vinyl Chloride, 1,1-Dichloroethylene, Dichloromethane, MTBE, 1,1-Dichloroethane, Chloroform, 1,1,1-Trichloroethane, Carbon Tetrachloride, 1,2-Dichloroethane, Benzene, Trichloroethylene, Bromodichloromethane, Toluene, 1,1,2-Trichloroethane, Tetrachloroethylene, Dibromochloromethane, Chlorobenzene, 1,1,1,2-Tetrachloroethane, Ethylbenzene, m+p-Xylene, o-Xylene, Styrene, Bromoform, 1,1,2,2-Tetrachloroethane, 1,2,4-Trimethylbenzene, 1,4-Dichlorobenzene, 1,2-Dichlorobenzene

Pesticides I

Includes: Mataven (Flamprop-methyl), Propanil (Stampede), Triallate (Avadex BW), Trifluralin (Treflan), Diazinon, Dimethoate (Cygon), Fenitrothion, Lorsban (Chlorpyrifos), Malathion, Methyl Parathion, Parathion, Atrazine, Carbaryl (Sevin), Carbofuran (Furadan), Ethylfluralin

Pesticides II

Includes: Bromacil, Diuron, Linuron, Simazine, Tebuthiuron

Phenoxy Herbicides

Includes: 2,4-D, Bromoxynil (Buctril), Dicamba (Banvel), Diclofop methyl (Hoe grass), Picloram (Tordon), 2,4,5-T, 2,4,5-TP (Silvex), MCPA, 2,4-DP

Drinking Water

Sample Preparation

When necessary, sample preparation steps are performed to obtain suitable samples for analysis or when required for specific analysis. For example, for dissolved parameters, filtration is required to remove suspended solids from the sample. Digestion is performed for trace metals analysis to include any metals present in suspended material within the sample.

Filtration

Digestion

Microbiology

Total Coliforms and E. coli

Fecal Coliforms (membrane filtration)

Heterotrophic plate count

Fecal Streptococcus

Weekend Surcharge

A weekend surcharge will apply to any samples submitted for bacteria analysis on Fridays and days preceding statutory holidays. Weekend surcharges are waived for PTO program participants.

Emergency Arrangements

For emergency cases, arrangements for delivery of bacteria samples on weekends or statutory holidays can often be made. Contact the laboratory with as much advance notice as possible. In addition to a weekend surcharge, additional charges will also apply to accept, log in and setup a sample; to process a sample; and/or to report results during weekends or holidays.

Miscellaneous Parameters

Color (true)

Odour (Threshold Odour Number)

Solids, total suspended (TSS)

Solids, total dissolved (TDS)

Total solids (calculated from TSS + TDS)

Turbidity

Benzo(a)pyrene*

*Part of Polycyclic Aromatic Hydrocarbon (PAH) scan

Trace Metals

Trace Metals Package

Includes: Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc

Individual Elements

Available elements: Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Bismuth, Bromine, Cadmium, Calcium, Cerium, Chromium, Cobalt, Copper, Dysprosium, Europium, Erbium, Gadolinium, Hafnium, Holmium, Iron, Iodine, Lanthanum, Lead, Lithium, Lutetium, Magnesium, Manganese, Molybdenum, Nickel, Neodymium, Niobium, Phosphorous, Potassium, Praseodymium, Rubidium, Samarium, Selenium, Scandium, Silver, Sodium, Strontium, Tantalum, Tellurium, Terbium, Thallium, Thorium, Thulium, Tin, Titanium, Tungsten, Uranium, Vanadium, Yttrium, Yttrium, Zinc, Zirconium

Mercury

Nutrients

Total Organic Carbon (TOC)

Dissolved Organic Carbon (DOC)

Ammonia (NH₃)

Nitrate (NO₃)

Nitrite + Nitrate as N (NO₂ + NO₃, N)

