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## **Division 31 GEO: Global Energy & Environmental Integrity Solutions**

Harnessing Biotechnology and Robotics to Maintain Asset Integrity Without Downtime

### **Overview**

**Division 31 GEO** provides an integrated suite of turnkey engineering, biological innovation, and robotic maintenance. Our solutions eliminate increase production of sour crude, reduce operational bottlenecks, and ensure 100% regulatory compliance through the containment and remediation of environmental contaminants.



## I. Turnkey Geosynthetic Construction & Installation

We do not just provide materials; we deploy full-scale infrastructure solutions to the highest safety standards.

- **Containment Systems:** Full-service installation of drilling pads, frac pits, and secondary containment dikes, including site preparation and sub-grade leveling.
- **Precision Engineering:** Utilizing **SureWeld** extrusion technology and heat-welding to ensure 100% leak-proof joins.
- **Advanced Covers:** Engineering of floating covers for H2S odor control and insulated covers for thermal retention.
- **Mechanical Anchoring:** Expert installation of **SureLock** profiles to secure geomembranes to concrete and tank foundations.
- **Integrity Verification:** Post-installation spark testing using conductive liner technology to repair micro-pores before commissioning.

## II. Production Optimization & Flow Assurance

Eliminate mechanical and chemical bottlenecks through biological and robotic innovation that keeps your systems **100% online**.



## Oil & Gas Production and Environmental Solutions

### Advanced Paraffin & Wax Mitigation

Our **Para-GeoBac™ Series** (X, XX, XXX) utilizes targeted microbial blends to liquefy long-chain paraffin waxes (C16–C60+).

- **Natural Biosurfactants:** Lower the Cloud Point and Pour Point of crude oil.
- **Continuous Maintenance:** Replace expensive "hot oiling" or mechanical scraping with biological flow assurance.

### Online Robotic Maintenance

- **Zero-Outage Sludge Removal:** Remotely operated **DredgeBots** remove sediment from cooling towers and scale pits while systems remain fully operational.
- **Tank Bottom Recovery:** Specialized robotic heads break up and recover solidified paraffin blankets without requiring personnel entry or tank drainage.

### Sour Gas (H<sub>2</sub>S) Suppression

- **SRB Inhibition:** **GEO-Bac®** bacteria outcompete sulfate-reducing bacteria to neutralize H<sub>2</sub>S at the source.
- **Oxidative Conversion:** Biological conversion of dissolved sulfides into elemental sulfur reduces toxicity during transit.

### III. High-Performance Infrastructure Materials



Our multi-layer barriers are engineered for the rigors of hazardous waste and energy production.

Technology	Key Industrial Application
<b>D31 High Puncture</b>	High-puncture resistant liners for shale gas drilling and frac pads.
<b>D31™ HDPE</b>	Primary liners for produced water reservoirs and hazardous waste cells.
<b>D31 Barrier® EVOH</b>	Multi-layer liners that block methane, H2S, and VOC migration.
<b>D31 Conductive Liner</b>	Specialized liners for electronic leak location in high-risk zones.

#### IV. Environmental Remediation & Site Restoration

We offer permanent destruction of "forever chemicals" and legacy contaminants rather than simple "dig and haul" methods.

- **Soil Decontamination:** The **M-1000® Series** mineralizes diesel, jet fuel, and chlorinated solvents into CO2 and water.
- **PFAS Remediation:** We utilize **D31 Barrier®** technology to vault impacted soils and coordinate **Supercritical Water Oxidation (SCWO)** to achieve 99.9% destruction of PFAS molecules.
- **Waste Volume Reduction:** On-site robotic dewatering reduces waste volume by up to **70%**, recycling filtered water back into your facility loop.

#### Hydrocarbon & Soil Decontamination (GEO-Bac)

- **M-1000® Series:** Rather than "dig and haul," these microbes mineralize contaminants into CO2 and water.
- **M-1000H\*:** Broad-spectrum remediation for diesel, jet fuel, and chlorinated solvents.
- **M-1000BX:** Targeted for Gasoline-range organics (BTEX).
- **Spill-GeoBac™:** Rapid-response granulated microbes for land-based crude spills.

#### Specialized PFAS Remediation

- **Sequestration & Capping:** Use of **D31 Barrier®** technology to "vault" PFAS-impacted soils, preventing leachate migration into the water table.
- **PFAS Destruction Support:** Coordination of on-site **Supercritical Water Oxidation (SCWO)** to break carbon-fluorine bonds, achieving 99.9% destruction of PFAS molecules in soil and water.

#### Robotic Sludge Dewatering

- **Volume Reduction:** Removed sludge is processed through on-site dewatering units, reducing waste volume by up to **70%** and recycling filtered water back into the facility loop.

