

ReNew™

TREATMENT FOR SALT CONTAMINATED SOILS

ReNew™ is a water soluble liquid calcium/nutrient solution that remediates soils contaminated with sodium chloride (NaCl). Salt waters and brine disrupt the uptake and utilization of nutrients that plants and crops require for normal growth. Sodium from produced waters and brine deteriorate soil structure resulting in reduced plant water availability, excess water runoff, and ultimately, erosion. A high sodium concentration in the soil causes plant "yellowing" and dehydration resulting in wilting or stunting of the plant.

Chemically, **ReNew™** affects the ion exchange in the soil. Remediating sodium affected soils necessitates lowering excess exchangeable sodium with a soluble calcium source. The more favorable calcium ions replace the sodium ions present in the soil. The displaced sodium is then free to be flushed out of the root zone by water, allowing plant functions to return to normal.

The remediation effects of **ReNew™** begin immediately, and normal growing conditions are soon regained. Substantial decreases in sodium concentrations can be measured within weeks. Additional soil conditioning may be required depending upon degree and period of contamination.

Treatment of contaminated soils with **ReNew™** is a *quick easy, and economical* way to remediate sodium affected soils.

About **ReNew™**

Reduces sodium levels quickly and effectively.

Helps restore crops and vegetation.

Flocculates soil particles for improved soil structure and water penetration.

Improves nutrient utilization.

Cost-effective treatment.

Easy to apply.

Non-toxic and non-hazardous. Can be applied in and around inhabited areas.

ReNew™....Reclamation of sodium contaminated soils

The principal carrier of salt through our environment is water. In the oil and process industries, salt laden waters are stored and transported via cross country piping and storage networks. These systems, through leaks and spills, cause accidental influxes of salt to the soil that can completely devastate all vegetation and stop biological activity in a matter of days.

SODIUM CONTAMINATION

The primary salt associated with oil field wastes or produced waters is sodium chloride (NaCl). Soils, drill cuttings, and other E&P waste solids exposed to high sodium levels naturally become sodium saturated, or sodic. Previous remedies for excess sodium accumulations and influxes to soil have been limited to those problems of minor agriculture salinization. In many such projects, the addition of large quantities of gypsum (2 ½ to 50 tons per acre) and water leaching (1 acre-foot of water per ton of gypsum) have been incorporated. Results are time consuming and costly. These methods show little to no effect at all when sodium influxes are rapid and during a short period of time such as with heavy laden salt water from pipeline leaks and industrial brine spills.

PROBLEM DEVELOPMENT

Sodium problems can occur suddenly in the case of a spill, or develop gradually in the case of a salt mine or well. As the accumulated sodium reaches higher concentration levels, the plants normal transpiration processes (absorption of water from the soil) are affected. In this process, pure water is removed from the soil and the sodium salts are left behind. As sodium concentrations increase, water that previously flowed easily into the plants root system is reduced.

SOIL RECLAMATION

The parameters often used to estimate sodium damage to the soil include; electrical conductivity (EC), sodium adsorption ratio (SAR), exchangeable sodium percentage (ESP), and cation exchange capacity (CEC).

ReNew™ Reclamation of sodium contaminated soils

The following values are recommended for farming and residential conditions:

