SCG's PFAS Contaminated Water Remediation Solution

SCG
REMEDIATION SERVICES
A Subsidiary of NELSON Environmental Group

The STORY

PAST

PRESENT

FUTURE

In the early 1990s, the remediation industry in Canada took off mostly with US-imported technologies.

As a result, SCG Remediation was founded in 1992 seeing an opportunity to provide Canadian remediation services, led by Canadian-made technologies and local expertise, and has remained competitive, bringing the most innovative solutions to the industry through the years.

Today, SCG has consolidated as a preferred remediation and water treatment equipment and systems manufacturer through its strength in design and ability to leverage practical and technical understanding of technology applications. This experience enabled SCG to help its clients by customizing systems designed to meet the most demanding project requirements.

In 2018, SCG became part of the NELSON Environmental Group.

The SERVICES

30 Years of Technology Manufacturing and Design

By acting as both the manufacturer and the operator, SCG Remediation has a unique perspective on site characterization, remedial action planning, system design, operation, and application. The technologies used and manufactured by SCG are user-friendly and remediation programs are tailored to the site-specific goals of our clients.

Remedial Options Assessment and Evaluation Services

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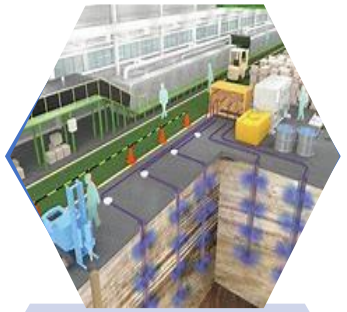
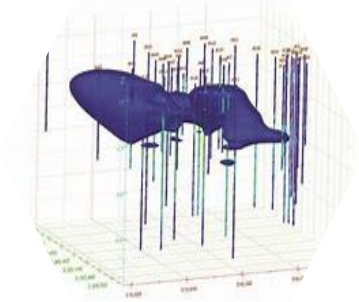
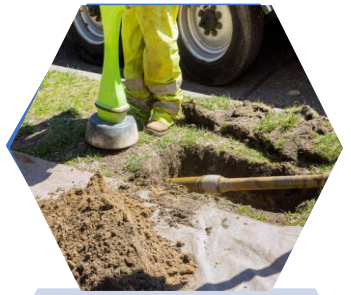


In-Situ Injection Services



High-Resolution Site Characterization Services

In-Situ Water Treatment Systems Design and Manufacturing Services



In-Situ Soil Remediation Services

NELSON Environmental Group Inc.

NELSON Environmental Group combines decades of expertise in contaminated soil and groundwater.
Our team delivers complete ex-situ and in-situ remediation solutions to Canadian and international projects.



NELSON Environmental Remediation Ltd.

Direct-Fired Thermal

DTD

Direct-fired Thermal Desorption:

Is an ex-situ process for remediation of soils with organic contamination via evaporative extraction and oxidation destruction.

DTD recycles high-quality soil for beneficial re-use while eliminating risks of off-site transportation, imported backfill quality, and long-term landfill liability.

Indirect-Fired Thermal

ITD

Indirect-fired Thermal Desorption:

Is an ex-situ process for evaporative extraction and condensation recovery of organic compounds from waste streams.

ITD is a non-destructive thermal process delivering value of product recovery from waste with high-level organic concentration, such as sludge and oil-based muds.

NELSON Earthworks

General Contracting

Excavation and Site Restoration.

Soil Treatment/Disposal.

Tank Removal.

Barrier Wall and Slurry Excavations.

Water Treatment.

Shoring.

Site Decommissioning and Demolition.

Pipeline Decommissioning and Abandonment.

Concrete Crushing and Recycling.

Osprey Scientific

Environmental Assessment

Remediation Test Kits and Samplers.

Water Quality Meters, Kits, and Samplers.

Waste Characterization Test Kits and Samplers.

Gas Monitors for Safety & Site Evaluation.

Consumables.

Laboratory Equipment and Supplies.

Service and Technical Support Training.

Rentals.

SCG Remediation Services

In-situ Environmental Services Pioneer

Provides innovative solutions for the assessment, management, and remediation of impacted sites.

High-Resolution Site Characterization Services.

In-situ Remediation Services.

Water Treatment Systems Design and Manufacturing Services.

