

# NELSON

Environmental Remediation



NELSON Environmental Remediation  
Website: [www.NERglobal.com](http://www.NERglobal.com)



# NELSON Environmental Corporate Profile



Direct-Fired Thermal Remediation



Indirect-Fired Thermal Remediation



NELSON Earthworks



Osprey Scientific



SCG Remediation Services



MALAHAT NELSON

## DTD

### Direct-fired Thermal Desorption

It's 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.

## ITD

### Indirect-fired Thermal Desorption

It's 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.

## 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.

## 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.

## 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.

## 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.



# NELSON Thermal Capacity & Advantages

## Unique Advantages

**Largest mobile TDU fleet in North America** – unmatched capacity.

- 4 Direct Thermal Treatment Units with capacity from 15-80 tonnes/hour
- 1 Indirect Thermal Treat unit with capacity from 5-15 tonnes/hour
- **Process intensity for PFAS treatment** – precise heating + longer residence times.
- **Onsite treatment = lowest carbon footprint** among thermal options.
- **Eliminates replacement soil costs** by returning clean soil immediately.
- **ISO:14034 / ETV certified** – objective performance verification.



# Thermal Desorption to Treat PFAS

Benefits of TDU (Thermal Desorption Unit) Technologies:

1. Effectiveness: Onsite Thermal Desorption effectively breaks down the complex PFAS molecules, ensuring a thorough and complete remediation.
2. Rapid Treatment: This process significantly accelerates treatment timelines compared to traditional methods, reducing project durations and costs.
3. Mobility: The mobile onsite aspect of TDUs allows us to target contaminated sites directly, eliminating the need for offsite soil transport/disposal and import of replacement backfill.
4. Cost Effective: TDU application has long proven to be a cost-efficient solution delivering liability elimination.



# Thermal Desorption to Treat PFAS

PFAS compounds have extremely strong carbon-fluorine bonds, which require high temperatures to separate and destroy. Thermal Desorption provides:

- **High-Temperature Volatilization:**  
PFAS in soil transitions to the vapor phase at elevated temperatures, enabling complete extraction from solids. Soil heated to 350–550°C depending on PFAS type.
- **Thermal Oxidation Destruction:**  
PFAS vapors are destroyed in the thermal oxidizer at >950°C, breaking carbon-fluorine bonds and converting them into HF, CO<sub>2</sub>, and inert salts safely neutralized in downstream air-pollution controls. High turbulence and oxygen conditions ensure >99.99% destruction.
- **Outcome:**  
Nearly complete PFAS removal from soil. Destruction efficiency in gas phase >99.99%. Soil meets regulatory standards for reuse.



# Regulatory Drivers for PFAS Thermal Treatment

## Regulators Increasingly Support Thermal Approaches

- PFAS identified globally as *persistent, bioaccumulative, and toxic*.
- Several jurisdictions restricting or banning landfill disposal and aqueous film-forming foam (AFFF) dumping.

Thermal treatment recommended or recognized by:

- **US EPA** – High-temperature thermal destruction identified as highly effective.
- **Australia, EU, and Canadian agencies** – Thermal Desorption approved for PFAS-contaminated media.

## Advantages Under Tightening Regulations

- Eliminates long-term liability from long-lived PFAS residues.
- Avoids future soil rehandling due to evolving PFAS limits.
- Provides auditable treatment records and performance test data.



# Comparison of PFAS Treatment Technologies

Technology	Pros	Cons
<b>Thermal Desorption (NELSON TDU)</b>	Proven PFAS removal; onsite; large throughput; eliminates PFAS liability; reusable soil	Requires energy input; air system complexity
Activated Carbon / IX Resins	Effective for water	Not effective for soil; creates PFAS-laden waste
Stabilization / Solidification	Low cost	Does not destroy PFAS; high long-term liability
Excavation & Landfill	Fast	Banned in several regions; liability remains; hazardous transport
Incineration	High DRE	Expensive; regulatory scrutiny; not onsite



# Summary on PFAS Treatment

## Environmental

- No offsite disposal of PFAS waste.
- Reduces GHG emissions vs. excavation/landfill approaches.
- Prevents groundwater recontamination from landfill leachate.
- Thermal Treatment is a Proven Technology for Removing PFAS from Soil and Destroying PFAS in the Exit Gas at a Very High Destruction and Removal Efficiency

## Economic

Significantly lower lifecycle cost.

Eliminates future liabilities and revisit costs.

Earns carbon credits (where programs exist).



# TDU Projects “Around the world from the Arctic to the Tropics”



# TDU Process “Clean Dirt, No Doubt!”

**DTD: Direct-Fired Thermal Desorption – Soil/Sediment Organic Extraction & Destruction**



**ITD: Indirect-Fired Thermal Desorption – Sludge/Oil Mud Organic Extraction & Recovery**

