When the performance and accuracy of a flow meter in operation has to be verified, plant managers have two options to choose from: they can perform an off or an on-site verification. Deciding which one is the most appropriate for any given installation depends on the nature of the verification as well as the various pros and cons associated with both of these two approaches.

An off-site verification requires the flow meter to be removed from its location whereas an on-site verification can be performed in situ without having to remove the measurement device. Although it might seem tempting to jump to that conclusion, it does not necessarily mean that on-site verification is always the preferred solution.

Within many process plants across a wide variety of industries, flow meters are installed to ensure efficient operation by measuring the flow of liquids, gases and steam. In order to do so, they are located in strategic positions where they provide control systems with vital flow rate information. This information can be used as a base for adding or dosing chemicals, ingredients and other liquids and to indicate the efficiency of an installation. Optimal plant performance is a prerequisite to secure growth, efficiency and sustainability in many businesses, especially in the current economic environment, so if a device or application is not performing at its best, it can have a major impact on the bottom line.

A simple calculation illustrates this: by law, a paper mill has to pay a wastewater facility for the treatment of its paper production waste at a cost based on the amount of discharge. If the monthly discharge amounts to, say, 15 million gallons at 2.5 cents/gallon, the paper mill would pay the utility a monthly fee of $375,000. If the flow meter measuring this discharge is off by as little as 1%, the paper mill would pay an excess of $3,750/month, turning annual meter verification into an investment that will easily pay off.
Apart from the cost involved in recalibrating a meter there is also the mandatory requirement that a flow meter needs to be recalibrated periodically. This is to ensure that the equipment lives up to the original accuracy specifications, even after several years of service.

ON-SITE VERIFICATION
Although it would be highly beneficial to combine the calibration process with the convenience of the on-site verification, it would be a very difficult approach. For one, flow meter calibration labs are typically custom designed installations, relatively expensive, involving multiple valves and weigh tanks that control the entire process down to the smallest detail. Secondly, on-site verification includes performing the verification test directly on the installed meter in a factory or a plant, making a duplication of the environment in an actual process plant virtually impossible. Several alternative methods exist but none of them has proven to be as accurate as off-site calibration.

For these reasons, on-site verification is mainly used to check the performance of existing flow meters. Receiving this information, however, is also very beneficial to a process plant operator, particularly in industries where flow meters are merely used to indicate the amount of liquid flowing through a specific pipe or where flow meters are not used at all. One of the clear benefits of an on-site device verification is that it allows the verification to take place while the meter is in operation, making temporary plant shut-down unnecessary. Depending on the check meter used to perform the verification, the task can be completed in less than 15 minutes, although a more reliable result can usually be obtained if the check meter is left to gather data for at least one hour. Despite the fact that many newer models of flow meters come with embedded diagnostic facilities that verify the integrity of a flow meter at varying intervals, a check meter can typically be used to double check the meter performance and to detect measurement or meter issues.

ON-SITE VERIFICATION SOLUTIONS
Several manufacturers produce on-site check meters that accommodate the process industry requirements. The solutions range from all-in-one equipment delivered in a suitcase with everything needed to perform a verification test to small hand-held devices. Measurement accuracy can be as high as 0.5%, enabling verification of any brand or type of flow meter based on the traditional flow measurement principles including electromagnetic, ultrasonic, orifice or rotary piston technologies. Additional solutions offer automatic switch between Doppler and transit time ultrasonic measurement to accommodate applications with changing liquid conditions. Most of these devices are battery-powered, facilitating free movement around the facility if more than one meter needs to be checked.

Some verification devices have been developed to work with only one type of meter technology, such as the electromagnetic principle. These, in turn can perform very quick and reliable performance checks with verification reports that can be used as ISO 9000 and ISO 140001 documentation.

CONCLUSION
As this article indicates, choosing between on-site and off-site verification or calibration is not always just a matter of choosing the most convenient solution. In many situations, off-site recalibration is the only possible solution to continue operation under custody transfer conditions, whereas on-site verification is perfect for a quick verification of a meter’s performance. Thus, the on-site and the off-site verification should be seen as two separate approaches, fulfilling two different purposes. This makes both approaches equally relevant, making it possible for plant operators to make informed decisions about the performance, reliability and accuracy of their installations.