Remedial Option Assessment and Evaluation Services.

MALAHAT NELSON

Indigenous Partnership on Vancouver Island

Thermal Treatment of Hydrocarbon Soils.

Impacted Soils.

Landfill of Saline Impacted Soils.

Creosote and Clean Wood Disposal.

Water Treatment Services.

Soil Wash and Earthworks Services.

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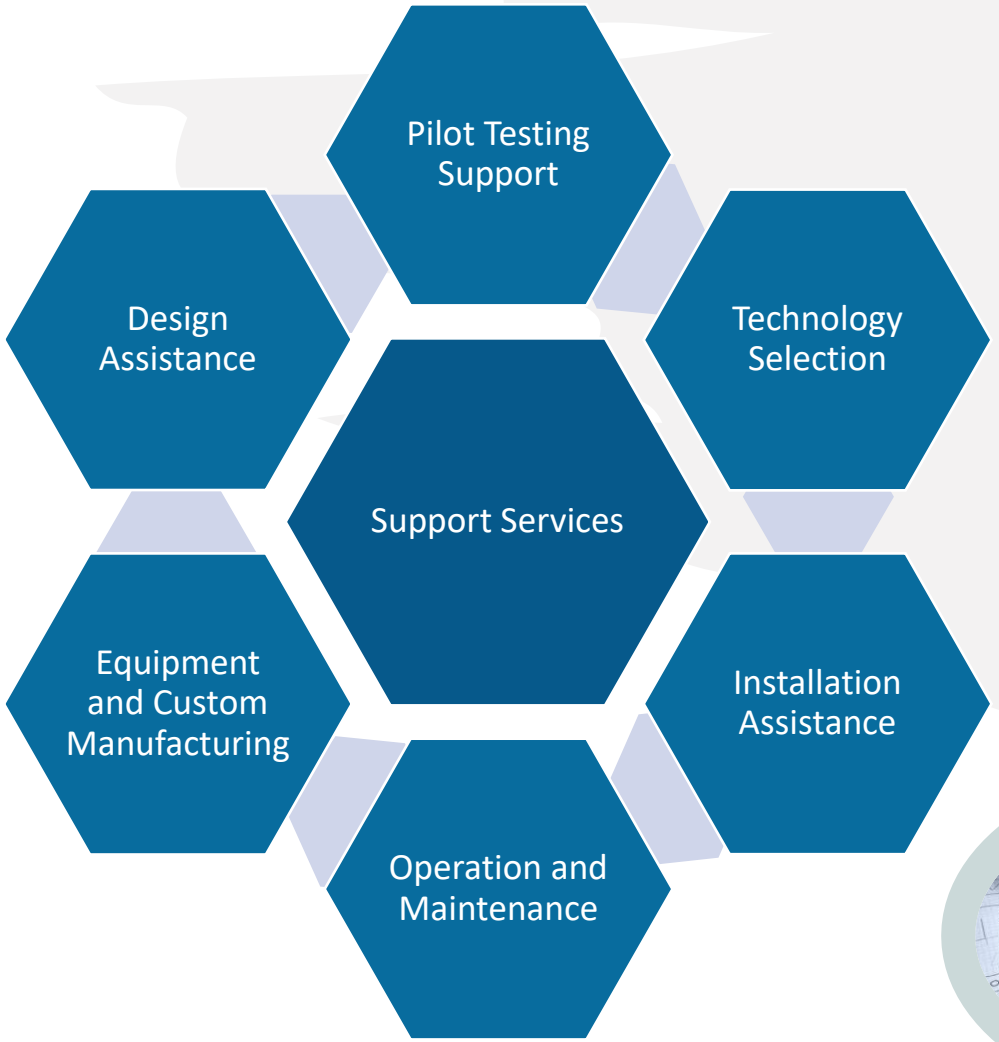
Support Services



Projects

SCG Remediation provides services in Canada, the US, and the Caribbean, and has completed over 1,200 successful projects.

This spirit will help the company and its team to continue to provide exceptional technologies and services to our clients over the years to come.

Per and Polyfluoroalkyl Substances (PFAS) GROUNDWATER REMEDIATION

What is PFAS, How is it Made, and Why is it Harmful

Human-made family of thousands of chemicals that are prized for their flame-retardant and non-stick properties.

