Monitoring Raw Water Turbidity – What's Important!

Monitoring raw water turbidity is important to inform the operator of significant changes in water quality, especially turbidity, allowing the operator to make process chemistry changes to respond to the increasing raw water turbidity.

Variations in Raw Water

Raw water turbidity values can range from less than a few NTU to greater than 1000 NTU. In some cases raw water may contain dissolved chemical species such as organics, which produces a color. Highly variable turbidity samples, which may also contain color-producing compounds, can foul the optics in contact-design instruments, presenting additional technical challenges to monitoring the turbidity.

Figure 1

Figure 1: Surface water sources can provide varying raw water quality

Options for Turbidity Measurement

Most turbidity analyzers found in Water Treatment Plants are used for measurement of clarified and treated water, and for EPA compliance. EPA Regulations require white light, 400 - 600 nm wavelength, for compliance monitoring. This wavelength is more sensitive to small particles and the primary reference solution, formazine, used for calibration. However, this wavelength is greatly affected by color and absorption of the white light by dark particles. In raw water applications this can present problems.

By contrast, the red light, ~ 860 nm wavelength, specified in the ISO 7027 standard is not as impacted by color and dark particles. Table 1 compares the EPA 180.1 and ISO 7027 standard.

Table 1

	US EPA 180.1	ISO 7027
Units	NTU	FNU
Design	Non-ratio	Non-ratio
Wavelength of light source	400 – 600 nm	Infrared light 860 nm
Primary Std.	Formazin	Formazin

Table 1 Comparing EPA Method 180.1 and ISO 7027 (Note: 1 NTU = 1 FNU)

In addition, use of a non-contact design instrument provides many technical advantages over a contact design instrument such as:

- No fouling of the optics
- Less frequent cleaning
- No degradation or scratching of the optics
- More stable and accurate readings
- No calibration requirement, verification with a secondary standard, Veri-Kit is sufficient to ensure accuracy.

Figure 2 illustrates the superior response of the red-light source versus the white light source when measuring a low concentration of 1-micron iron particles.

Figure 2

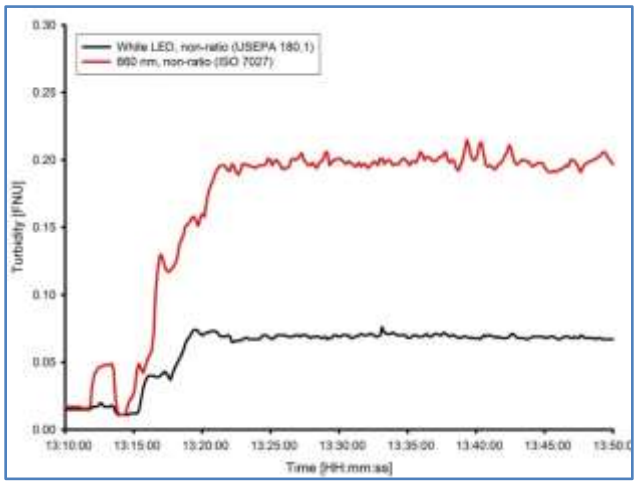

Figure 2: Response of red versus white light.

Swan AMI Turbiwell 7027

The Swan AMI Turbiwell 7027 employs a red LED light source providing the superior raw water performance described above. In addition it features a non-contact design with an optional auto-drain to provide superior performance and accuracy when monitoring raw water.

Table 2 lists the Swan AMI Turbiwell specifications.

Table 2

	Turbiwell Red LED
Range	0 – 200 NTU auto-ranging
Precision	0.003 NTU or 1% of reading, whichever is greatest.

Table 2: Swan AMI Turbiwell 7027 with red LED, auto-drain, and optional degasser along with specifications.

Figure 3

Figure 3: Swan AMI Turbiwell 7027

Conclusion

Variations in raw water present turbidity measurement challenges different from those found elsewhere in a typical treatment plant. Selecting an analyzer optimized to meet these challenges can provide valuable guidance and smoother plant operation. The Swan AMI Turbiwell 7027 is a good choice in such applications.