EC	2-4
SAR	<12
ESP	<12
Sodium ppm	<500

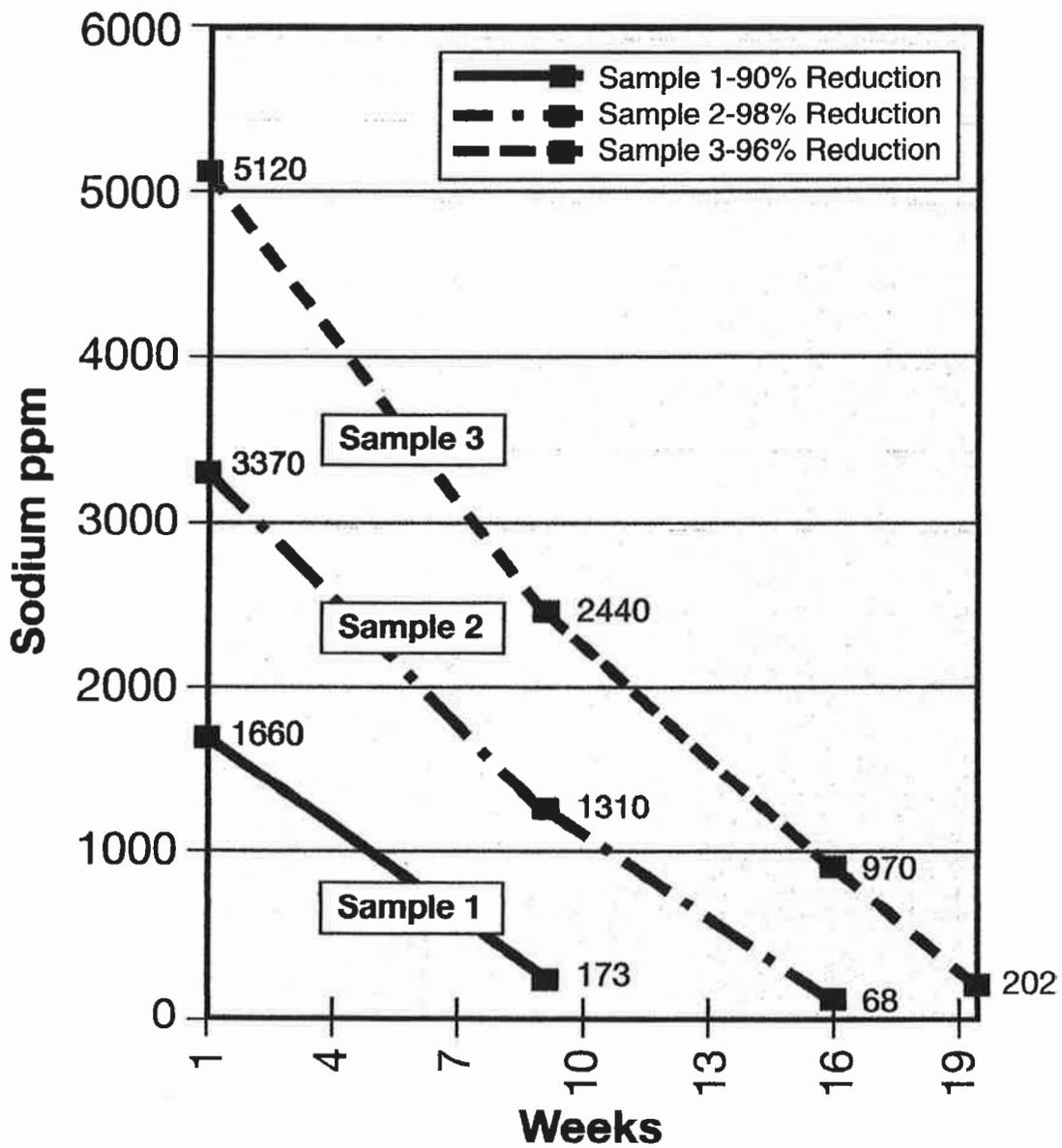
Remediating severely sodium damaged soils in a timely manner necessitates lowering excess exchangeable sodium with a *soluble* form of calcium. The calcium cations will replace the sodium ions present in the soil. The displaced sodium is then free to be flushed out of the root zone by water. **ReNew™** satisfies the need for a *soluble* calcium source, quickly reducing harmful sodium levels while flocculating soil particles for improved soil structure and water penetration. **ReNew™** provides a more concentrated and readily available source of calcium than the traditional lime, gypsum, and other calcium amendments. By using a *soluble* calcium source such as **ReNew™**, sodium is quickly and efficiently leached from the root zone resulting in increased water uptake, improved nutrient utilization, and restoration of crops and vegetation.

