

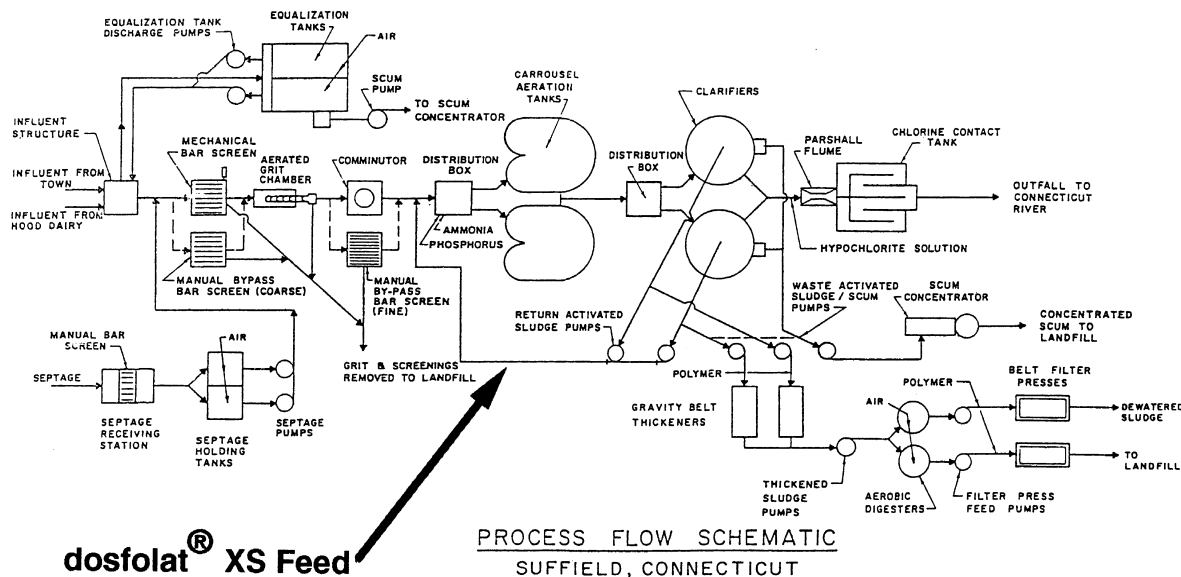
BIOPRIME

Environmental Technologies from Europe

dosfolat® XS Provides Sludge Bulking Control at Lower Cost for the Town of Suffield, CT W.P.C.F.

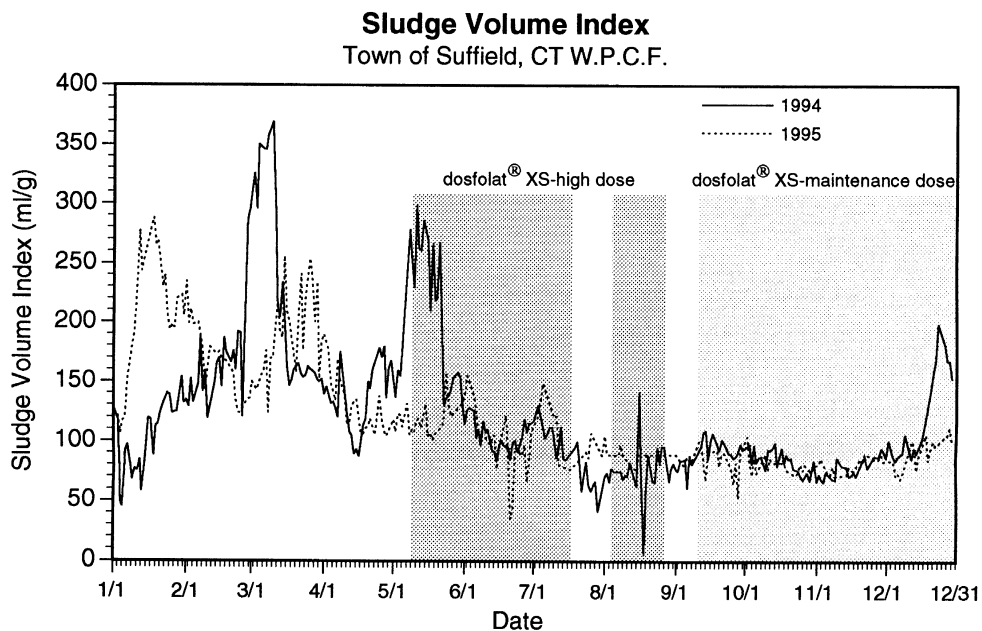
In the past Suffield has controlled filamentous bacteria growth by chlorination. Suffield's filament outbreaks with floc bridging, affecting SVI and plant stability, are common throughout the year and are thought to be related to the animal fats in the dairy processing component of their influent. Suffield's plant management were interested in alternatives to RAS chlorination, however, not only because of the expense and handling hazards associated with the use of sodium hypochlorite but also because some biomass die-back is inevitable followed often by plant instability and poor process removals. In the spring of 1995 they decided to test an alternative filament control technology, dosfolat®, the original aqueous folic acid additive. Folic acid, a B complex vitamin, is essential for the growth and metabolism of all cells. Its action increases the variety, number and activity of microorganisms in secondary wastewater treatment. dosfolat® XS, the newest member of the dosfolat® line, supplements the folic acid solution in dosfolat® with a molybdenum-complex cofactor, and was selected for use in this trial.

