EFFLUENT SAMPLER

BACKGROUND OF THE INVENTION

The present invention relates to effluent sampling devices and in particular to an effluent sampler for withdrawing effluent from a remote location for controlled collection and analysis at a central location.

The present invention is particularly suitable for sampling industrial effluent and will be described with particular reference thereto; however, it will hereinafter become apparent that the invention has broader application to the collection of samples from various fluidlines wherein the conveyed fluid contains species, the presence and amounts of which must be periodically ascertained

Industrial sites, without captive water purification facilities, must discharge the effluent into municipal sewage lines. The municipal sewage line leads to a waste processing facility whereat the combined municipal effluent is purified. The industrial effluent places a higher pollution load on the facility than residential or business waste. The costs associated with the industrial portion is also considerably higher. However, inasmuch as all the effluent is combined prior to processing, it is not possible for the municipality to allocate processing costs proportionately. In order to more accurately allocate such costs, many municipalities have adopted surcharge regulations which require the discharger or others to assay the effluent at point of discharge to the main sewer line and pay supplemental charges in accordance therewith. Generally, this is accomplished by periodically sampling the discharge on a statistically representative basis and analyzing the samples with regard to certain effluent parameters indicative of the contribution to increased processing costs. On the basis of the analyses and discharged volume, a surcharge is determined in accordance with the municipalities fee schedule.

Typically, the samples are collected at the discharge point on an hourly basis, one day at a time, for a limited number of days each month in order to give a representive hourly and daily profile of the monthly effluent discharge. The collected samples are then analyzed for parameters such as biological oxygen demand (BOD), chemical oxygen demand (COD), oil and grease, suspended solids and pH. On the basis of these figures, the charges are established.

While these samples may be manually collected at point of discharge, more conventionally automatic sampling devices are placed thereat. In one such sampler, a container is lowered into the discharge line through an access hole such as a manhole. The container includes a battery operated sampler that includes a pump which withdraws effluent from the line and on a timed schedule automatically discharges the effluent into a series of containers. At the end of the sampling period, the container is withdrawn from the line, the samples removed and forwarded for analysis. Depending on whether consecutive sampling days are required, the sampler may be repositioned or moved to storage until the next sampling period.

While capable of meeting sampling requirements, many disadvantages and problems are associated with the use and operation of such devices. First, the sampler must be transported to the site for each sampling period. Inasmuch as such site is oftentimes located at a remote location on the industrial site and must be operative during fair and foul weather, the installation and removal time together with the inconvenience and unpleasantness associated therewith are considerable. Further, the raising and lowering of such devices may be beyond the physical capabilities of the technical staff and require assignment of supplemental personnel for this function. Moreover, these samplers are unattended during the sampling period. Should a malfunction occur, it is only determined at the conclusion of the sampling period. Such a faulty sampling may require an additional sampling at a future date thereby disrupting technical schedules, all with consequent inconvenience and additional cost.

Such samplers are particularly prone to malfunction during temperature extremes. During cold periods, for instance, the sampler lines may freeze thereby preventing the sampling schedule. During hot periods, the samples may undesirably deteriorate rendering the subsequent analysis inaccurate. At any time, the lines may plug with foreign material thereby interrupting the sampling. Also, because the effluent samples are directly deposited upon a common diverting chamber, the grease and oil and solids left on the diverting chamber between samples are not purged and therefore are drawn or added to next incoming sample and so collected in individual bottles leading to a non-representative sample and unnecessarily increased surcharge. Purging of the line occurs but is very brief after uptake and not continuous. Thus, when the next sample starts, the submerged effluent from the previous sample could still reside in the tube at the inlet. Even less desirable, any accumulation or buildup of effluent material in the inlet head, upon start-up goes directly to the collecting bottle, via the common diverting chamber which doesn't represent the true effluent. In order to accurately analyze the sample, it is preferable to analyze non-degraded effluent on a regular basis along with other operational abnormalties e.g., pH, temperature, salt concentration, etc. Such determinations are not possible with devices of the above described type and therefore prompt correction is not possible.

BRIEF SUMMARY OF THE INVENTION

The present invention overcomes the above-mentioned problems and difficulties by providing an effluent sampler which may be permanently located indoors at the appropriate industrial laboratory and which withdraws effluent samples from a remote discharge point on a monitored and representative basis with programable automatic controls.

More particularly, the sampler includes a peristaltic pump having a permanently installed, and preferably buried, intake line having an inlet communicating with the discharge point. The pump discharges a metered quantity of effluent on a scheduled basis into a collecting vessel where the pH and temperature and other parameters thereof are recorded. The collecting vessel is heated to minimize grease buildup which could affect subsequent analysis. The sample is then automatically discharged to a temperature controlled holding vessel until conclusion of the sampling routine thereby avoiding sample degradation. The temperature, preferably around 5° C. effectively limits bacterial growth and thus maintains a representative non-degraded BOD load. Contents are gently stirred with a Teflon coated blade to keep the constituents from settling and sticking.