
Boldwater Environmental Solutions
Pioneering mobile, bio-based treatment and recycling technologies in the Oil & Gas Industry since 2013.
visme Create Presentation

Ensuring Corporate Sustainability

Sustainable Development

Sustainable Development is the process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations.

Corporate Social Responsibility

The premise of Corporate Social Responsibility is that corporate managers have an ethical obligation to consider and address the needs of society, not just act solely in their self-interest or the interests of the shareholders.

Corporate Accountability

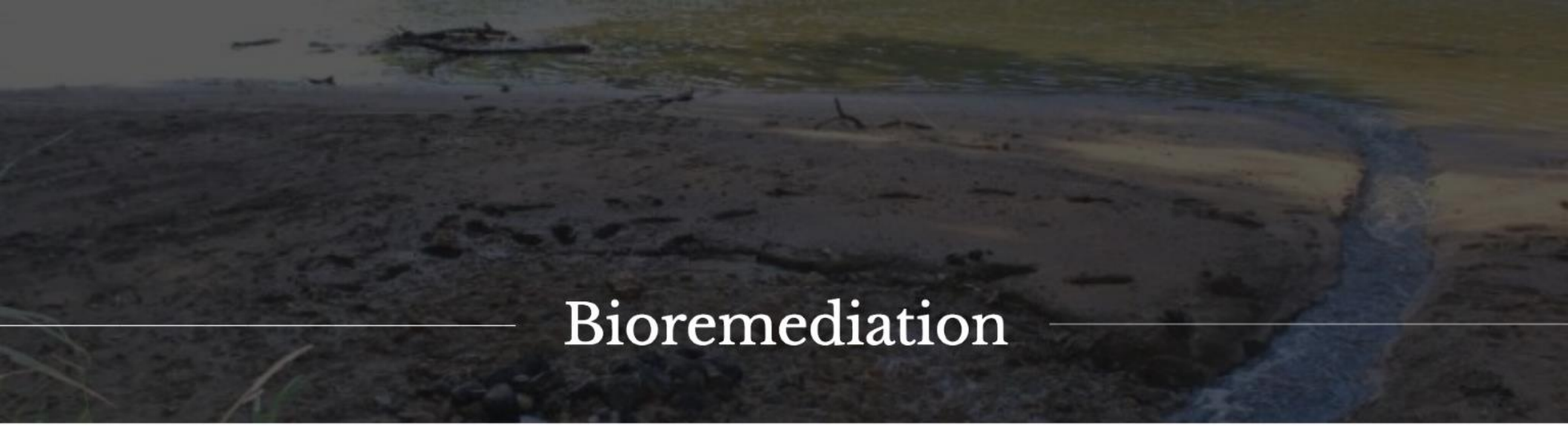
Corporate Accountability provides the rationale for as to why companies should report to society on their performance in these areas. Shareholders will support and reward companies that have made public commitments to environmental protection and economic development, and that conduct their operations in the spirit of sustainability.

FROM BURIAL TO BOLDWATER

In 1988, the Environmental Protection Agency exempted E&P wastes from the Resource and Conservation Recovery Act (RCRA) Subtitle C. Although they are relieved from regulation as hazardous waste, the exemption does not mean these wastes could not present a hazard to human health and the environment if improperly managed (because they are, in fact, hazardous).

After companies bury their contaminated drilling waste, the corporations as well as the landowners remain **liable**. If/when the RCRA E&P waste exemption is lifted, or when the EPA decides that natural degradation is not sufficiently decontaminating their waste site(s), these companies will have to dig up and pay for their waste to be treated and disposed of properly.

As a permitted mobile waste recycling entity, Boldwater releases drilling companies and landowners of their liability. Instead of accumulating waste burial sites or reserve pits, hiring Boldwater to operate alongside the drilling operation to treat and recycle the solid waste will save companies time and money in the long run, as well as relieve them of their liability. On top of this, **it is the right thing to do**. This method will soon become the industry standard as more and more companies prepare for the future and start implementing processes that protect the environment and promote economic development.



Bioremediation

The challenge facing scientists and industrialists alike today is tackling this problem of environmental degradation in a safe, environmentally sound manner with rational cost implications.