PFAS have various chemical structures and range in size from small to large polymers.

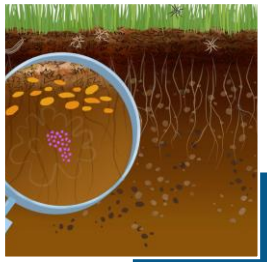
The production of PFAS is a complex process that involves the use of several chemicals.

The exact process varies depending on the specific type of PFAS being produced.

PFAS do not easily breakdown and can accumulate in water, soil, animals, and humans. Exposure to certain PFAS can cause serious health effects like cancer and other medical problems.

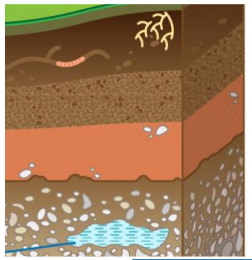
How Can PFAS be Treated

As of today, several treatment technologies have been used to reduce or destroy PFAS in the environment, with more focus on the treatment of aqueous environments.



SOIL

- Treatment of soil is challenging with most methods involving immobilization; however, some effective methods are:
  - Indirect/Direct Thermal Fired Treatment
  - Bioremediation
  - Chemical Oxidation



WATER

- Multiple filtration systems can remove PFAS from tap and well water
- The most effective methods are:
  - Granular activated carbon
  - Ion exchange resins
  - Reverse osmosis

PFAS' Regulations

Under the Stockholm Convention UNEP 2016b:

- Restriction and Elimination
- Assessment
- Safer Alternatives
- Inventories
- Available Techniques and Practices
- Awareness Raising

UNEP

Under the Prohibition of Certain Toxic Substances Regulations, 2012:

- Prohibits Manufacture, Use, Sale and Import (some limited exemptions)
- BC and AB Included PFAS Under the ***Contamination Sites Regulation***
- BC Included Drinking Water Under its ***Design Guidelines for Drinking Water Systems***

Gov. of Canada

Proposed further regulation of PFAS in Canada

- **Notice of intent** (2021) to move forward with activities to address PFAS as a class, since substance-specific information was lacking for most PFAS that are used in Canada, including those that are commonly used by industry to replace those PFAS currently restricted for use in Canada (as above, PFOS, PFOA and LC-PFCAs).

- **Draft State of Per- and Polyfluoroalkyl Substances (PFAS) Report** (2023) and a complimentary **Risk Management Scope for PFAS Report:**
  - Introducing regulations and/or other instruments to minimize environmental and human exposure to the class of PFAS from firefighting foams
  - Gathering information (including through mandatory reporting) needed to identify and prioritize options for minimizing environmental and human exposure to PFAS from other sources and products
  - Aligning with actions in other jurisdictions, where appropriate

