IRRIGATION WATER ANALYSIS TERMS

Cations are **positively** charged ions and make up nearly 50% of the salts found in waters.

Anions are **negatively** charged ions and make up about 50% of the salts found in waters.

The sum of cations and anions in meq/1 must be within ± 10% for an analysis to be considered valid.

Nitrate To convert Nitrate to Nitrogen (N) ÷ 4.43
To convert Mg/l to Lbs/AF N x 2.72

Minor Elements

These elements are usually present in very small quantities in ground waters, but may be higher in surface waters and recycled waters.

Other

pH pH is an indication of the degree of acidity or alkalinity of a water. A pH of 6.5 to 8.4 is normal for most waters. A pH level of 7.0 is neutral while below 7.0 is acidic and above 7.0 is basic or alkaline.

E.C. Electrical Conductivity is a measure of a water's capacity to conduct an electrical current. The E.C. provides an approximation of a water's mineral content.

SAR Sodium Absorption Ratio. This is a calculation to determine the degree to which a water may adversely affect soil structure and drainage.

Crop Suitability

The crop suitability evaluation is derived from information taken from a variety of research publications and assumes the use of good irrigation management practices.

Amendments

Leaching Requirement

This is a calculation to determine the relative amount of extra water that must be applied to prevent excess salts from accumulating in the root zone of an irrigated crop.

Gypsum Requirement

This is a calculation to determine the amount of pure gypsum (or the equivalent) needed to prevent a water from adversely affecting soil structure and drainage.

The chemical reaction when gypsum is added to soil is as follows:

$$2Na\times + CaSO_4 + 2H_2O \rightleftharpoons Na_2SO_4 \downarrow + 2H_2O + Ca\times_2$$

Exch. Sodium	Soluble Calcium Sulfate	Water	Leachable Sodium Sulfate	Water	Exch. Calcium

× = Soil Exchange Sites

The addition of gypsum to soil, either directly or via irrigation water, provides a readily available source of soluble Calcium to exchange with the Sodium held on the soil exchange sites. This Sodium will combine with Sulfate to form a soluble Sodium-Sulfate compound which can then be leached from the root zone.

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
TEL: (805)392-2000
Env FAX: (805)525-4172 / Ag FAX: (805)392-2063
CA NELAP Certification No. 01110CA

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: (209)942-0182
FAX: (209)942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: (530)343-5818
FAX: (530)343-3807
CA ELAP Certification No. 2670

Office & Laboratory
3442 Empresa Drive, Suite D
San Luis Obispo, CA 93401
TEL: (805)783-2940
FAX: (805)525-4172
CA ELAP Certification No. 2775

Field Office
Visalia, California
TEL: (559)734-9473
Mobile: (559)737-2399
FAX: (559)734-8435

Amendments (cont).

Urea Sulfuric Acid Requirement

This is the result of a titration that is made to show how much of this acid is needed to remove approximately 80% of the water's alkalinity. See the footnote on page 2 of your water analysis report.

The chemical reaction that takes place when Sulfuric Acid is added to soil is as follows:

$$H_2SO_4 + CaC0_3 \rightleftharpoons CaSO_4 + CO_2 \uparrow + H_20$$

Sulfuric Acid	Insoluble Calcium Carbonate	Soluble Calcium Sulfate

The use of Urea Sulfuric Acid, rather than raw Sulfuric Acid, is recommended for safety reasons. Be sure to read and follow all safety precautions when using any form of Sulfuric Acid.

The addition of the recommended amount of Sulfuric Acid to water is made to lower its pH to a level that will dissolve Carbonate Salts in the soil. When Calcium-Carbonate is dissolved, soluble Calcium is released and is then free to exchange with exchangeable Sodium. This Sodium will combine with Sulfate to form a soluble Sodium-Sulfate compound which then can be leached from the root zone.

Micro System Plugging Hazard

These analyses are of concern only when the water is applied via micro sprinklers, drippers or other low volume delivery systems.

Manganese and Iron

These elements tend to precipitate and form scale and/or slime that will cause plugging in alkaline waters.

TDS by Summation

This is a calculation that shows the sum of all the dissolved cations and anions and indicates the relative degree to which scaling will occur in water having an alkaline pH.

Alkalinity

This is a result of a titration. Total alkalinity expressed as Calcium Carbonate is a calculation from the Carbonate and Bicarbonate alkalinity. Alkalinity may contribute to scale formation.

Langlier Index

This is a calculation based on Alkalinity, Calcium, pH and Temperature that indicates whether a water has a tendency to be corrosive towards metals. A positive result indicates a tendency to promote hardness scale. A negative result indicates a tendency to corrode the pipe interior.

Aggressiveness Index

This is a calculation based on Alkalinity, Calcium and pH that indicates whether a water has a tendency to be aggressive towards metals. A result of $\geq$ 12.0 is nonaggressive, 10.0 - 11.9 is moderately aggressive and $\geq$ 10.0 is highly aggressive.

Hardness

This is a calculation that shows the sum of Calcium and Magnesium expressed as Calcium Carbonate. Hardness may contribute to scale formation.