Total Kjeldahl Nitrogen (TKN)

ortho-Phosphate (o-PO₄)

Total Phosphorous

Drinking Water

Radiochemical Parameters

Gross Alpha and Beta

Radium-226

Lead-210

Strontium-90

Tritium

Cesium-137 and Iodine-131

Radon-222

Water Treatment and Source Water Evaluation

Breakpoint Chlorination

(Includes Ammonia)

Chlorine, residual

Chlorine, free (available)

Monochloroamine and Dichloroamine

Chloramines (total)

Bromate

Chlorate and Chlorite

Acidity

Fluoride

eH (Oxidation-reduction potential of water)

Tannin and Lignin

UV (Transmittance)

Total Organic Carbon (TOC)

Dissolved Organic Carbon (DOC)

Glycols

Includes: 1,2-Propanediol, Diethylene glycol, Ethylene glycol, Triethylene glycol)

Trihalomethane (THM)

Formation Potential

Includes: spiking source water, incubation and testing for residual chlorine, and THMs at 4 different levels

Haloacetic Acids (HAA)

Formation Potential

Includes: spiking source water, incubation and testing for residual chlorine, and HAAs at 4 different levels

Wastewater and Effluent

Sample Preparation

When necessary, sample preparation activities on wastewater are done to obtain suitable samples for testing or when required for specific tests. In particular, filtration is done to remove suspended solids from the sample if these present an interference to testing. Digestion is done for trace metals analysis to include any metals present in suspended material within the sample.

Filtration

Pressure Filtration

Digestion

Packages for Wastewater

Sewer Receiving Wastes (SRW)

Includes: Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease (n-Hexane Extractable Material; HEM), Total Suspended Solids (TSS), Total Kjeldahl Nitrogen (TKN)

Lagoon Package 1 (LP-1)

Includes: Specific conductivity, Nitrate (NO_3), Chloride, Total coliform, E. coli

Lagoon Package 2 (LP-2)

Includes: Total, Volatile and Fixed Suspended Solids (TSS, VSS, FSS), Carbonaceous Biochemical Oxygen Demand (c-BOD), Chloride, Total coliform, E. coli

Lagoon Package 3 (LP-3)

Includes: Total, Volatile and Fixed Suspended Solids (TSS, VSS, FSS), Carbonaceous Biochemical Oxygen Demand (c-BOD), Chloride, Total coliform, E. coli, Ammonia as Nitrogen ($\text{NH}_3\text{-N}$)

Lagoon Package 4 (LP-4)

Includes: Total, Volatile and Fixed Suspended Solids (TSS, VSS, FSS), Carbonaceous Biochemical Oxygen Demand (c-BOD), Chloride, Total coliform, E. coli, Ammonia as Nitrogen ($\text{NH}_3\text{-N}$), Total Kjeldahl Nitrogen (TKN), Nitrite plus Nitrate as Nitrogen ($\text{NO}_2+\text{NO}_3\text{-N}$), Total Nitrogen, Total Phosphorous

Lagoon Package 5 (LP-5)

Includes: All of LP-4 plus Alkalinity, Calcium, Potassium, Magnesium, Sodium, pH, Sulfate, Specific Conductivity, Total Hardness, Sum of Ions

Historical Lagoon Package

Includes: Total, Volatile and Fixed Suspended Solids (TSS, VSS, FSS), Chloride, Total Coliform, Fecal Coliform, Total Kjeldahl Nitrogen (TKN), Nitrate (NO_3), Alkalinity, pH, Specific Conductivity, Sum of Ions, Total Hardness, Ortho-phosphate as P, Biochemical Oxygen Demand (BOD), Dissolved Organic Carbon (DOC), Calcium, Magnesium, Potassium, Sodium, Sulphate, Phosphorus

Wastewater and Effluent

Microbiology on Wastewater

Total Coliforms and E. coli

Fecal Coliform

Fecal Streptococcus

Routine Wastewater Tests

Biochemical Oxygen Demand (5-day BOD)

