

TECHNICAL INFORMATION BULLETIN

WELLHEAD Soil Surfactant is designed specifically to treat and encourage rapid recovery from existing problems associated with water repellency such as localized dry spot (LDS) and dry patch. Applications of WELLHEAD soil surfactant help the professional turfgrass manager overcome problems with poor penetration and infiltration of water into the soil profile and inadequate hydration and rehydration of the rootzone.

Unlike many “soil penetrants,” WELLHEAD’s unique blend of two triblock soil surfactants will also help correct soil water repellency conditions that disrupt the uniform distribution, hydration, retention and drainage of water in turfgrass rootzones. Non-uniform movement of water due to water repellency at or near the surface of the soil profile is also corrected with applications of WELLHEAD.

Golf course managers commonly report problems with dry patch or localized dry spots on their greens, tees and surrounds during heat stress periods of the growing season.

Localized Dry Spot (LDS) and dry patch are general terms that are often used to describe the occurrence of an irregular area of turfgrass that, for no apparent reason, begins to show signs typical of drought stress. LDS and dry patch first appear as patches of dead or dying turfgrass. These spots usually continue to enlarge in a circular pattern. Soil beneath these spots is commonly found to be highly water repellent (hydrophobic) to a depth of 1 to 2 inches. Symptoms of LDS may also appear as a result of fungal disease.

WHAT CAUSES DRY PATCH OR LOCALIZED DRY SPOT?

There is general agreement that the cause of dry patch or LDS is water repellency -- the build-up of non-polar organic coatings on mineral surfaces in the upper root zone. The origin of these organic coatings has long been recognized as decomposing plant litter. When these organic coatings are subjected to wet and dry cycles (such as found in the upper root zone), they can become water repellent (hydrophobic). Once soil mineral particles become water repellent, areas of the rootzone cannot hold or retain water needed to meet metabolic requirements. As temperatures elevate, turfgrass growing in these water repellent areas weaken or may die from the lack of water and nutrients

Once established, water repellent coatings caused by organic materials such as humic substances are very difficult, if not impossible to remove. Water repellency caused by organic coatings usually increase in severity over time and therefore, should be expected to be an annual problem for the turfgrass manager.

MANAGING WATER REPELLENT SOILS

The standard practice for treating water-repellent sand root zones is the systematic application of nonionic soil surfactants. The use of newer, block copolymers, are now preferred when formulating soil surfactants. Surfactants today are formulated for a number of programs to help manage water repellent issues where turfgrass is grown. The most common uses are in preventative programs, irrigation penetrants and treatments that address existing problems caused by water repellency.

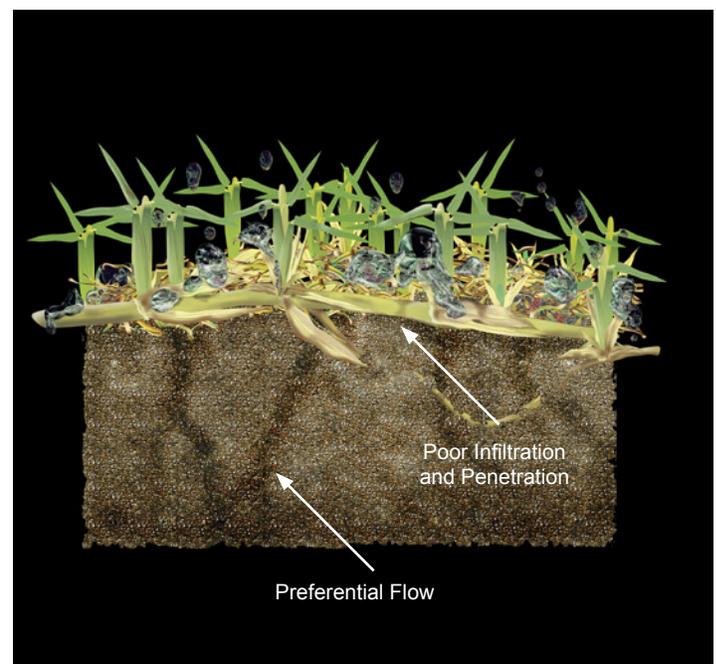
The Importance of Adhesion

Adhesion occurs as water molecules at the wetting front attach to negative sites on the soil surface. Adhesion is required to “wet” or hydrate the soil and

to provide the tension for capillary suction (“pull”) of water (vertically and horizontally) through pores in the soil matrix.

When soil particle surfaces become water repellent (non-polar), adhesion is reduced because water molecules cannot attach to a non-polar surface. Further, surface tension is also increased that can further prevent water from entering or moving uniformly through soils.

Uniform flow (matrix flow) through a soil profile is dependent on maintaining a uniform wetting front as water flows into and through the soil profile. Maintaining a uniform wetting front is dependent on adhesion. If water repellent conditions exist below the soil surface, non-polar surfaces will disrupt the wetting front and promote uneven hydration patterns such as preferential flow or fingered flow. This can result in poor distribution of water, fertilizer, pesticides, and other important amendments required for healthy turfgrass conditions.



Cross section of soil profile showing poor infiltration, poor penetration and a non-uniform wetting front – resulting in preferential flow of water.

WELLHEAD is a blend of soil surfactants designed specifically to treat and correct water repellent soil conditions that contribute directly to the formation of dry patch, hot spots or localized dry spots on greens, tees and surrounds. Surfactants in the WELLHEAD formulation have been selected specifically on the basis of their ability to establish an optimum pattern of hydration and rehydration of soil particle surfaces within a water repellent soil profile.

