

Non-Contact, Surface-First Monitoring for Source & Intake Water Protection

A practical overview of where surface-based optical monitoring can support intake protection and operational awareness



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What This Document Covers

This handout summarizes where non-contact, surface-first water quality monitoring can support source and intake water protection, with emphasis on early detection of surface-expressed contamination risks that may affect intake operations and treatment decisions.

The focus is on intake-proximate, real-time situational awareness of surface and near-surface conditions that are often difficult to observe using submerged sensors or periodic sampling alone—particularly under dynamic intake hydraulics and changing surface conditions. The approach is intended to complement other monitoring and laboratory methods where present.

Where Surface-First Monitoring Adds Value for Intake Protection

- **Early surface expression** – Many intake-relevant contamination events first appear as thin, transient surface features or accumulations before mixing into the water column
- **Intake-specific visibility** – Monitoring is focused on the surface water approaching the intake, rather than generalized conditions elsewhere in the source water body
- **Operational time alignment** – Surface-first monitoring aligns with minute-to-hour intake decisions, providing early awareness that can support operational response

Surface-Relevant Contaminant Classes Addressed

- **Hydrocarbons** – Non-contact detection of thin oil and fuel sheens at the water surface at or near intakes, well suited for early warning of spills, leaks, and transient surface contamination that may otherwise go undetected before reaching the intake
- **Harmful Algal Blooms (HABs)** – Real-time monitoring of early-stage algal surface accumulation at or near intakes, providing earlier awareness of intake exposure in cases where surface expression precedes changes detected by in-water sondes
- **Organics (CDOM)** – Surface organic loading trends at or near intakes relevant to bloom-favorable conditions and intake treatment sensitivity (DBP precursor context), used as an early-warning and trend signal rather than a direct DOC/TOC substitute

How This Approach Is Typically Used (and Why It Fits Intake Environments)

- **Continuous surface** awareness at intakes without placing sensors/personnel in water
- **Early indication of short-duration or patchy surface events** that may be missed by periodic sampling or single-location measurements
- **Earlier visibility than common below-surface sensing**, as many contaminants appear first at the surface before mixing into the bulk water column
- **Resilient to intake hydraulics**, including flow, turbulence, debris, and fluctuating water levels that complicate in-water sensor deployment and data stability
- **Low-maintenance operation**, avoiding biofouling, drift, cleaning, and recalibration cycles common to submerged sensors
- **Contextual input to support intake operation and control decisions**, complementing sondes and lab sampling where present for a more complete picture