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# Use of Package Monitoring Stations for Industrial Pretreatment Compliance

by

Ryland Brown
Johnston, Inc.

Effluent monitoring activities are an integral part of all industrial pretreatment compliance programs. As municipal wastewater treatment systems were constructed and upgraded to meet the Clean Water Act criteria, the importance of carefully checking industrial contributions to these systems became more and more important. In the early days, such monitoring was a relatively simple process of examining hand-collected grab samples for sediments, color, odor and relatively simple parameters, such as pH. However, it became increasingly apparent that more reliable and repeatable sampling methodologies would be required to properly characterize and quantify industrial discharges.

Accordingly, wastewater samplers have been incorporated into pretreatment monitoring programs. These instruments allow users to gather a 24-hour composite sample representative of the industry's discharge, by automatically collecting a series of small sample aliquots on a timed basis throughout the day. Generally, these automatic samplers are portable units, placed by the pretreatment monitoring personnel at the location furthest downstream of the industry's final process area. This location is, in most cases, the last manhole available before the flow enters the municipality's interceptor. It is often not the most convenient place to access, often being located in areas used for utilities, product loading, materials storage, parking and related activities. Such areas also limit the options for leaving automatic sampling equipment on-site for the required monitoring period. The samplers are typically lowered into the manhole and secured to the top rung by use of a chain or rope, in the attempt to protect them and keep them from interfering with plant operations.

The primary reason for sampling of an industrial facility is to insure that the industry is fairly charged for the pollutant loading they send to the municipal wastewater treatment plant. In applications having a relatively consistent discharge flow, the industrial surcharge billing can be prepared using the water quality data collected using the simple timed sampling technique, and the plant's *water meter* reading. This method assumes that all or a fixed portion of the plant's intake water is discharged, and it is clearly the simplest way to calculate pollutant loadings.

made. Several different types of flumes are available; selection again is very site-specific.

If the existing manhole is suitable, it is sometimes possible to retrofit a flume by modifying the existing manhole base. This usually is a difficult task, and is only practical if the base has a U-channel that can be chipped out, and the flow is low enough to allow use of a flume that is physically small enough to pass through the manway opening and fit into the modified U-channel. If these conditions do not exist, a new monitoring station is usually required. This can be done in one of several ways:

- Mounting a flume above-ground in the facility
- Casting a flume into concrete manhole or vault
- Use of a package fiberglass manhole with built-in flume

The first option is only practical in those situations where the facility has its own pretreatment system, or where discharge piping is at least partially above-ground and is located in a readily-accessible and isolated part of the site. The advantages of this approach are the simplicity and low cost of installation and the fact that the flume is easily accessible for monitoring and routine maintenance activities. The disadvantages include the space taken up by the system, the requirement that the flume must be covered, odor concerns and the fact that its location often means pretreatment monitoring personnel must go into the operating facility itself to do their work.

A flume may be cast into the base of a conventional concrete manhole. This can be an effective option in certain applications, yet has certain disadvantages:

- Heavy equipment is required for installation. A 1-foot high section of a 4-foot diameter manhole weighs over 800 pounds. The manhole base with cast-in flume weighs much more than this.
- Manholes larger than 4-foot diameter are required for larger size flumes, increasing cost and installation difficulties.
- Due to problems in forming the transition area between the flume and connecting piping, disruptions to flow can occur, resulting in less accurate flow measurements.
- Once installed, the manhole must be sealed to prevent leakage, especially around section joints.

Concrete vaults have essentially the same characteristics as concrete manholes, in terms of cost and installation considerations. They are most suited for applications where additional equipment, such as pumps, flow control structures and related items are involved.

**All concrete manholes and vaults are subject to degradation over time. This is especially true in situations where high levels of hydrogen sulfide or other corrosive chemicals can periodically occur. This is often the case in industrial wastewater systems. If potential problems of this type are anticipated, it may be possible to treat or coat the interior of the structure with corrosion-resistant materials, but long-term maintenance issues still exist.**

**A package fiberglass-reinforced polyester (FRP) metering manhole features a high-density FRP barrel with an appropriately-sized flume molded into the system's base. Since portions of the flume can extend outside of the manhole in these FRP structures due to their design and integral fabrication, a 4-foot diameter barrel is normally all that is required. However, 5 or 6-foot diameter versions are available, and are used in situations where additional interior space is desired for operations considerations, or to house monitoring equipment. These metering stations can be fabricated in one of two manners:**

- **The *Cone-top* manhole has a concentric 24" manway reducer upper section to facilitate use of concrete grade rings and a standard cast iron manhole cover to finish the system to grade. In this format, the entire structure is suitable for H-20 highway loading.**

- **The *Hinged lid* manhole is designed for non-traffic areas, and is supplied with a hinged FRP lid of the same diameter as the barrel. The lid features a lockable hasp for system security. The large opening of this type manhole makes it very accessible for maintenance and monitoring activities.**

**All FRP metering manholes offer similar benefits:**

- **They are extremely lightweight, weighing less than 10% of a comparable concrete structure.**
- **They may be installed within a very short period of time. In retrofit applications, once on-site, the piping can be cut, the manhole placed into position and flow resumed within minutes, while the structure is being leveled and final connections made.**
- **They are totally sealed and watertight.**
- **They are highly corrosion-resistant, durable and strong, being built to ASTM D-3753 standards.**
- **The interior is smooth, presenting a non-abrasive surface inside the manhole. The white gelcoat barrel finish also aids in illuminating the interior for required work.**
- **Since the transition from pipe to the flume is made using integral FRP pipe stubs and transition zones, installation is greatly simplified, and the effect on the flow stream characteristics is minimized, improving metering accuracy.**

- **All fiberglass manholes over 4 feet deep are provided with FRP ladders, which are very sturdy and corrosion-resistant.**
- **Utility taps are molded directly into the barrel, further insuring watertightness.**
- **They can often be relocated, should this be necessary.**

**Metering stations located at industrial discharge locations provide a number of additional benefits, including:**

- **The FRP flume can be fabricated with flow meter provisions that eliminate the need for manhole entry during monitoring events. They can also be provided with a built-in stainless steel sampler pipe, which helps insure collection of a satisfactory sample and eliminates the potential for debris becoming clogged on the sampler strainer which would otherwise be located in the flow stream.**
- **These metering systems provide an excellent means of installing additional required instrumentation, such as pH, temperature or conductivity monitoring equipment.**
- **Permanent electrical provisions may be installed at the station, to power fixed-site instrumentation, or to simplify setup of portable systems. Systems may even be powered by solar-recharged batteries.**
- **They can be supplied with nested flumes, allowing accurate flow measurements at lower flow conditions now while, at the same time, providing the same benefits when the facility expands, without the need to install a new station.**
- **Communications options, such as SCADA systems, telephone modems and radio telemetry systems may be easily interfaced with monitoring stations, providing real-time information on discharge characteristics. This information can often be incorporated in a feedback loop to help improve the quality of the facility discharge, thereby potentially lowering surcharge expenses.**

**All dedicated monitoring stations, whether fabricated of concrete or FRP, greatly simplify and improve the process of industrial pretreatment monitoring. They provide a secure place to house monitoring equipment and a safer working environment for monitoring personnel than conventional manholes. By facilitating the collection of valid, representative effluent samples and accurate flow data, both the industry and the receiving municipal treatment authority benefit from their use.**