Carbaceous Biochemical Oxygen Demand (c-BOD)

Chemical Oxygen Demand (COD)

pH

Conductivity

Chloride

Sulfate

Fluoride

Solids, total suspended (TSS)

Volatile Suspended Solids (VSS)

Solids, total dissolved (TDS)

Volatile Dissolved Solids (VDS)

Hexavalent Chromium (Cr VI)

Cyanide, total

Nitritotriacetic Acid (NTA)

Oil and Grease (n-Hexane Extractable material; HEM)

Mineral Oil and Grease (Silica-Gel treatment n-Hexane Extractable material; SGT-HEM)

Phenolics

Sulfide

Surfactants

(as Methylene Blue Active Substances, MBAS)

Total Organic Carbon (TOC)

Ammonia (NH₃)

Nitrate (NO₃)

Nitrite (NO₂)

Nitrite + Nitrate as N (NO₂ + NO₃, N)

Total Kjeldahl Nitrogen (TKN)

Total Phosphorous

ortho-Phosphate (o-PO₄)

Inorganic Phosphorous (IP)

Organic Phosphorous (OP)

Organic Phosphorous is calculated from, and requires the determination of, Total Phosphorous and Inorganic Phosphorous.

Dissolved Phosphorous

A filtered sample is required; if not supplied, a filtration charge will apply.

Trace Metals

Trace Metals Package

Includes: Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc

Individual Elements

Available elements: Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Bismuth, Bromine, Cadmium, Calcium, Cerium, Chromium, Cobalt, Copper, Dysprosium, Europium, Erbium, Gadolinium, Hafnium, Holmium, Iron, Iodine, Lanthanum, Lead, Lithium, Lutetium, Manganese, Molybdenum, Nickel, Neodymium, Niobium, Phosphorous, Potassium, Rubidium, Samarium, Selenium, Scandium, Silver, Sodium, Strontium, Tantalum, Tellurium, Terbium, Thallium, Thorium, Thulium, Tin, Titanium, Tungsten, Uranium, Vanadium, Ytterbium, Yttrium, Zinc, Zirconium

Mercury

Wastewater and Effluent

Organics

Polychlorinated Biphenyls (PCBs)

Phenoxy Herbicides

Includes: 2,4-D, Bromoxynil (Buctril), Dicamba (Banvel), Diclofop methyl (Hoe grass), Picloram (Tordon), 2,4,5-T, 2,4,5-TP (Silvex), MCPA, 2,4-DP

Chlorinated Pesticides

Includes: Aldrin, a-Chlordane, g-Chlordane, Dieldrin, Endrin, Endosulfan I, Endosulfan II, Heptachlor Epoxide, Heptachlor, p,p'-Methoxychlor, Mirex, O,P'-DDD, O,P'-DDT, P,P'-DDD, P,P'-DDE, P,P'-DDT, PCBs, Toxaphene, alpha-BHC, beta-BHC, gamma-BHC (Lindane)

Pesticides I

Includes: Mataven (Flamprop-methyl), Propanil (Stampede), Triallate (Avadex BW), Trifluralin (Treflan), Diazinon, Dimethoate (Cygon), Fenitrothion, Lorsban (Chlorpyrifos), Malathion, Methyl Parathion, Parathion, Atrazine, Carbaryl (Sevin), Carbofuran (Furadan)

Pesticides II

Includes: Bromacil, Diuron, Linuron, Simazine, Tebuthiuron

Purgeable or Extractable Hydrocarbons

- Purgeable hydrocarbons includes: BTEX (Benzene, Toluene, Ethylbenzene, Xylenes), F1 (C6-C10)
- Extractable hydrocarbons includes: F2-F4 (C11-C50)

Petroleum Hydrocarbons

Includes: BTEX (Benzene, Toluene, Ethylbenzene, Xylenes), F1-F4

Polycyclic Aromatic Hydrocarbons (PAHs)

