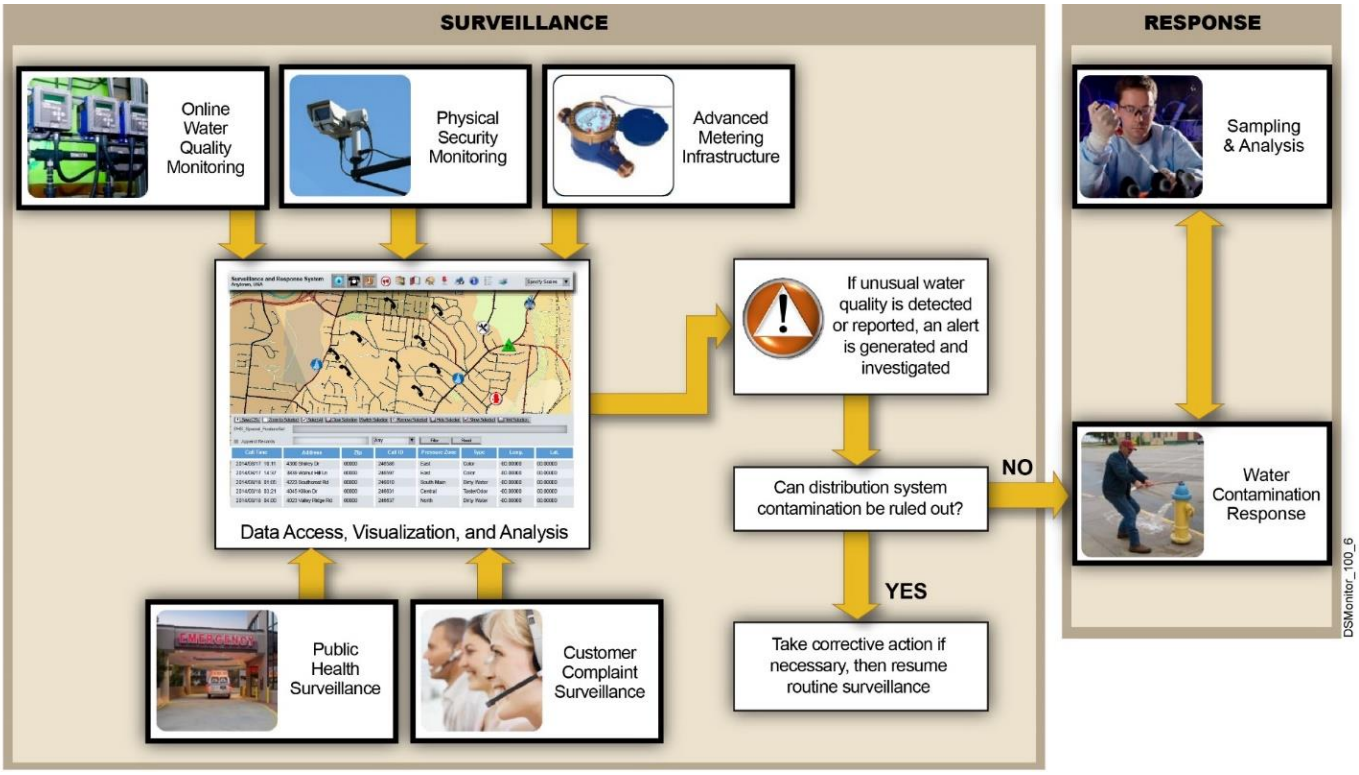
Incorporating AMI
into a Surveillance and Response System

A Water Quality Surveillance and Response System (SRS) provides a systematic framework for enhancing drinking water distribution system monitoring activities to detect abnormal system conditions and respond promptly to minimize potentially adverse consequences. These can include public health threats due to intentional system contamination, as well as potentially undesirable conditions due to a variety of natural or operational causes. The surveillance components are designed to provide near real-time awareness of distribution system water quality and conditions, and timely detection of abnormal system conditions. The response components guide effective response to system contamination. The components of an SRS are shown in the architecture diagram below.



AMI AS A SURVEILLANCE COMPONENT OF AN SRS

WHAT IS AMI?