SOIL FERTILIZATION

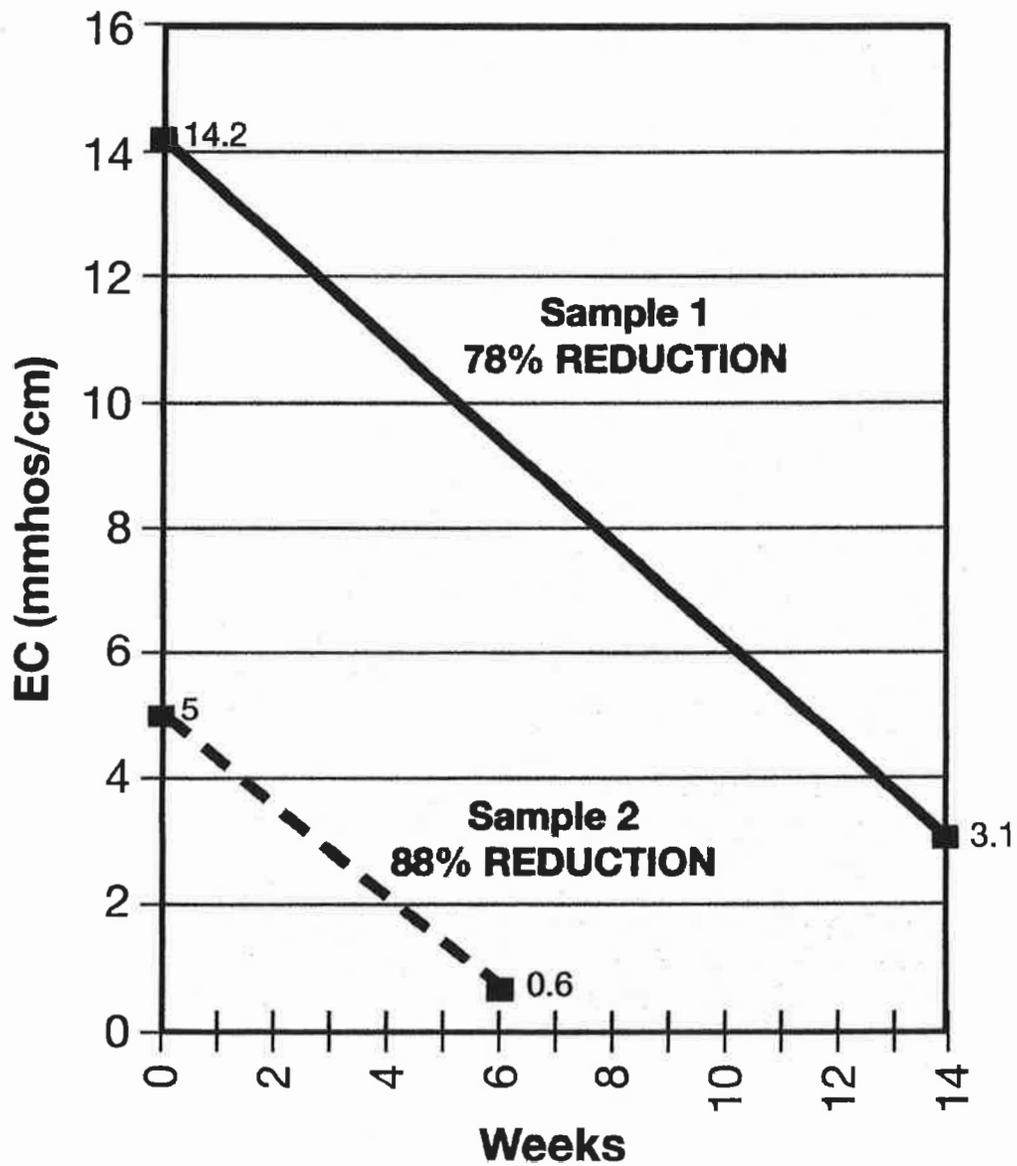
Soil fertilization is often overlooked when treating sodium contaminated soils. After sodium has been removed from the root zone, damaged plants and vegetation require proper nutrition for recovery and regrowth. **ReNew™** supplies valuable nutrients for plant development and growth. **ReNew™** offers optimum nitrogen efficiency. **ReNew™** also supplies calcium nutrition for improved plant structure and development. Because **ReNew™** improves soil structure and increases soil permeability, sufficient amounts of water can once again reach the plant, allowing vegetation to return to its natural state and growing condition.

SALT (NaCl) STUDY SODIUM REDUCTION

with *ReNew*TM



**SALT (NaCl) STUDY
ELECTRICAL CONDUCTIVITY
REDUCTION with *ReNew*TM**



ReNew™, RxDP™, Crop-Up™

TREATMENT FOR SALT CONTAMINATED SOILS

APPLICATION GUIDELINES

-SITE SPECIFIC-

1. Sample soil to establish existing sodium levels.
2. Determine extent of sodium damage in soil to be treated i.e., depth and surface area.
3. Prepare soil to improve percolation by plowing, tilling and bulking.
4. Apply ***RxDP™, ReNew™*** and ***Crop-Up™*** solution into soil.
5. Irrigate the site heavily with fresh water.
6. Apply ***GeoBond™*** to site to improve tilth and control erosion.
7. Sites adversely affected for longer periods of time may require additional treatments.

To verify the volume of soil to be treated is important!

*Introduce ***RxDP™*** and ***ReNew™*** to the soil by spraying, tilling, or injection.*

Level soils, efficient irrigation and good drainage are recommended.

Application rates may vary due to varying conditions. Depending upon the severity of the sodium soil damage, the depth of contamination and the soil type, a wide range of effective product usage rates can be applied. Consult your local Environmental Recovery Sales representative for recommendations.

ReNew™ ... Reclamation of sodium contaminated soils

PRODUCED WATER PIPELINE LEAK



BEFORE **ReNew™** APPLICATION



AFTER **ReNew™** APPLICATION

**Site Remediation Using
ReNew™, RxDP™, Crop-Up™
Old Soil Damage From Multiple
Saltwater Leaks**



BEFORE



AFTER

