The Use of Solmar Formulations in Industrial Wastewater Treatment Facilities

Many industrial wastewater treatment facilities have difficulties in consistently meeting effluent standards. Upsets can occur on a seasonal basis - peak seasons, during winter months, etc.; as flow rates approach design capacity; or as production changes are made. So problems arise. Many industrial companies have found an answer in bioaugmentation. Regular users of the Solmar formulations do so to:

. Improve BOD_5 removals
. Increase settleability
. Lower sludge volumes
. Control malodors
. Reduce hydrogen sulfide corrosion
. Improve digestion of solids
. Provide much quicker recovery from upsets due to shock loadings or mechanical failures
. Prevent malodors from lagoon inversions
. Give more predictable results

What is involved in a Program?

Programmed additions of Solmar formulations are introduced to the wastewater system to establish and maintain a dominance of the selected cultures over those present by happenstance through natural selection processes. A normal treatment program entails an initial higher inoculation (or seeding phase), followed by regular sustaining applications. The maintenance dosage keeps less desirable bacteria, which are constantly entering the system, from gaining dominance over the Solmar cultures.

Oils, petrochemicals, complex starches, phenolics and other troublesome substances are biodegraded. Organic solids are usually more completely broken down. Malodors are reduced or eliminated, as the effects of odor producing organisms are minimized by the overwhelming competition provided by the Solmar formulation. The effluent quality is improved through the increased digestion of organic matter and improved settleability. Being facultative anaerobes, the Solmar cultures function with or without dissolved oxygen.

The bacteria employed in the Solmar formulations are susceptible to toxic substances such as heavy metals, germicides, strong acids or alkalis, as are the indigenous organisms. If there is little or no biological activity in a treatment facility, it is necessary to discover and eliminate any adverse conditions before bioaugmentation.

Typical Direct and Indirect Benefits

I. Reduction of costs. Most of the benefits listed below generate obvious savings, either in construction or operational expenses.
II Reductions of effluent BOD_5 and suspended solids levels.
  A. Eliminate, reduce or delay need for plant expansion of modernization.
  B. Reduce chemical treatment requirements.
  C. Reduce or eliminate surcharges.
  D. Provide more consistent, predictable results.
III Elimination of organic deposits
  A. Less maintenance.
    1. Cleaner sludge and scum lines.

2. Cleaner wet wells and clarifiers
3. Reduction of many foams in aeration tanks, lowering defoamer and cleaning costs.

B. Improved appearance.
C. Reduced chemical requirement for handling deposits.
D. Improved safety
E. Increased capacity and reduced maintenance of sand filters.
F. Lower energy requirements from reducing head loss in lines. Less power for pumping.

IV. Effective elimination of odors.
A. Improved public relations
B. Avoidance of costly and time-consuming litigation.

V. Reduction of hydrogen sulfide.
A. Reduction in corrosion.
B. Improved safety
C. Lowered toxicity to biomass in aeration basins.

VI. Improved settleability of solids.
A. Elimination or reduction of flocculants.
B. Increased sludge density.
1. Less sludge pumping.
2. Lowered transportation costs for sludge disposal.

VII. Improved digestion of organic matter.
A. Onsite detoxification of many organics
B. Reduced solids disposal and associated energy costs.

VII. Improved anaerobic operations.
A. More rapid startups.
B. More stable operation.
C. Reduction of many scums and deposits.
D. Increased gas production.
E. More stable sludge.
1. Reduced odors.
2. Easier to dewater.

IX. Accelerated recovery from upsets.
A. Can use cultures to reseed following washouts.
B. Provides identical biomass to reseed after toxic shocks.
C. Being facultative, they will survive the loss of aeration associated with mechanical failure.

Typical Schedule of Results

Each treatment system is different, with a personality of its own. Consequently there are variations as to how quickly treatment plants will respond to treatment with the Solmar formulation. Much is dependent upon the extent of the accumulations and solids within the plant, as well as the variability of loadings. The following pattern can be considered typical:

FIRST WEEK: Very little change, perhaps a slight improvement in effluent quality and a decrease in odor levels.

SECOND WEEK: The system begins to clean itself. Grease and accumulated solids break from walls. Undigested solids rise from their hiding places. Effluent quality may deteriorate. In some cases, the extreme load uses all dissolved oxygen. Odor should not be significant. This purging activity will continue for several days or several weeks, depending upon the amount of accumulated solids and the type of treatment system.

Until the system comes to equilibrium with the organic matter being completely converted to gases, cell growth, etc., there can be a temporary increase in BOD_5 being discharged. This is because new metabolites are now being produced, which may be soluble. Until they are mineralized (i.e. broken down to gases and water), the BOD_5 level will be temporarily higher.

THEREAFTER: Effluent quality improves gradually. Settleability increases. Systems have generally stabilized within 60 to 120 days. For some activated sludge systems, it may be necessary to adjust the sludge-pumping rate in order to maintain an appropriate level of MLSS. Many systems have been able to significantly reduce their sludge wasting.

Degree of Improvement

The improvement in effluent quality depends primarily on how the system was performing originally. If a plant is operating at or near the theoretical optimum for that type of system, the expected improvement will generally be less than for a plant operating poorly. A primary plant may show significant improvement in the removal of suspended solids. Secondary plants likewise show improved removals. Results will very depending on the difference in treatment systems.

Application of Solmar Formulations

The formulation to be used is normally determined by laboratory studies conducted at Solmar's Technical Service Center. Ideally in continuous flow systems, the cultures should be added to the system as far upstream as practical. Introduction within the wastewater collection system has been shown to be an effective means of pretreating the wastewater, thereby maximizing the effectiveness of bioaugmentation. It should be borne in mind that dominance is essential. Many plants treat at the headworks it self. Treatment before any primary clarifiers is desirable, so BOD_5 removals across the primary system can be maximized.

For long-term shelf life and potency the culture formulations are supplied in dry form. Prior to application, the culture must be soaked in warm (80-100^{0}F) water for four (4) to twelve (12) hours in order to fully activate the cultures. The slurry can then be allowed to cool to ambient temperature during presoaking. Use at least two (2) gallons of either tap or wastewater for each pound of Solmar formulations. Do not presoak more than thirty-six (36) hours. If the waste stream is cool, the slurry should be cooled to the approximate temperature of the wastewater during the presoak cycle to prevent thermal shock.

The applications should be distributed as much as possible throughout the day. Try to employ five to six applications per day for the first few days and three applications per day for the first few days and three applications per day in the maintenance phase of the program. Extended aeration package treatment plants, which generally have long detention times, may be treated in one application per day during the maintenance phase.

Solmar Corporation technical personnel are available for consultation on specific applications.

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