StableCrete™ Products

Produced by CONSELCOR™

Stabilizing Concrete Structures in Water and Waste WaterTreatment Plants

Waste treatment plants which base their entire operations on the microorganisms within them have been designed for the past **fifty** years with almost **no consideration** for the affect of biochemical reactions to the chemistry of the concrete structures. The net result has been sigpificant degradation of concrete materials costly repair, shortened life cycle and catastrophic loss of structural integrity.

One of the more common occurrences in waste treatment systems is the production of hydrogen sulfide in sewage, which is usually accompanied with depressed pH levels. The gaseous hydrogen sulfide, soluble in the moisture of condensation is deposited on walls, crowns in pipes and roofs of structures where it remains for long periods. The sulfur-oxidizing bacteria, **thiobacillus thrives** in a rich hydrogen sulfide environment where it oxidizes the hydrogen sulfide to sulfuric acid. The resultant sulfuric acid remaining on a concrete surface reacts with the calcium hydroxide (free lime) within the concrete matrix, forming calcium sulfate. Calcium sulfate lacks the structural strength to hold the aggregate together in concrete and the H2S corrosion cycle has begun. The use of vitrified clay materials, lime, ad-mixtures and protective coatings has met with limited success especially in warm climates and larger systems where the retention time of sewage is greater. This is but one of the microbiological reactions which affect a concrete surface and ultimately the reinforcing steel and diaphragms in tanks.

The best time to protect concrete is when it is new, **before** contaminates are introduced to the concrete matrix and the cycle of deterioration begins. ***StableCrete***™ applied to a new structure will prevent harsh chemicals like acids, salts and sulfates from entering the concrete matrix. With the reduction of moisture and oxygen in proximity to embedded reinforcing steel, a high alkalinity of the new concrete (pH 12-13.2) can be maintained. This high pH creates a natural protective oxide layer around the steel known as a passivating layer. As long as this layer remains intact, the steel is protected from corrosion. A ***StableCrete*** treated concrete surface is impermeable and will not allow aggressive chemical, salts, water and oxygen to enter and destroy the passivating layer.

The abrasive effects of waterborne silt, sand, gravel and other debris coming in contact with the concrete and causing the concrete to erode create an environment for chemical attack. As the chemical reaction of alkali and ***StableCrete*** takes place in the gel pore system the solid formed increases the compressive strength enhancing the abrasive qualities of all concrete.

A ***StableCrete*** waterproofed concrete surface resists the presence of acids and low pH water (less than 6.5). Acidic water dissolves the lime that binds the aggregate in the concrete, causing it to become weakened and deteriorate. Sulfates contained in waste water no longer react with tricalcium aluminate found in cement. Therefore the expansive compound ettringite is not formed causing internal stress, cracking and crumbling.

For years coatings have been a choice for the design of Water and W.W.T.P. structures. These materials attempt to provide a barrier preventing water from coming in contact with the concrete. Coatings such as epoxies, polyureas, urethanes and vinyl esters, while offering high degrees of chemical resistance experience failures due to two common moisture related issues. These moisture problems do not occur on a ***StableCrete*** concrete surface.

Continued…

Moisture Vapor Transmission (outgassing) simply refers to water in a gaseous form (moisture vapor) trying to exit the concrete through the gel pore system and return to the atmosphere. Permeability, temperatures and humidity play a significant role in the amount of water vapor being emitted. ***StableCrete****'s* reaction with alkali forms a solid in this gel pore system inhibiting outgassing and by having neutralized the alkali prevents "burn or peeling" of a coating applied to a ***StableCrete*** surface. Any "non-breathable" coating applied to an untreated concrete surface is subject to premature delamination, pinholes and blisters. When this occurs, chemically aggressive water borne contaminates are now in direct contact with the unprotected concrete chemistry.

Excessive Moisture Content refers to the amount of water which has not hydrated (evaporated) from the concrete. In new construction the luxury of waiting 28 days may not be possible, feasible or cost effective. A structure that has been in service for many years and in constant contact with water may present chemical as well as moisture content problems prior to application of a non-breathable coating. In some cases specially formulated epoxy cement mortars are used to act as a **temporary** moisture barrier on a surface allowing placement of a coating. These products combine a water based epoxy and a sand/cement component on the surface in an attempt to allow a coating to achieve an adequate bond. These products, containing Portland Cement are still chemically reactive and do not offer the long term solution to excessive moisture content (above four percent) from creating a bond problem with coatings as that moisture has been encapsulated temporarily, but will come to the surface. This moisture, deposits chemicals contained in the concrete on the backside of a coating, creating adhesive problems. A ***StableCrete*** application prevents this moisture transfer.

Design professionals often call for the use of a liquid amino alcohol-based material in the repair of concrete structures. Laboratory test results indicate that corrosion of reinforcing steel is reduced by as much as 50 to 70 percent by using this technology. Alcohol penetrates deeper into the concrete delivering the amine chemical in close proximity to the steel. As the amine sublimes (vaporizes) it is attracted to the steel, returning the passivating layer to the steel inhibiting corrosion. ***StableCrete*** applied, after the alcohol medium has dissipated does not allow moisture or oxygen into the concrete and conversely does not allow the amine product to migrate out of the concrete matrix.

It is estimated that 300 billion dollars in capital expenditures will be required to rehabilitate existing and build new water and waste water treatment facilities over the next two decades in the United States alone. Whether the concrete is new or an aged in service structure, in order to extend the life cycle the concrete must be protected. The chemistry of any Portland cement product must be stabilized in order to afford this protection. *Stabilize your concrete with* ***StableCrete****.*