The Suffield, CT W.P.C.F. is a 5 mgd design, 1 mgd average flow activated sludge plant consisting of two one-million gallon capacity aerated equalization basins, two 1.34 million gallon Carrousel® oxidation ditches and two 250,000 gallon secondary clarifiers. Wasting rates are adjusted to maintain a sludge age of 20 days. Effluent is discharged into the Connecticut River. Sludge is wasted to gravity thickener and belt press operations for concentration and dewatering. The resulting sludge (13-17% solids) is trucked to a regional municipal facility for further treatment and disposal.



Influent flow consists of two elements: high-strength dairy wastes from a local ice cream maker and domestic flow which includes significant volume from a prison. Dairy processing wastes can contribute almost half of the BOD load and have been reported above 2,000 mg/L.

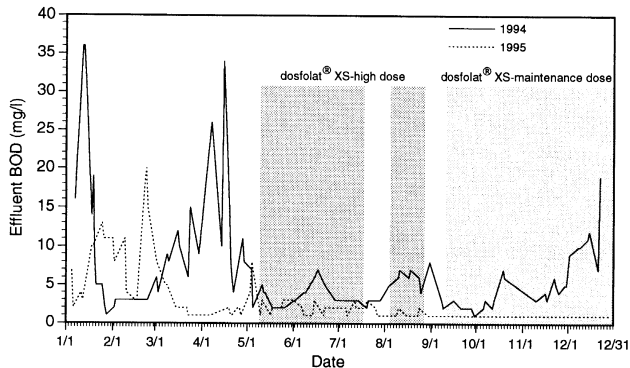
dosfolat[®] XS was continuously injected into the pressure side of the return sludge line to most effectively contact bacteria concentrations. Maximum dosages of from 0.35 ppm to 0.5 ppm were used from test start in early May through late August with short interruptions the second half of July and the at end of August. Maintenance doses of 0.15 ppm were then used from September to the end of the year on a 20 day on, 10 day off cycle.



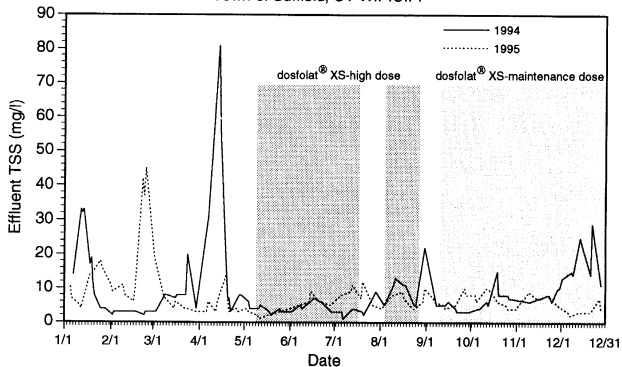
dosfolat[®] XS use from May 9 to December 31, 1995 was evaluated for this study and the results compared where possible to periods the previous year. Despite no hypochlorite use during the trial period in 1995, the SVI chart above demonstrates that dosfolat[®] XS alone provided filament control and optimal low SVI's. Other benefits include hypochlorite use dropping below the threshold set for an OSHA hazardous material handling and storage regulation and reduced operator exposure to hypochlorite.

The effluent BOD₅ and TSS graphs on the next page show that the use of dosfolat[®] XS instead of hypochlorite resulted in effluent quality as good as or better than that achieved during the same period the previous year.

Effluent BODs
Town of Suffield, CT W.P.C.F.



Effluent Total Suspended Solids
Town of Suffield, CT W.P.C.F.