Includes: Acenaphthylene, Acenaphthene, Acridine, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(b+j) fluoranthene, Benzo(e)pyrene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3,c,d)pyrene, Naphthalene, Perylene, Phenanthrene, Pyrene, 1-Methylnaphthalene, 2-Methylnaphthylene, Quinoline

Organic Volatiles (VOCs)

Includes: Vinyl Chloride, 1,1-Dichloroethylene, Dichloromethane, MTBE, 1,1-Dichloroethane, Chloroform, 1,1,1-Trichloroethane, Carbon Tetrachloride, 1,2-Dichloroethane, Benzene, Trichloroethylene, Bromodichloromethane, Toluene, 1,1,2-Trichloroethane, Tetrachloroethylene, Dibromochloromethane, Chlorobenzene, 1,1,1,2-Tetrachloroethane, Ethylbenzene, m+p-Xylene, o-Xylene, Styrene, Bromoform, 1,1,2,2-Tetrachloroethane, 1,2,4-Trimethylbenzene, 1,4-Dichlorobenzene, 1,2-Dichlorobenzene

Monitoring Wells

Sample Preparation

When necessary, sample preparation is performed to obtain suitable samples for testing or when required for specific tests. In particular, filtration is performed to remove suspended solids for the analysis of dissolved parameters. Digestion is performed for trace metals analysis to include any metals present in suspended material within the sample.

Filtration

Digestion

Packages for Monitoring Wells

Piezometer Package

Includes: pH, Specific conductivity, Total Hardness, Carbonate, Bicarbonate, Hydroxide, Total Alkalinity, Total Kjeldahl Nitrogen (TKN), Total Kjeldahl Nitrogen – Dissolved (TKN-dissolved), Total Dissolved Solids (TDS), Sum of ions, Dissolved Organic Carbon (DOC), Total Coliform and E. coli, Calcium, Magnesium, Sodium, Potassium, Sulfate, Total Phosphorous

Soil, Biosolids and Compost

Sample Preparation

To obtain representative results, samples are normally dried and ground before analysis. Percent moisture can be determined and results are typically reported on a dry weight basis. If unstable or volatile parameters, such as mercury, are required, a representative portion of the wet sample is taken and analyzed. The moisture results are used to calculate these results back to a dry basis. Initial preparation charges for soil are as follows:

Drying

Grinding

Drying, Grinding and % Moisture

Microwave digestion

Water leach and filtration

Distilled Water Leach Procedure

Compositing, per portion

Packages for Soil, Biosolids and Compost

Salinity Package

The salinity package is used to assess suitability of a soil for various agricultural purposes. A minimum of 500 g of soil is required. The salinity package does not include initial preparation, such as drying and grinding.

- Pricing includes the paste leach preparation and the following determinations: pH, Conductivity (EC, Electrical Conductivity or Specific Conductivity), Sodium Absorption Ratio (SAR), % Saturation, Calcium, Magnesium, Sodium, Potassium, Sulfate, Chloride and Theoretical Gypsum Rate (TGR)

Package price does not include initial preparation, such as drying and grinding. For more complete information about the condition of the soil, additional parameters can be added to the package.

Ammonia as Nitrogen

Nitrite + Nitrate as N ($\text{NO}_2 + \text{NO}_3$, N)

Phosphorus (available)

Alkalinity (carbonate and bicarbonate)

Boron

Trace Metals Package

Trace metals in soil can give information about the suitability of different soils for various purposes. Concentration limits for several different metals are listed in the *CCME Soil Quality Guidelines for the Protection of Environmental and Human Health*. Pricing does not include initial preparation, such as drying and grinding.

Includes: Sample digestion, Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Calcium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Phosphorous, Potassium, Selenium, Sodium, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc

Note that boron determined with the trace metals package is not suitable for evaluating compliance with environmental quality guidelines. For evaluation of compliance with environmental quality guidelines, boron must be determined from a suitable leach.