The Pilot PROJECT

PFAS Groundwater Treatment

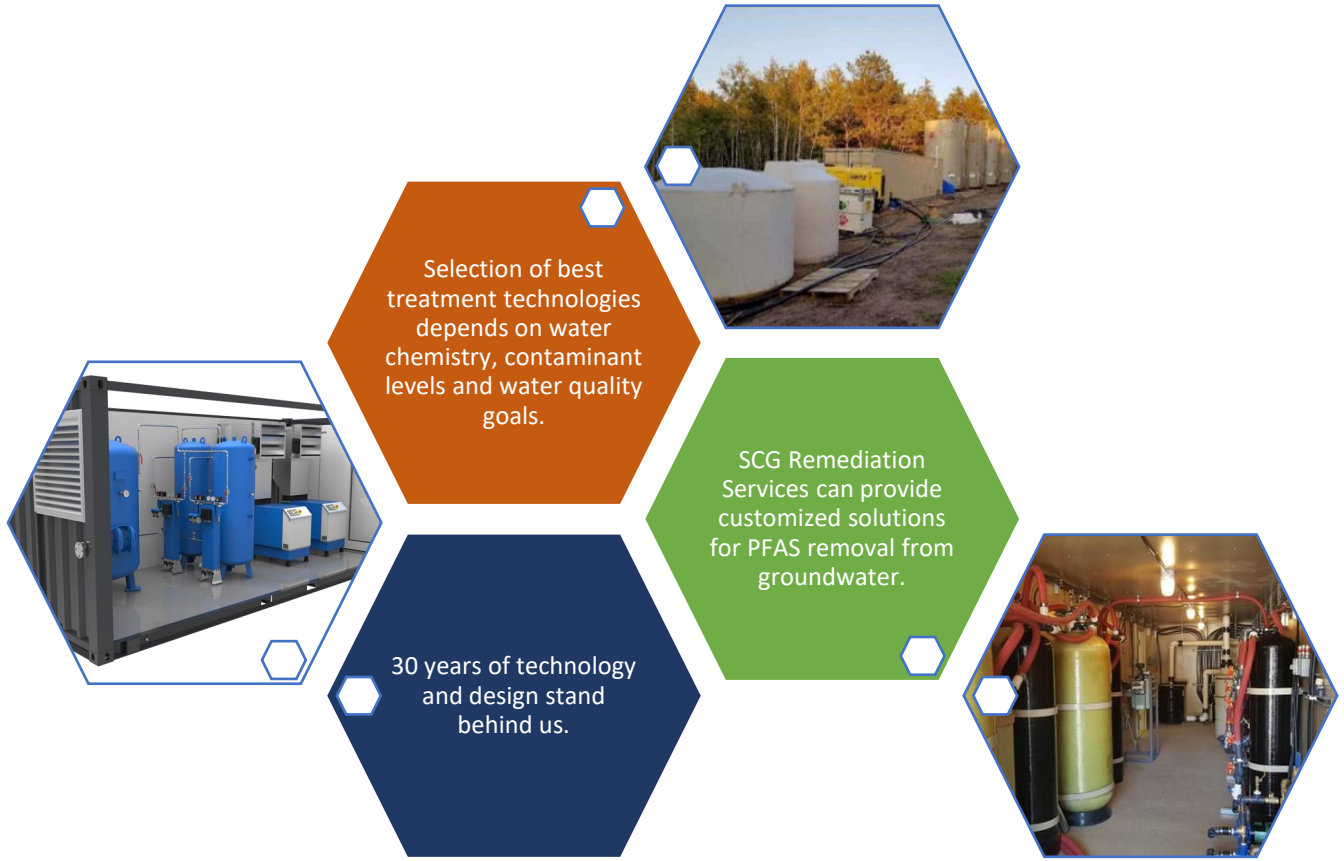
Pilot Project

- The client: Department of National Defense (DND).
- Location: Oil Disposal Pit, CFB Cold Lake, AB.
- Objective: to evaluate the efficacy of granular activated carbon and ion exchange media for the removal of PFAS in contaminated groundwater.

In 2012, Environment Canada's (EC) Emergencies Science and Technology Section (ESTS) put out a request for a feasibility study on PFAS remediation to be conducted at the CFB Cold Lake, AB.

This project was organized under the Canadian Federal Contaminated Sites Action Plan (FCSAP).

Potential Treatment Technologies



PFAS water treatment systems are designed to remove PFAS, from contaminated water.

The most studied and effective treatment processes are activated carbon, ion exchange, and high-pressure membrane filtration:

- Activated carbon has a large adsorption surface area, making it ideal for PFAS remediation.
- Ion exchange resin is designed to be more selective and preferentially absorbs targeted PFAS.
- High-pressure membrane filtration (reverse osmosis) can reject PFAS by size and concentrate it in a waste stream.

Potential Treatment Technologies

Activated Carbon

Commonly used in drinking water treatment systems to adsorb various contaminants, including **PFAS**.

Adsorption is the process of accumulating a substance (such as **PFAS**) at the interface between liquid and solid phases.

Granular activated carbon (GAC) filters are particularly effective for **PFAS** removal.

Ion Exchange

Ion Exchange Resins have negatively or positively charged sites that attract charged ions, including **PFAS**.

When water containing **PFAS** passes through the resin bed, the **PFAS** ions are captured by the resin, effectively removing them from the water.

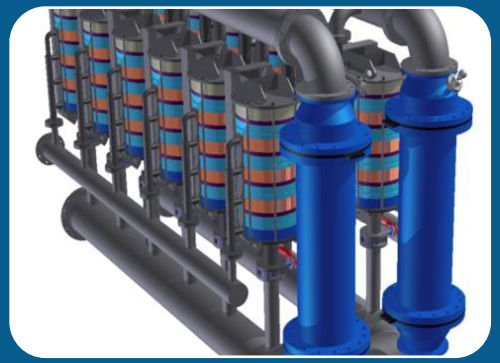
Ion exchange resins can be selected to preferentially target PFAS compounds.