This is our mission.

Timeline

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2013

Boldwater Environmental Solutions was founded, specializing in the treatment and recycling of drilling wastes.

1989

Bioremediation begins to receive widespread attention and interest following the Exxon Valdez spill, which contaminated 1,300 miles of shoreline and 11,000 square miles of ocean with crude oil.

1972

Scientists successfully cleaned out the fuel tanks on the British passenger ship, RMS Queen Mary. This was the first commercial application of the ideals founded by George Robinson.

1967

The Resource and Recovery Act (RCRA) gives the EPA the authority to control hazardous waste. The RCRA also set forth a framework for the management of non-hazardous wastes.

1960s

George Robinson, the Assistant County Petroleum Engineer for Santa Maria California, devised the process of 'Bioremediation' during experimentation with microbes and polluted jars.

Terminology

Recognizing the Difference in Biostimulation and Bioaugmentation

Biostimulation

The modification of the environment to stimulate existing bacteria capable of bioremediation. This can be done by addition of various forms of nutrients and electron acceptors.

Bioaugmentation

The addition of oil-degrading microorganisms to supplement the indigenous populations in degrading the wide range of potential substrates present in complex mixtures such as petroleum.

CASE STUDIES

A variety of case studies published by the Environmental Protection Agency.

Demonstration of Augmentation

Conducted under the Department of Defense (DoD) Environmental Security Technology Certificate Program (ESTCP) from 1999 - 2002.

SIGNIFICANCE

The primary objective was to determine if complete reductive dechlorination could be stimulated through the introduction of a microbial culture (KB-1) in contaminated groundwater.

CONTAMINANTS

40,000 gallons of groundwater was contaminated with Tetrachloroethane (PCE) and Trichloroethane (TCE). The microbial culture introduced, KB-1, contained halorespiring bacteria.

TECHNOLOGY

Groundwater was extracted and pumped into a tank where electron donors were added, then pumped into the injection well. The demonstration plot included one injection well, three extraction wells, and five monitoring wells, each completed to a depth of 25 feet.

RESULTS

Within 72 days of of the addition of KB-1 culture, ethane was detected in the demonstrate plot, and the PCE and TCE were observed at the lowest levels since 1999. The augmentation stimulated complete reductive dechlorination.

Land Treatment at the Brown Wood Preserving Superfund Site - Live Oak, Florida 1989-1990

Site

For 30 years, this site was used to treat lumber products with creosote for preservation purposes. The wastewaters from the cylinders where they were treated was discharged into a lagoon.

Contaminants

8,100 cubic yards of stockpiled soil were contaminated with Polynuclear Aromatic Hydrocarbons. Total PAH concentrations ranged from 100 to 208 mg/kg.

Treatment

Installed clay liner, berm, run-on swales, and a subsurface drainage system. Also set up a retention pond for runoff control and a portable irrigation system.

Results

The Record of Decision required reduction of TCIC concentration to 100 mg/kg within 2 years. This goal was achieved in 18 months, when the concentrations ranged from 25 mg/kg to 92 mg/kg.

Slurry Phase Bioremediation at French Limited Superfund Site - Crosby, TX 1992-1993

Site

Former industrial waste disposal facility where approximately 70 million gallons of petrochemical wastes were disposed in an unlined lagoon between 1966 and 1971.

Contaminants

300,000 tons of contaminated sludge and soil in the lagoon were treated to levels below those specified in the ROD. The primary contaminants include benzo(a)pyrene, vinyl chloride, benzene, arsenic, and PCB's.

Treatment

The "MixFlo" system was used for aeration which minimized air emissions while supplying oxygen to the biomass. Soil and sludge were treated in two separate treatment cells each designed to hold 17 million gallons

Results

After 275 days, the analytical results for all sampling points were in compliance with site remediation cleanup goals specified in the ROD. Maximum allowable concentrations are listed below:

- Benzo(a)pyrene: 9 mg/kg
- Total PCB's: 23 mg/kg
- Vinyl Chloride: 43 mg/kg
- Arsenic: 7 mg/kg
- Benzene: 14 mg/kg

Soil Vapor Extraction & Bioventing for Remediation of JP-4 Jet Fuel Spill at Hill Air Force Base Site 914 - Ogden, Utah 1988-1990

Site

27,000 gallons of JP-4 jet fuel were spilled when an automatic overflow device failed. The spill covered approximately 13,500 square feet. The formation consisted of mixed sands and gravel with occasional clay lenses.