Mercury

Boron (includes leach)

Soil, Biosolids and Compost

Soil Characteristics

Cation Exchange Capacity (CEC)

CEC is a measure of a soil's fertility and nutrient retention capacity. Clay mineral and organic matter components of soil have negatively charged sites on their surfaces, which adsorb and hold positively charged ions (cations). In general, soils that retain more cations are more fertile than those with lower CEC.

CEC with Sodium Acetate

CEC with Ammonium Acetate

Miscellaneous Tests

Ash

Total Carbon*

Organic Carbon*

Inorganic Carbon*

Carbonates by back titration

Chloride, water soluble

(includes water leach)

Hexavalent Chromium (Cr VI)

Colour

Cyanide

Density

Fluoride

Loss on Ignition (550C)

Ammonia as Nitrogen

(includes water leach)

Nitrite + Nitrate as Nitrogen

(includes water leach)

Total Kjeldahl Nitrogen

Oil and Grease

(n-Hexane Extractable material; HEM)

Mineral Oil and Grease

(Silica-Gel treatment n-Hexane Extractable material; SGT-HEM)

pH

Phenolics

Total Phosphorous (TP)

(includes digestion)

Inorganic Phosphorous (IP)

Organic Phosphorous (OP)

(calculated, requires TP and IP)

Silica

Specific Conductivity

Sulfate, acid soluble

(includes digestion)

Sulfide

(calculated, with sulfate and total sulfur)

Sulfur, total*

* Subcontracted to another lab within SRC.

Soil, Biosolids and Compost

Organics

Phenoxy Herbicides

Includes: 2,4-D, Bromoxynil (Buctril), Dicamba (Banvel), Diclofop methyl (Hoe grass), Picloram (Tordon), 2,4,5-T, 2,4,5-TP (Silvex), MCPA, 2,4-DP

Chlorinated Pesticides

Includes: Aldrin, a-Chlordane, g-Chlordane, Dieldrin, Endrin, Endosulfan I, Endosulfan II, Heptachlor Epoxide, Heptachlor, p,p'-Methoxychlor Mirex, O,P'-DDD, O,P'-DDT, P,P'-DDD, P,P'-DDE, P,P'-DDT, PCBs, Toxaphene, alpha-BHC, beta-BHC, gamma-BHC (Lindane)

Pesticides I

Includes: Mataven (Flamprop-methyl), Propanil (Stampede), Triallate (Avadex BW), Trifluralin (Treflan), Diazinon, Dimethoate (Cygon), Fenitrothion, Lorsban (Chlorpyrifos), Malathion, Methyl Parathion, Parathion, Atrazine, Carbaryl (Sevin), Carbofuran (Furadan), Ethylfluralin

Pesticides II

Includes: Bromacil, Diuron, Linuron, Simazine, Tebuthiuron

Purgeable or Extractable Hydrocarbons

- Purgeable hydrocarbons includes: BTEX (Benzene, Toluene, Ethylbenzene, Xylenes), F1 (C6-C10)
- Extractable hydrocarbons includes: F2-F4 (C11-C50)

Petroleum Hydrocarbons

Includes: BTEX (Benzene, Toluene, Ethylbenzene, Xylenes), F1-F4

Polycyclic Aromatic Hydrocarbons (PAHs)

Includes: Acenaphthylene, Acenaphthene, Acridine, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(b+j)fluoranthene, Benzo(e)pyrene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3,c,d)pyrene, Naphthalene, Perylene, Phenanthrene, Pyrene, 1-Methylnaphthalene, 2-Methylnaphthylene, Quinoline

