

## **U.S. Geological Survey Real-Time Hydrologic Monitoring: Operation and Quality Assurance**

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The United States Geological Survey (USGS) operates more than 9,300 hydrologic data-collection sites with various types of telemetry to transmit the data from the field in near real time. Water-level and streamflow data are collected at most sites, and water-quality data are collected at more than 1,400 of the sites. The goal of this comprehensive monitoring program is to collect and disseminate these data to Federal, State, Tribal, and local agencies as well as the general public. The importance of timely and robust access to these data has driven the USGS National Water Information System (NWIS) to develop redundant, fault-tolerant methods of routing, processing, quality assuring, and delivering these data on the Internet.

Data from field sensors are transmitted primarily by way of satellite to 1 of 48 separate locally maintained databases located in USGS District offices in most States, as well as 1 of 48 nationally maintained backup databases, for processing and quality-assurance review by both automated and manual methods. The backup databases process the data in parallel with the District databases and thereby act as "hot standbys," which can be activated if a District database becomes unavailable. Data from either the District or backup databases are then aggregated at the national level and made available to the public on the Internet through the USGS National Web (NatWeb) system—three geographically distributed mirrored "web farms" located at high-bandwidth Internet gateways.