Contaminants

5,000 cubic yards of soil were contaminated with Total Petroleum Hydrocarbons, with an average concentration of 400 mg/kg.

Treatment

The Soil Vapor Extraction system included 7 vent walls located in the areas of highest contamination, 31 monitoring wells, and an catalytic incinerator. A plastic liner was installed on the surface to prevent local air infiltration. The Bioventing phase that followed included 4 vent wells and the same monitoring wells. Biodegradation was enhanced by injecting oxygen, moisture, and nutrients into the soil.

Results

The SVE system effectively removed hydrocarbons from the soil ranging from 33 mg/kg to 101 mg/kg. Further reduction to levels below the specified TPH limit was achieved with 15 months of Bioventing. Throughout both methods, 211 lbs. of TPH were removed over 2 years of operation.

Windrow Composting of Explosives Contaminated Soil at Umatilla Army Depot Activity - Hermiston, Oregon 1992

Site

From 1955 to 1965, the UMDA operated a munitions washout facility where hot water and steam were used to remove explosives from munitions bodies. About 85 million gallons of heavily contaminated washwater were discharged into two lagoons on site.

Contaminants

The underlying soils and groundwater were determined to be contaminated with explosive compounds - primarily TNT, RDX, and HMX. Top 5 feet of soil under the lagoons (244 cubic yards) were excavated, treated, and returned to excavated area.

Treatment

Excavated soil was screened and mixed with soil amendments. Nonaerated and aerated windrows composted for 40 days. The treated soil was mixed with top soil and revegetated, redeposited in excavated area, or landfilled.

Results

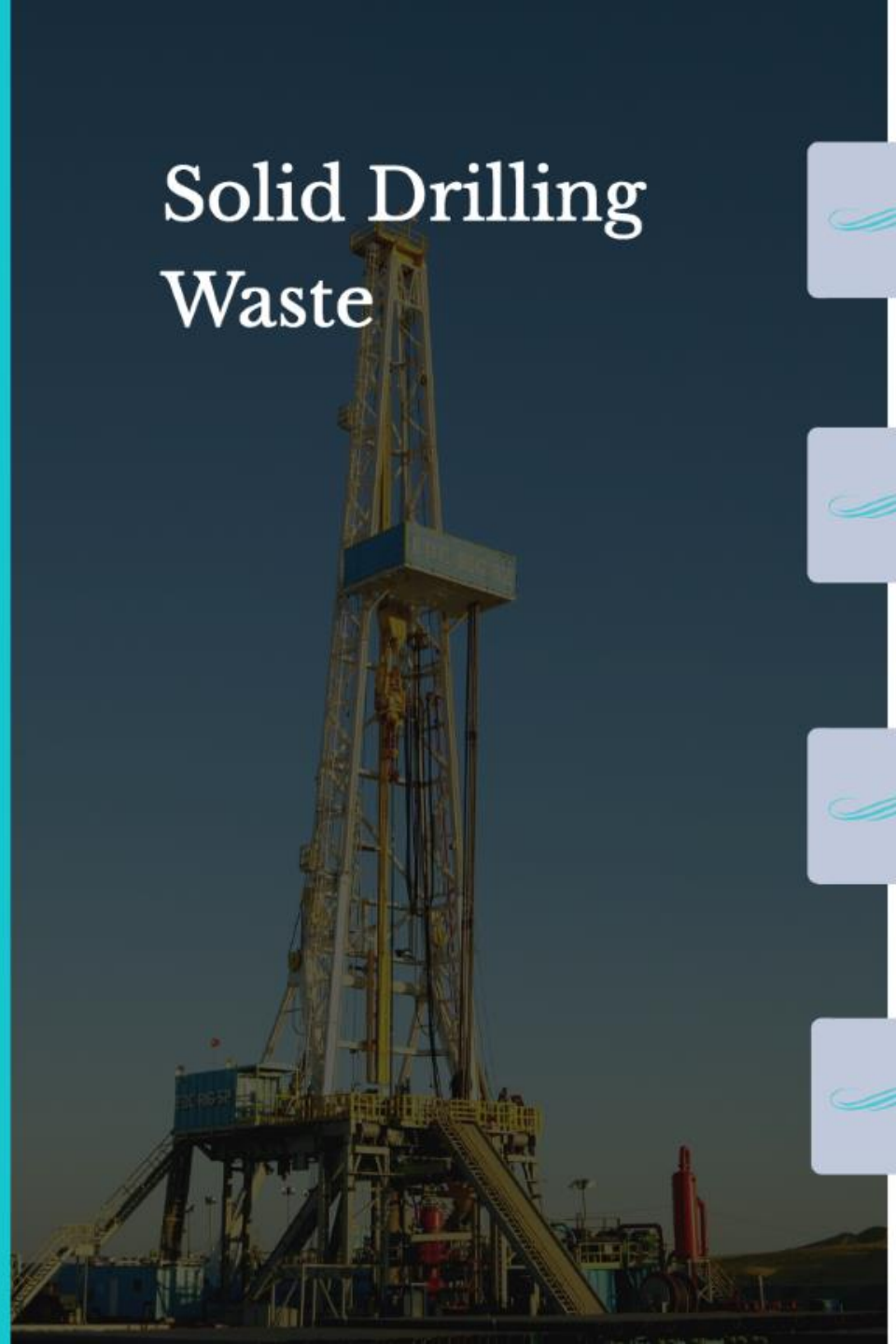
With the exception of HMX (aerated), all contamination levels were below the targeted cleanup levels of 30 ppm.