Organic Volatiles

Includes: Vinyl Chloride, 1,1-Dichloroethylene, Dichloromethane, MTBE, 1,1-Dichloroethane, Chloroform, 1,1,1-Trichloroethane, Carbon Tetrachloride, 1,2-Dichloroethane, Benzene, Trichloroethylene, Bromodichloromethane, Toluene, 1,1,2-Trichloroethane, Tetrachloroethylene, Dibromochloromethane, Chlorobenzene, 1,1,1,2-tetrachloroethane, Ethylbenzene, m+p-Xylene, o-Xylene, Styrene, Bromoform, 1,1,2,2-Tetrachloroethane, 1,2,4-Trimethylbenzene, 1,4-Dichlorobenzene, 1,2-Dichlorobenzene

Miscellaneous Organics

Glycol

Polychlorinated Biphenyls (PCBs)

Waste Disposal

Landfill Waste Material

Many of the tests required to characterize your waste material for acceptance at a landfill site are listed below. **Requirements vary** depending on the type and origin of the waste for disposal. Clients should discuss their disposal needs and arrange for a suitable testing protocol with the landfill where they intend to dispose of their waste. If you require any tests that are not listed below, contact the laboratory.

Sample Preparation

To obtain representative results, solid samples are normally dried and ground before analysis. Percent moisture can be determined and results are typically reported on a dry weight basis. If unstable or volatile parameters, such as mercury, are required, a representative portion of the wet sample is taken and analyzed. The moisture results are used to calculate these results back to a dry basis. Initial preparation charges for solid samples are as follows:

Drying and Grinding

Drying, Grinding and % Moisture

Packages for Waste Disposal

Class II Landfill Packages

The Class II landfill packages include many of the parameters normally required by landfills for disposal of waste material. **Requirements vary** depending on the type and origin of the waste for disposal. Clients are advised to discuss their needs with the landfill prior to testing.

Class II Landfill Complete Package

Includes: Dry, Grind, Moisture, Flashpoint, pH, Paint Filter Liquids Test, Phenolics, Metals Package, Hexavalent Chromium (Cr VI), Cyanide, Fluoride, TCLP Leach, Leachable Metals, Zero Headspace TCLP Leach, Leachable BTEX (Benzene, Toluene, Ethylbenzene, Xylenes), Total Petroleum Hydrocarbons, Polycyclic Aromatic Hydrocarbons, Volatile Organic Compounds, Glycols, Extractable Organic Halides, PCBs

Class II Landfill Basic Package

Includes: Dry, Grind, Moisture, Flashpoint, pH, Paint Filter Liquids Test, Phenolics, Metals Package, Hexavalent Chromium (Cr VI), Cyanide, Fluoride

Class II Landfill Leachate Package

Includes: TCLP Leach, Leachable Metals, Leachable BTEX (Benzene, Toluene, Ethylbenzene, Xylenes)

Leachable Mercury (if required)

Class II Landfill Chlorinated Organics Package

Includes: Extractable Organic Halides, PCBs

Class II Landfill Basic Organics Package

Includes: Total Petroleum Hydrocarbons, Polycyclic Aromatic Hydrocarbons, Volatile Organic Compounds, Glycols

Tests on Solid Wastes

Flashpoint

pH

Paint Filter Liquids Test

Phenolics

Metals Package

Includes: Sample digestion, Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Calcium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Phosphorous, Potassium, Selenium, Sodium, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc

Purgeable or Extractable Hydrocarbons

- Purgeable hydrocarbons includes: BTEX (Benzene, Toluene, Ethylbenzene, Xylenes), F1 (C6-C10)
- Extractable hydrocarbons includes: F2-F4 (C11-C50)

Total Petroleum Hydrocarbons

Includes: BTEX (Benzene, Toluene, Ethylbenzene, Xylenes), F1-F4

Polycyclic Aromatic Hydrocarbons (PAHs)