Advanced Metering Infrastructure (AMI) comprises the equipment, communications, and information management systems for remotely collecting water usage data in near-real time. AMI can provide a wide range of benefits including improved utility operations, increased water conservation, and enhanced security and resiliency. Security-related benefits of AMI include the ability to detect potential backflow of water from customer connections into the distribution system and meter tampering.

HOW DOES AMI FIT IN AN SRS?

As shown in the architecture diagram, AMI is an SRS *surveillance* component which provides the potential for early detection of intentional or unintentional contamination via a customer connection which could threaten public health. Prompt investigation of the backflow and tampering alerts generated through AMI allows for earlier and more efficient and effective response actions, which can significantly reduce the potential adverse consequences. In addition, AMI data can support investigation of alerts from other SRS components.

DETECT AND INVESTIGATE BACKFLOW AND TAMPERING ALERTS

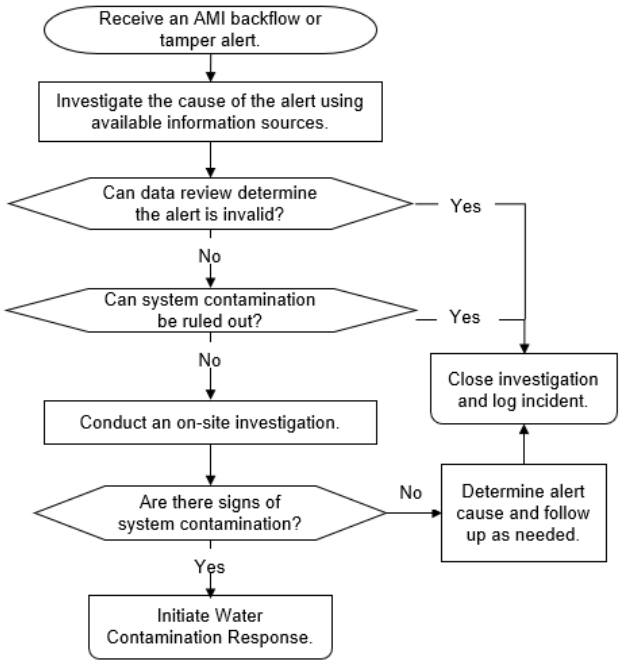
ELEMENTS OF AN AMI SRS COMPONENT

This table describes the typical elements of an AMI SRS component. AMI equipment, communications, and information management are intrinsic in any AMI system. ***In most cases, the equipment used in modern AMI systems can support the requirements of an SRS without modification.***

AMI Element	Description
AMI Equipment	The hardware that generates AMI data, especially meters that measure the flow to a customer connection
Communications	Equipment and systems used to transmit data from the meter or endpoint to the information management system
Information Management	System(s) that retrieve and store data and alerts from meters and other AMI equipment, and then provide data access, visualization and analytics
Alert Investigation Procedures	A documented procedure for the timely and systematic investigation of alerts with clearly defined roles and responsibilities for each step of the process

ALERT INVESTIGATION PROCEDURE

The most substantial enhancement to incorporate AMI into an SRS is to develop an alert investigation procedure. The purpose of this procedure is to identify an alert cause and trigger Water Contamination Response if contamination is possible. An example process is shown below.



INVESTIGATION TOOLS

Investigation tools, such as checklists or quick reference guides, can be developed to support staff in executing and documenting the alert investigation procedure efficiently. In addition, user dashboards can be developed or updated to align with SRS-specific data needs. These may integrate multiple information types, including data from other SRS components or utility information systems. An example dashboard is below.

Ensuring easy access to information improves monitoring and response. Also, these job aids ensure response is implemented consistently and efficiently.

ADDITIONAL BENEFITS OF AMI

The AMI component provides timely data from the distribution system and can detect contaminant injection from a customer connection, which could have serious public health and operational consequences for the utility. In addition, alerts and alert investigation procedures can support the detection of and response to other undesirable conditions including accidental backflow, needed meter repair, and water theft.

MORE INFORMATION

The *Using Advanced Metering Infrastructure in an SRS* guidance provides detail about AMI and its integration into an SRS. See the SRS website to access the document and for additional information: https://www.epa.gov/waterqualitysurveillance/Advanced-Metering-Infrastructure-resources