- TNT was reduced from 1600 to 4 ppm
- RDX was reduced from 1000 to 7 ppm (aerated) and 2 ppm (nonaerated)
- HMX reduced from 200 to 47 ppm (aerated) and 5 ppm (nonaerated)

DRILLING WASTE

Boldwater's Unique Treatment Process

Solid Drilling Waste



Treatment & Remediation

Our specialized enzyme treatment actively degrades hydrocarbons and effectively decontaminates the solid waste material alongside the drilling operation in an efficient time frame.

Strength Stabilization

Based on the recycled material's intended use, we will mix in either caliche, cement powder, or a combination of the two which ensures the final material will be strong and well-suited for its purpose.

Testing of Recycled Road Base

Under the terms of our permit, a third party tests the material for present levels of all state and EPA controlled substances including Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, Zinc, Benzene, Chloride, and TPH's.

Reuse of Recycled Road Base

Once the material is tested and cleared, it is available to be made into high quality lease roads.

Reserve Pits

Boldwater recognizes that in some cases, oil and gas operators utilize reserve pits to store and hold drilling wastes.

We offer to reclaim old pit locations and recycle these previously buried drilling wastes. Our eco-friendly processes rapidly eliminate hydrocarbon contamination and return the job site to environmental compliance in a cost-effective manner.

Operational Cost Reduction | Environmental Citizenship | Corporate Compliance | Landowner Satisfaction

Onsite Spills

Oil and Gas operations include numerous activities and day to day processes that have the potential of generating a hydrocarbon-based spill that would contaminate topsoil, flexible road base material, and even ponds, streams, and waterways.

Boldwater's treatment capabilities using our all-natural solution provides a rapid response and eco-friendly way to treat and clean up spills. We are dedicated to protecting the well-being of the environment by restoring the ecological damage caused by years of improper waste management.

Cost-effective | Fast Acting | Environmental Citizenship

An Outdated Disposal Method

Possible contaminants being buried:

- TPH's
- Arsenic
- Barium
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Silver
- Zinc
- Benzene
- Chlorides

Burial is the placement of waste in man-made or natural excavation areas, such as landfills or reserve pits. Due to its simplicity, it has remained the most common onshore disposal technique for disposing drilling wastes. By burying their untested waste material, these companies are potentially contaminating the surrounding soil not only with hydrocarbons, but also more harmful substances like lead or mercury.