PFAS Groundwater Treatment

Pilot Project

- Designed, manufactured, and rented out the water treatment system.
- Designed, supplied, and installed the well network (pumps, piping, and infrastructure).
- Extracted and operated groundwater treatment system.

NOTE: All guidelines were met on TSS, metals, hydrocarbon, and PFAS removal.



RESULTS:

The results (**Confidential**) generated enough engineering data to be used to design water treatment systems for PFAS treatment in complex, contaminated water sources.

CONCLUSION:

Adoption of a technology able to pump and treat, using an adsorption treatment approach.

The Case STUDY

Background

Year:
2021

Location:
Hanger 2
Lift Station at
CFB Edmonton.

NELSON Environmental Group Inc. (Parent Company) reached out to SCG Remediation Services to respond to a release of AFFF foam entering the sanitary system at the Hanger 2 Lift Station at CFB Edmonton.

The initial clean-out was conducted by NELSON.

Scope of Work

SCG provided a preliminary estimate for treatment requirements based on limited analytical data received in 2021 which consisted of the following:

- Equipment mobilization, manpower, and materials to NELSON's facility in Spruce Grove, AB.
- Preparation, set up, and operation of the water treatment system for contaminated groundwater.
- The processing of 6,000 L of contaminated water over five days of operation (including set up, tear down, etc.).
- Provision of analytical sampling.

System Design and Project Details

After the initial treatment of 6,000 L, approval was granted for the treatment of the remaining volume of 30,000 L.

Final project length = 3 weeks

Our Approach:

A combination of Adsorption Media and Filtration

- Bag/Cartridge Filters
- Sediment filtration (sand filter)
- Iron removal (ion exchange media)
- Granular Activated Carbon
- Polystyrenic Gel Resin (PFAS Removal Media)

Results: Non-Detect PFAS

Health Canada Santé Canada

The water treated met Health Canada's (HC's) Drinking Water Screening Values for PFAs and HC's Drinking Water Quality MAC's for PFOS and PFOA.