### Biological Production Optimization

The core strategy involves replacing traditional mechanical and chemical interventions with targeted microbial blends to maintain asset integrity and flow.



- **Paraffin & Wax Mitigation (Para-GeoBac™):** Utilizes targeted microbial blends (Series X, XX, XXX) to liquefy long-chain paraffin waxes.
- Microbes produce natural biosurfactants that effectively lower both the **Cloud Point** and **Pour Point** of crude oil.
- **Ben-GeoBac™** is specifically formulated for low-gravity crudes to address complex asphaltene and paraffin depositions.
- This continuous biological maintenance eliminates the need for "hot oiling" or mechanical scraping of flowlines.
- **Sour Gas (H<sub>2</sub>S) Suppression:**
  - **GEO-Bac® facultative bacteria** are used to outcompete Sulfate-Reducing Bacteria (SRBs) for available nutrients.
  - By inhibiting SRBs, the technology neutralizes H<sub>2</sub>S at the source within the reservoir or flowline.

## Oil & Gas Production and Environmental Solutions

- Biological oxidation further converts dissolved sulfides into elemental sulfur, reducing gas toxicity during storage and transit.

### Asset Integrity & Corrosion Mitigation

Our biological solutions protect tubulars and rod strings by sequestering and removing corrosive components.

- **Corroso-GeoBac:** An extra-strength product with four times the filming activity of Litho-Bac. It prevents hydrogen sulfide and sulfide-based corrosion while providing broad-spectrum paraffin and scale control.
- **Sulfo-GeoBac Line:** Targeted removal of hydrogen sulfide from gas, oil, and water through metabolic competition or inhibition of sulfate-reducing bacteria (SRBs).
- **GEO-Force Blue:** A specialized biocide formulated to control SRB populations and associated hydrogen sulfide concentrations in production equipment.

### Integrated Maintenance

These biological treatments are often paired with **Online Robotic Maintenance**, such as **DredgeBots** and specialized robotic heads that liquefy paraffin blankets in tank bottoms while systems remain 100% online.

### Advanced Paraffin & Wax Mitigation (Para-GeoBac™ Line)

Our microbial culture products contain naturally occurring, non-pathogenic, and non-genetically engineered microorganisms that liquefy long-chain paraffin waxes (C16–C60+).

- **Para-GeoBac™ (Original):** Targeted for paraffin control in the C16 to C22 range; also used for production increases and scale/corrosion control.
- **Para-GeoBac™ X:** Works on a wider spectrum of higher alkanes (C16 to C40).
- **Para-GeoBac™ XX:** Developed specifically for higher molecular weight alkanes (C40 to C58).
- **Para-GeoBac™ XXX:** Covers extremely high molecular weight paraffins from C45 to C60+.
- **Ben-GeoBac™:** Targets specific asphaltene and paraffin depositions to improve flow in low-gravity crudes.

### Inorganic & Complex Deposition Control

- **Litho-GeoBac:** Designed for water flood injection treatments to control calcium carbonate, calcium sulfate, and barium sulfate scales.
- **" + " Series (Para-GeoBac+ / X+ / XX+):** Combines the scale-controlling activities of Litho-GeoBac with the paraffin-controlling ranges of the respective Para-GeoBac products.
- **GEO-PB-M-1000:** A composite product for emulsion applications and the degradation of low levels of contaminating hydrocarbons like toluene, benzene, or xylene.

**Online Robotic Maintenance**

- **Zero-Outage Sludge Removal:** Remotely operated **DredgeBots** remove sediment from cooling towers and scale pits while systems remain fully operational.
- **Paraffin Blanket Liquefaction:** Specialized robotic heads break up and recover solidified paraffin blankets from tank bottoms without requiring personnel entry.



## The Integrated Value Proposition



By combining **GEO Construction**, **Robotic Maintenance**, and **Biological Integrity**, Division 31 GEO delivers:

- **Reduced Outage Time:** Maintenance performed while systems remain online.
- **Extended Asset Life:** Biological protection of steel and concrete assets.
- **Regulatory Certainty:** Guaranteed containment and permanent remediation of Hydrocarbons, VOCs, Hydrogen Sulfide, Chlorinated Solvents, Paraffin, and PFAS in soils and water.

## Who We Are

Division 31 GEO is a global provider of Geoenvironmental, Geoenergy, and Geosynthetics solutions, integrating patented technologies, biological innovation, and robotic automation to protect assets, restore environments, and optimize energy production. We support clients across the energy, industrial, municipal, transportation, aviation, military construction, marine, solid waste, and environmental sectors with turnkey engineering, construction, remediation, and maintenance capabilities. Our mission is to deliver high-performance, cost-efficient, and regulatory-secure solutions that keep critical infrastructure operating at peak performance while safeguarding the environment.