Burial Method

- Leaves a long term environmental footprint
- Takes decades for natural degradation
- Excavating contaminated materials requires many trucks and heavy equipment which further increases the environmental footprint

Off the Shakers

After 6 hours of Treatment

100%

Natural Microbial Material and Nutrients

100%

Environmental Liability Release

20%

Decrease in Waste Management Costs

100%

Successful Track Record

As a permitted entity, we have surpassed the high standards we are held to & take pride in our success rate.

Recycling Method

- Drilling Cost Reduction
- Reserve Pit Elimination
- Construction Cost Reduction
- Corporate Compliance
- Asset Valuation Enhanced
- Corporate Sustainability
- Landowner Satisfaction

A COMPARISON

On the following slide, we will provide some perspective on how heavily contaminated the solid drilling waste we deal with is, and just how well our enzyme treatment performs. Burying drilling waste with high oil concentration takes many decades to be naturally degraded, while our patented process rapidly degrades the hydrocarbon presence within 24 hours.

The following chart compares data from the Jet Fuel Spill case study (treatment deemed successful), drilling waste burial sites relying only on natural degradation, and a typical Boldwater return based on the data of many of our completed jobs.

Boldwater operates efficiently.

Process Comparison

Boldwater's patented process is by far the most efficient method in remediating hydrocarbon presence in solid waste.

	Case Study (JP-4 Jet Fuel Spill)	Burial Site	Boldwater
Hydrocarbon Level (Beginning)	400 mg/kg (0.04%)	580,000 mg/kg (58%)	287,000 mg/kg (28.7%)
Time Lapsed	2 years	13 years	8 hours
Hydrocarbon Level (End)	33 mg/kg - 101 mg/kg (.003% - .001%)	495,000 mg/kg (49.5%)	10,600 mg/kg (1.06%)
Treatment	Soil Vapor Extraction & Bioventing	Natural Degradation	Specialized Enzyme Treatment

CORPORATE BENEFITS

Drilling Operations Become More Efficient

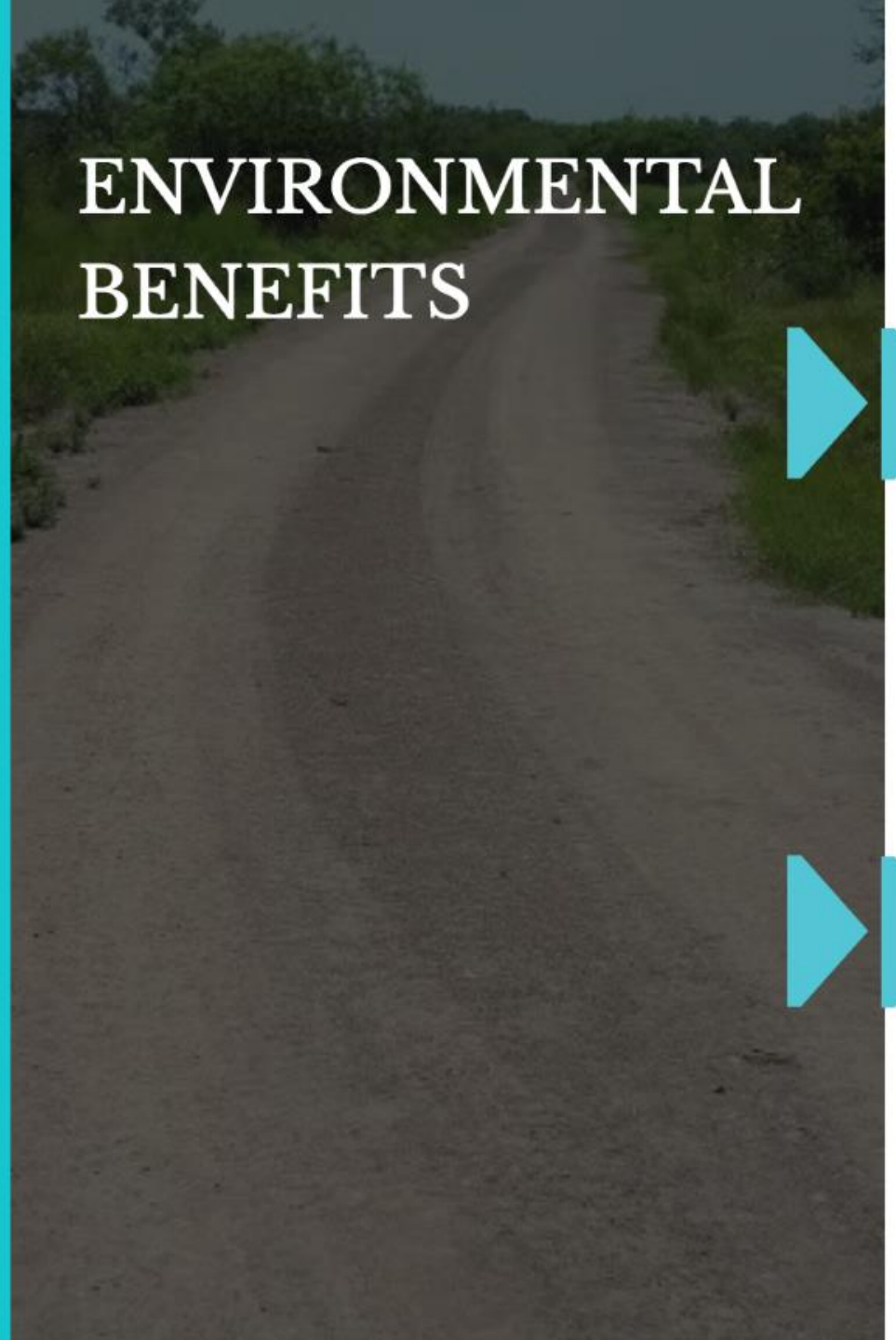
Boldwater's Drilling Waste Handling processes are engineered and designed to manage and reduce costs and provide greater overall value for the Operator.