Once these surfactants attach to non-polar sites on water repellent areas, the surfactant molecules serve as points for water molecule attachment (adhesion). Attachment of water molecules to the surfactants in WELLHEAD promote hydration, rehydration and retention of water to meet turfgrass plant demand. Further, application of WELLHEAD surfactants reduce surface tension – resulting in enhanced penetration, infiltration and the uniform flow of water into and through the soil profile.

The WELLHEAD soil surfactant construction consists of two high performance triblock copolymers chosen for their ability to establish or restore adhesion sites (negative sites) on soft surfaces such as thatch or surface litter as well as hard surfaces (soil mineral particles).

the soil profile. This is accomplished by the complementary action of its two block copolymer surfactants.

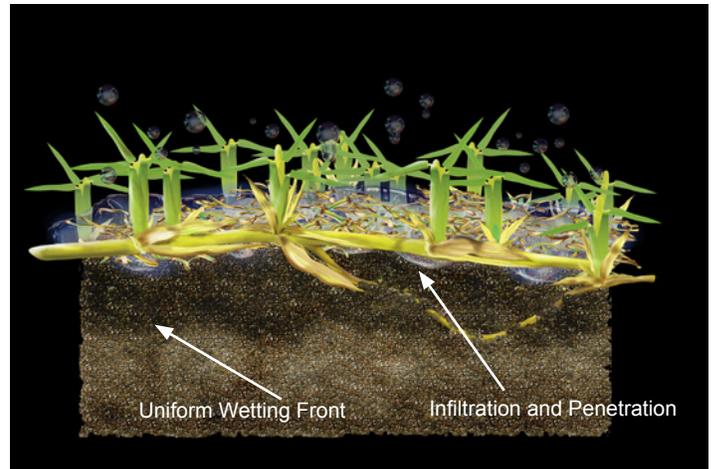


Illustration of a uniform wetting front being established as water moves into and through the WELLHEAD-treated soil profile.

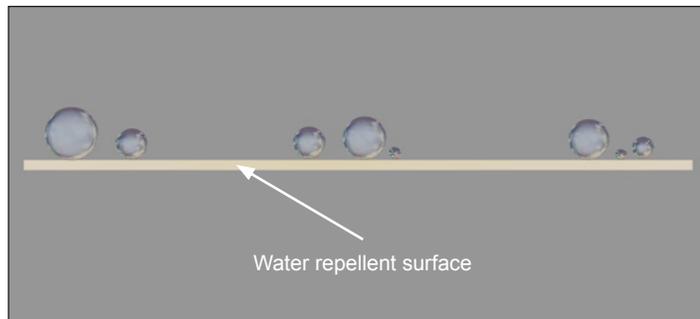
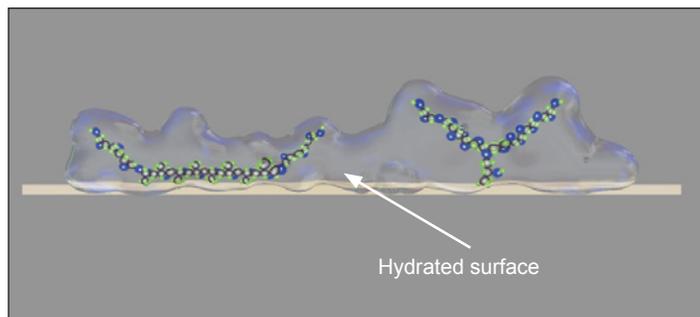


Illustration of water beads on water repellent surface. Water repellency restricts the hydration of the water repellent surface.

Once attached to the non-polar surfaces, negative sites on the WELLHEAD surfactants serve as sites for water molecule attachment (adhesion). Attachment of water molecules to the surfactants in WELLHEAD promote hydration of the surfaces and reduce surface tension that enhances penetration, infiltration and contributes to uniform flow in the soil.



As water is applied, the triblock copolymers provide adhesion sites that reduce surface tension — preventing the “beading” of water that restricts or prevents penetration and allowing hydration of the soil particle surfaces.

WELLHEAD’s best-in-class non-ionic triblock surfactants are designed to overcome hydrophobic conditions and promote a consistent and effective pattern of hydration and re-hydration of the soil profile. But WELLHEAD goes a step further by promoting a uniform movement of water through

The WELLHEAD Soil Surfactant formulation offers the professional turf manager a multi-functional surfactant complex with a range of chemical and physical properties that will address the demand by turfgrass managers for a surfactant solution that will:

- Offer exceptional penetration of water through thatch, litter, and mineral particle fines on the soil surface
- Increase infiltration rates and reduce runoff
- Improve wetting and water movement into and throughout the soil profile
- Increase irrigation effectiveness and efficiency
- Reduce stress conditions and improve recovery from stress

DIRECTIONS FOR GENERAL TURF USE

GREENS, TEES, SURROUNDS AND SPORTS TURF

Localized Dry Spot, Dry Patch and Water Repellency Conditions:

Apply WELLHEAD at 6-8 ounces (180 - 240 ml) per 1,000 sq. ft. (100 m²) in 2 gallons (8 L) of water. Reapply every 7-14 days or as needed until symptoms or problems associated with water repellency are alleviated.

WELLHEAD does not need to be watered-in following application

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