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CARO ANALYTICAL SERVICES

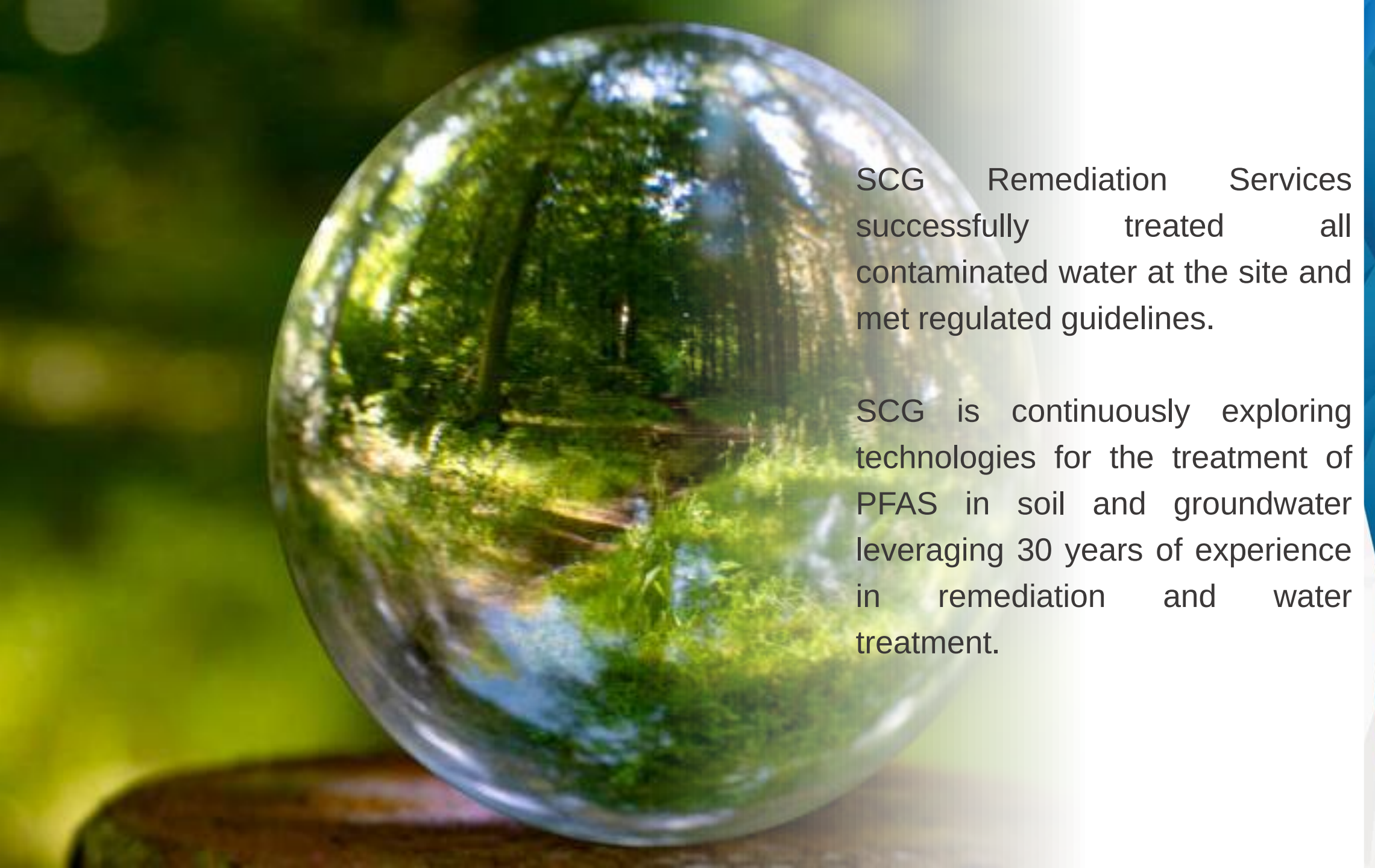
TEST RESULTS

REPORTED TO	SCG Industries	**WORK ORDER**	21E2296
PROJECT	Nelson PFAS	**REPORTED**	2021-06-05 16:30

Tank #1 First Pass (21E2296-01) | Matrix: Water | Sampled: 2021-05-19

Perfluorinated Compounds

Perfluorooctanesulfonate (PFOS)	< 0.020	0.020	µg/L	2021-06-05
Perfluorooctanoic acid (PFOA)	< 0.020	0.020	µg/L	2021-06-05
Perfluoropentanoic acid (PFPeA)	< 0.020	0.020	µg/L	2021-06-05
Perfluorobutanesulfonate (PFBS)	< 10.0	10.0	µg/L	2021-06-05
Perfluorohexanoic acid (PFHxA)	< 0.010	0.010	µg/L	2021-06-05
Perfluoroheptanoic acid (PFHpA)	< 0.010	0.010	µg/L	2021-06-05
Perfluorohexanesulfonate (PFHxS)	< 0.020	0.020	µg/L	2021-06-05
Perfluoroheptane sulfonate (PFHpS)	< 0.020	0.020	µg/L	2021-06-05
Perfluorononanoic acid (PFNA)	< 0.020	0.020	µg/L	2021-06-05
Perfluorodecanoic acid (PFDA)	< 0.020	0.020	µg/L	2021-06-05
Perfluoroundecanoic acid (PFUnA)	< 0.020	0.020	µg/L	2021-06-05
Perfluorodecanesulfonate (PFDS)	< 0.040	0.040	µg/L	2021-06-05
Perfluorododecanoic acid (PFDoA)	< 0.030	0.030	µg/L	2021-06-05
Perfluorotetradecanoic acid (PFTeA)	< 0.020	0.020	µg/L	2021-06-05
Perfluorooctanesulfonamide (PFOSA)	< 0.020	0.020	µg/L	2021-06-05
Perfluorotridecanoic acid (PFTrA)	< 0.020	0.020	µg/L	2021-06-05
Perfluorobutanoic acid (PFBA)	< 10.0	10.0	µg/L	2021-06-05



SCG Remediation Services successfully treated all contaminated water at the site and met regulated guidelines.

SCG is continuously exploring technologies for the treatment of PFAS in soil and groundwater leveraging 30 years of experience in remediation and water treatment.

Thank You

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