Construction and Production Teams Receive High Quality Base Material

Boldwater's on-site recycling of solid drilling waste provides a regulated, high quality flexible base material for lease and ranch roads, county roads, and operational pad sites that will offset purchases of commercial or locally excavated base material.

Corporate Balance Sheet & Corporate Sustainability Ratings Improve

When drilling wastes are recycled by Boldwater and reused as defined and pre-approved by regulations, there is no ongoing liability. Therefore, the need for associated liability reserves, insurance, or entries on the company balance sheet is reduced. Shareholders will support companies that structure their operations to protect the environment.



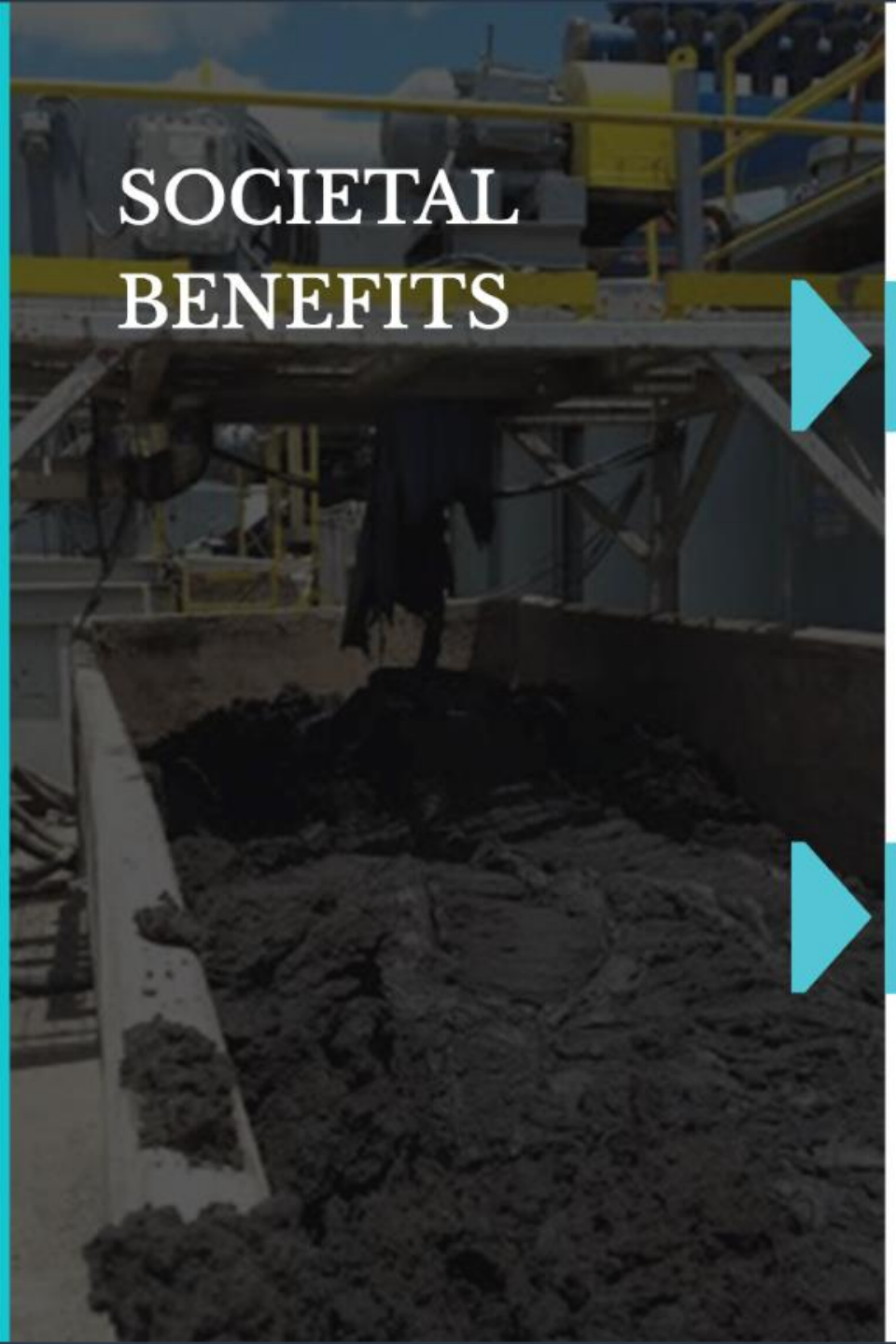
ENVIRONMENTAL BENEFITS

Rapid, All-Natural Treatment Solutions

In the last few decades, technological advances have enabled bio-remedies to target every level of hydrocarbon and eliminate them in a very rapid timeframe, and we at Boldwater employ a state-of-the-art bio-solution in our remediation services. Using our all-natural enzyme solution, we can virtually erase any hydrocarbon-related activity and return the area to its native condition.

Improved Air Quality

Because Boldwater's process eliminates the need for transporting hazardous drilling waste to a dumping facility, we eliminate on average 70 heavy-haul trucks for every drilling project. This improves local air quality by avoiding combustion emissions associated with truck traffic as well as the high maintenance and (typically bi-annual) rebuilding of roads.



SOCIETAL BENEFITS

Footprint Minimization

Boldwater is permitted to perform onsite bio-treatment and recycling and, as such, the use of our bio-remediation solution for drilling waste eliminates the need for a drilling reserve pit or the necessity of dumping the waste at an expansive land-based facility. In a spill situation, we can perform treatment in place. This capability, in addition to being eco-friendly, saves significant expenses for our clients.

Less Traffic

Oil and Gas drilling operations are usually accompanied by many large and small vehicles on roads and highways. Because Boldwater performs all services onsite, the drilling waste never leaves the drilling lease. Thus large vehicle traffic and risks associated are significantly reduced.

Boldwater Environmental Solutions

Pioneering mobile, bio-based treatment and recycling technologies in the oil and gas industry since 2013.

Bio-based, Eco-friendly

Remediation treatment for hydrocarbon contaminated soils.

Operate Efficiently

Remediation and recycling performed at your well site means no risk or expense in transporting waste.

PROTECT THE ENVIRONMENT

Boldwater's EPA & RRC approved vetted process uses only 100% natural microbial material and freshwater.

100% SUCCESSFUL TRACK RECORD

Recycle drilling wastes into a high quality road base material approved for reuse.

Sources

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