Includes: Acenaphthylene, Acenaphthene, Acridine, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b+j)fluoranthene, Benzo(e)pyrene, Benzo(g,h,i)perylene, Benzo(k)fluoranthene, Chrysene, Dibenzo(a,h)anthracene, Fluoranthene, Fluorene, Indeno(1,2,3,c,d)pyrene, Naphthalene, Perylene, Phenanthrene, Pyrene, 1-Methylnaphthalene, 2-Methylnaphthylene, Quinoline

Volatile Organic Compounds (VOCs)

Includes: Vinyl Chloride, 1,1-Dichloroethylene, Methylene Chloride, MTBE, 1,1-Dichloroethane, Chloroform, 1,1,1-Trichloroethane, Carbon Tetrachloride, 1,2-Dichloroethane, Benzene, Trichloroethylene, Bromodichloromethane, Toluene, 1,1,2 Trichloroethane, Tetrachloroethylene, Dibromochloromethane (THM3), Chlorobenzene, 1,1,1,2 Tetrachloroethane, Ethylbenzene, m+p-Xylene, o-Xylene, Styrene, Bromoform, 1,1,2,2-Tetrachloroethane, 1,2,4 Trimethylbenzene, 1,4 -Dichlorobenzene, 1,2-Dichlorobenzene

Waste Disposal

Tests on Solid Wastes (Continued)

Extractable Organic Halides (EOX)

Reported as chlorine

PCBs

Glycols

Includes: 1,2-Propanediol, 1,3-Propanediol, Diethylene glycol, Ethylene glycol, Triethylene glycol

Hexavalent Chromium

Total Cyanide

Mercury, total

Fluoride

Sulfur, total

Sulfur, Sulfate and Sulfide

Toxicity Characteristic Leaching Procedure

(TCLP Leach)

The TCLP leach is a US EPA method used to assess contaminants that have the potential to leach out of waste material over time. The leach is simply a sample preparation procedure and does not provide any direct data. The leachate is typically analyzed for trace metals, as well as certain organic compounds. Several other parameters can also be determined on the leachate.

TCLP Leachable Metals

Includes: Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc

TCLP Leachable Mercury

TCLP Leachable Hydrocarbons (F2-F4)

Zero Headspace TCLP Leach

If analysis of volatile compounds, such as benzene on the TCLP leachate, are required then the procedure must be conducted in a modified apparatus to ensure volatiles are not lost during the leach.

TCLP Leachable Benzene or BTEX F1

Naturally Occurring Radioactive Material (NORM)

The Canadian Guidelines for the Management of NORM outline criteria for the disposal of naturally occurring radioactive material that arises in processes unrelated to the nuclear industry. The laboratory can provide testing to help assess if these waste materials meet the release limits outlined in the guidelines.

NORM on Solids Package

Includes: determination by gamma spectroscopy for K-40, Pb-210, Ra-226, Ra-228, Th-228, Th-230; determination by ICP-MS for U-238 and Th-232; assessment if the material meets the release limits specified in the guidelines

Gamma Spectroscopy for NORM

Includes: determination by gamma spectroscopy for several NORM parameters including: K-40, Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-234

NORM on Liquids Package

For disposal of aqueous or liquid waste containing NORM, the gamma spectroscopy technique is not sufficiently sensitive to assess if a waste meets the disposal criteria for all the radionuclides outlined in the guidelines. The NORM on liquids package includes determination of K-40, Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232 and U-238 by sufficiently sensitive techniques to assess if the material meets the release limits specified in the guidelines.

Oily Wastes

Metals Package

Includes: Sample digestion, Aluminum, Antimony, Arsenic, Boron, Barium, Beryllium, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Molybdenum, Nickel, Selenium, Silver, Strontium, Thallium, Tin, Titanium, Uranium, Vanadium, Zinc

PCBs (oil/solvent)

Total Organic Halides (TOX) in oil/solvent

Water Content

Determined with either: the Karl Fischer (non-aqueous liquids) or Dean Stark (high-water content) techniques

Paint

Lead in paint



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