

BYODETOX

SOIL CONTAMINATION REMEDIATION

PRODUCT OVERVIEW

BYO-DETOX is a proprietary humified soil extract with the nine essential soil microbes included in the formulation. The product provides an organic substructure with an extremely high ion exchange capacity that Na^+ and Cl^- ions can bind and be charged neutralized (via an ionic bond). The carbon chain then becomes a food supply for the natural soil and product's adjunct microbes. Over time, the salts become encapsulated, effectively removing them from the environment. Special enzymes significantly increase the degradation process by facilitating the transfer and uptake of nutrient by the microbial population.

APPLICATION & BENEFITS



Bonds and eliminates salt (sodium & chloride) ions up to 100,000 ppm.



Increases nutrient and water storage through more efficient cellular uptake.



Detoxifies the soil from the full spectrum of accumulated toxins associated with fertilizers and regular chemical products.



Improve the natural organic soil structure through humic acid technology.



Serves as an effective chelating agent, magnifying the availability of vital plant nutrients, including nitrogen, calcium, phosphorus, potassium and trace minerals.



Reduces disease pressure via beneficial microbial activity that breaks down both carbohydrates and protein components of harmful bacteria and disease pathogens.



Increases plant beneficial microbes in soil.



Contains food grade ingredients that are safe for use around animals, fish and humans.

DOSAGE

Dosage rates are calculated based on soil volume and total chloride level. Salt binding will occur after the first application.



PHYSICAL PROPERTIES

PROPERTY	BYODETOX
Appearance	Liquid
Odor	Musty to Earthy
Solubility	100% Water Soluble
pH Neat	7.0-8.0
Color	Dark Brown to Black
Density	8.8 lbs/gal (1.05 kg/L)

PACKAGING Shipped from the manufacturing facility and regional distribution centers in 5-gallon, 55-gallon and 265-gallon containers.

Bulk quantities are available upon request.

STORAGE & HANDLING

Ingredients not precisely identified are non-hazardous. Do not ingest. May cause sickness if ingested in large quantities. Prolonged contact with skin may cause irritation. Safety glasses and gloves, as a minimum, are recommended when handling. Keep container closed when not in use. Store product in a dry and cool area. See Safety Data Sheet (SDS) for other safety and handling information.

BYO-DETOX FOR SOIL REMEDIATION & SALT CONTAMINATION

Dosage Chart

The Byo-Detox dosage chart is based on soil or solution salt levels. For application to the soil, the recommended dose should be diluted with enough water to ensure you'll be able to completely cover the affected area, and if required, that the solution can soak into the appropriate depth.

If applying Byo-Detox to solution, add the product to the contaminated water, ensuring adequate mixing prior to discharge.

SOIL APPLICATION

Salt (Cl) Level (ppm)	Byo-Detox Dosage, Gallons/Acre-Foot Initial Application	Byo-Detox Dosage Gallons/Acre-Foot Subsequent Applications
0 - 2,500	0.5	0.25
2,500 - 5,000	1.0	0.5
5,000 - 10,000	2.0	0.75
10,000 - 15,000	3.0	1.0
15,000 - 20,000	4.5	2.0
20,000 -100,000	4.5-35.0	5.0
100,000	55.0	15.0

SOLUTION APPLICATION

Salt (Cl) Level (ppm)	ByoDetox-HL-Solution Level Gallons/225 Barrels
0 - 2,500	0.25
2,500 - 5,000	0.50
5,000 - 10,000	1.25
10,000 - 15,000	2.0
15,000 - 20,000	3.0
20,000 - 50,000	4.0-10.0
50,000 -100,000	10.0-20.0

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APPLICATION METHOD

BEFORE YOU GET STARTED:

1. If there is any visible salt present on soil surface, the soil needs to be thoroughly tilled. Results are significantly improved if soil is tilled or disced prior to Byo-Detox application.
2. Plan to apply Byo-Detox in late afternoon or early morning, avoiding the heat of the day, for optimum results.
3. Make sure soil temperature is $>45^{\circ}\text{F}$ and rain is not forecasted for at least 12 hours.
4. Make sure application vessel and equipment is clean and free of any chemical or pesticide residue.

APPLYING BYO-DETOX:

1. Based on the soil sample chloride level, determine the amount of Byo-Detox per acre using the dosage chart provided.
2. Mix Byo-Detox prior to use to make sure any sediment in the bottom of container is dispersed.
3. No more than 24 hours prior to application, mix the Byo-Detox with non-chlorinated, <100 ppm chloride water. If chlorides are >100 ppm, application dosages need to be adjusted. Add water at no less than a 10:1 dilution and no more than a 100:1 dilution. The 10:1 is a minimum number and needed for activation. Almost any application is going to need to be in the 40-80:1 dilution range to create enough solution for coverage and moisture saturation.
4. Spray the diluted Byo-Detox solution evenly over soil surface, contacting as much of the surface as possible. Properly treated soil should be moist to the touch and not overly saturated. Depending on dilution, sometimes it is necessary to add additional water with a second application pass to provide moisture saturation.