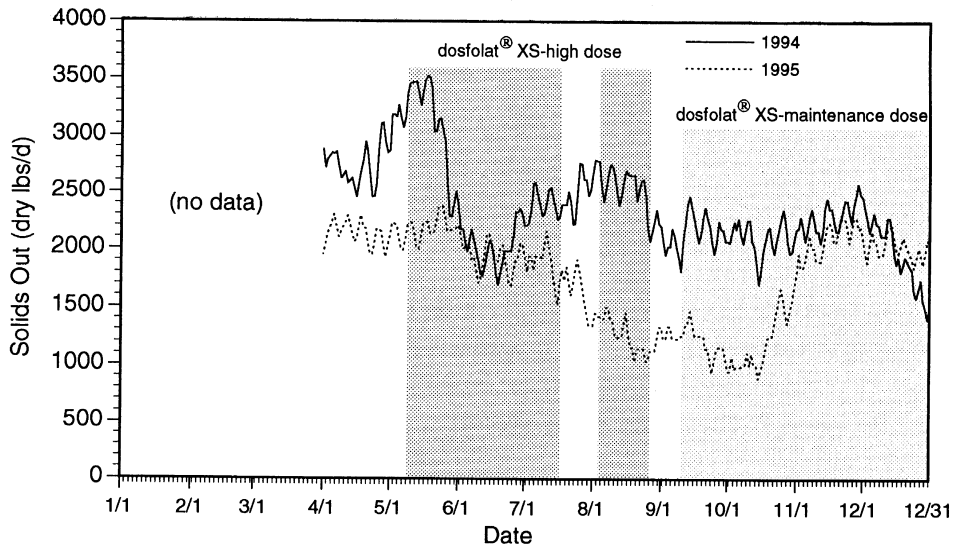


The first effects of the micronutrient on biomass diversity were recorded early by the plant laboratory supervisor about one sludge age into the test. He observed that before the test started there were increasing numbers of floc bridging filaments and fewer, less robust stalked ciliates. After one sludge age, there were "...big clusters of branched stalks and rotifers and what filaments are present don't bridge the floc." By the middle of June an enthusiastic observer recorded "...thousands of stalks...". Interestingly, a filamentous bacteria population ebb and resurgence closely followed the maintenance dose injection cycle of 20 days on, 10 days off.

Waste Solids Removed from Plant

(31-day running mean)

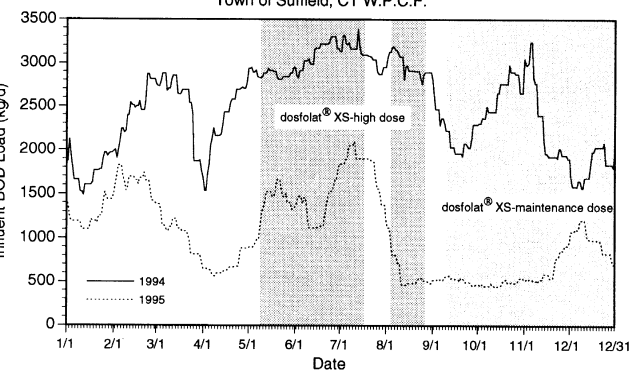
Town of Suffield, CT W.P.C.F.



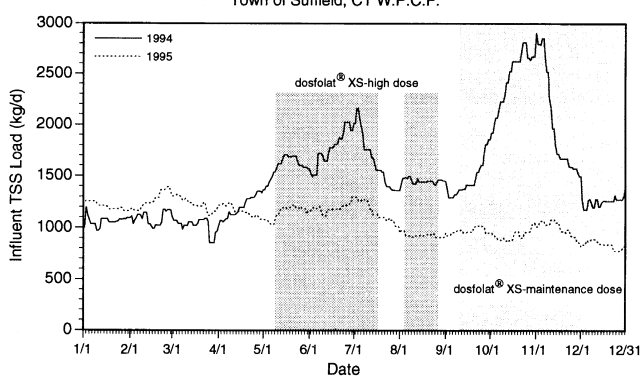
Typically, the effects of dosfolat[®] XS lag both introduction and removal by one to three sludge ages. Examination of the Waste Solids Removed chart above reveals a marked downward slope of the 1995 solids curve from late May through the middle of October. This interval, given the initial lag and terminal carry over of the micronutrient's effect, represents the period of high folic dose on biomass activity. dosfolat[®] and now dosfolat[®] XS have been shown to reduce waste sludge generation and increase sludge density.

1995 influent BOD₅ and TSS loads as charted below do not show loading variations that explain the behavior evident in the chart of Waste Solids Removed—specifically, neither the drop in sludge removed from the plant that occurred from May through mid-October 1995, nor the increase in sludge noted post mid-October result from changes in loading rates.

Influent BOD₅ Load
(31-day running mean)
Town of Suffield, CT W.P.C.F.



Influent TSS Load
(31-day running mean)
Town of Suffield, CT W.P.C.F.



Conclusion

dosfolat[®] XS use at Suffield, CT W.P.C.F. confirms that the combination of solubilized, stable folic acid and molybdenum complex is a reliable and effective alternative to hypochlorite for control of filamentous bulking. The results are a measurably healthier biomass, low SVI and a smoother running plant operating well within effluent permit limits. The shift in microbial diversity developed quickly in little more than a sludge age and was seen as greater variety, vigor and numbers of free-swimming and stalked ciliates, and rotifers—all indicators of good plant operation. Filamentous bacteria, although present, were confined mainly within the floc.

In addition to these positive operating results, the cost of using dosfolat[®] XS at maintenance dose levels was 16% less than the cost of the sodium hypochlorite required to produce comparable filament control. For the Suffield, CT W.P.C.F. operation at maximum dosfolat[®] XS dose produced the added benefit of reduced waste sludge, a strategy which could translate into significant dollar savings.