PERFORMANCE INDICATORS:

- ↗ Vegetative growth should be viable in 7-14 days. This growth, however, is not guaranteed as many things affect vegetation growth. Byo-Detox is designed to reduce chloride and total soluble salt levels specifically.
- ↗ The complete encapsulation process is completed in 30-90 days. It is recommended that vegetation tests be completed after 90 days, or once soil tests confirm complete encapsulation.
- ↗ These two results are dependent on soil temperature, moisture levels, etc.
- ↗ Samples prior to application are recommended. Test at a few locations and at least two depths.
- ↗ These same locations should be re-sampled at 60 then 90 days to evaluate product performance.

BYO-DETOX FOR SOIL REMEDIATION & SALT CONTAMINATION

OKLAHOMA TREATMENT SITE CASE STUDIES

Executive Summary

Saltwater spills require immediate attention for remediation and contamination treatment. Historically, this has involved costly soil excavation and removal, or a multi-step process to apply gypsum, calcium nitrate, ground limestone, and/or manure to effectively treat the site over several, labor-intensive applications. Depending on the extent of the brine spill, remediation can sometimes take years.

With Byo-Detox, salt contaminated ground can be treated with an easy, spray-on application to neutralize the chlorides and address the total soluble salts. Byo-Detox treatment results can be effective in as quickly as 60 days, and many times do not require a second treatment, avoiding soil excavation.

Here's a snapshot of how the product has worked at saltwater spill sites in Oklahoma:

Oklahoma | Site #1

- o Contaminated with multiple barrels of salt water, initial environmental testing included taking two samples.
- o Byo-Detox treatment took place the same day as testing, and the application was in place for 83 days before a second set of samples from the same initial testing plots were taken.
- o **RESULTS:** The chlorides were neutralized to below acceptable levels in both sample areas. TSS levels were substantially reduced by 94%. The post-treatment chloride and TSS levels showed that the single Byo-Detox treatment had been successful and no further remediation efforts were needed.

PRE-TREATMENT SAMPLES	CHLORIDES	T. SOLUBLE SALT
#1 sample	7,220	9,410
#2 sample	29,100	31,040
POST-TREATMENT SAMPLES	CHLORIDES	T. SOLUBLE SALT
#1 sample	318	579
#2 sample	2,050	5,100

Oklahoma | Site #2

- o Multiple barrels of salt water were spilled outside the tank battery, and the site soil samples showed chloride levels as high as 38,515 and TSS levels as high as 87,600.
- o The plant treated the spill 3 months after it took place, and Byo-Detox was applied and allowed to sit for 51 days before secondary samples were taken from the same spots.
- o **RESULTS:** Chloride levels were neutralized and reduced over 99% in the West Sample, and the TSS levels were reduced by 98% in less than two months after the Byo-Detox treatment. The post-treatment samples showed remediation to acceptable levels.

PRE-TREATMENT SAMPLES	CHLORIDES	T. SOLUBLE SALT
West Sample	38,515	87,600
East Sample	19,000	43,200
POST-TREATMENT SAMPLES	CHLORIDES	T. SOLUBLE SALT
West Sample	250	1,850
East Sample	650	2,550

BYO-DETOX FOR SOIL REMEDIATION & SALT CONTAMINATION OKLAHOMA TREATMENT SITE CASE STUDIES

Oklahoma | Site #3

- An area outside of an Oklahoma tank battery was contaminated with a spill of several barrels of salt water. Testing at the site revealed chloride levels of 32,600 ppm. The Total Soluble Salts (TSS) measured 94,700 mg/kg.
- The contaminated patches were treated by Byo-Detox the day after the spill. Post-treatment testing at the site took place 73 days after application.
- **RESULTS:** The chloride contribution was neutralized, and TSS levels were reduced over 98% in less than 3 months, passing regulatory requirements.

PRE-TREATMENT SAMPLES	CHLORIDES	T. SOLUBLE SALT
#1 sample	32,600	94,700
POST-TREATMENT SAMPLES	CHLORIDES	T. SOLUBLE SALT
#1 sample	128	960

Oklahoma | Site #4

- A saltwater spill in Oklahoma left the contamination site with chloride levels as high as 4,300 ppm and TSS levels measuring 8,310 mg/kg.
- Byo-Detox treatment was performed over the winter months, when colder temperatures can sometimes cause remediation to take longer. The second set of post-treatment samples were taken after 100 days.
- **RESULTS:** The chloride levels had been reduced by 82% and neutralized. The TSS levels had come down by 77% in just over 3 months, bringing the salinity levels to acceptable levels.

PRE-TREATMENT SAMPLES	CHLORIDES	T. SOLUBLE SALT
#1 sample	4,300	8,310
POST-TREATMENT SAMPLES	CHLORIDES	T. SOLUBLE SALT
#1 sample	738	1,880

About BYO-DETOX

BYO-DETOX binds Na⁺ and Cl⁻ ions and neutralizes the charge through an ionic bond. Created from proprietary humified soil extract, Byo-Detox contains essential soil microbes and provides an organic substructure with a very high ion exchange capacity. The carbon chain acts as a food source for the soil and the product's adjunct microbes. Over time, the salts become encapsulated, effectively removing them from the environment. Enzymes in the formulation increase the degradation process and allow the transfer and uptake of nutrients in the microbes.

Byo-Detox can be used for saltwater spills at oil and gas sites, and it has been an effective, quick alternative to soil excavation and other labor-intensive treatment methods. Fast-acting, many customers keep Byo-Detox on hand as a "just-in-case" solution as part of their procedures to address any potential future spills.