

System level evaluation of flow meters

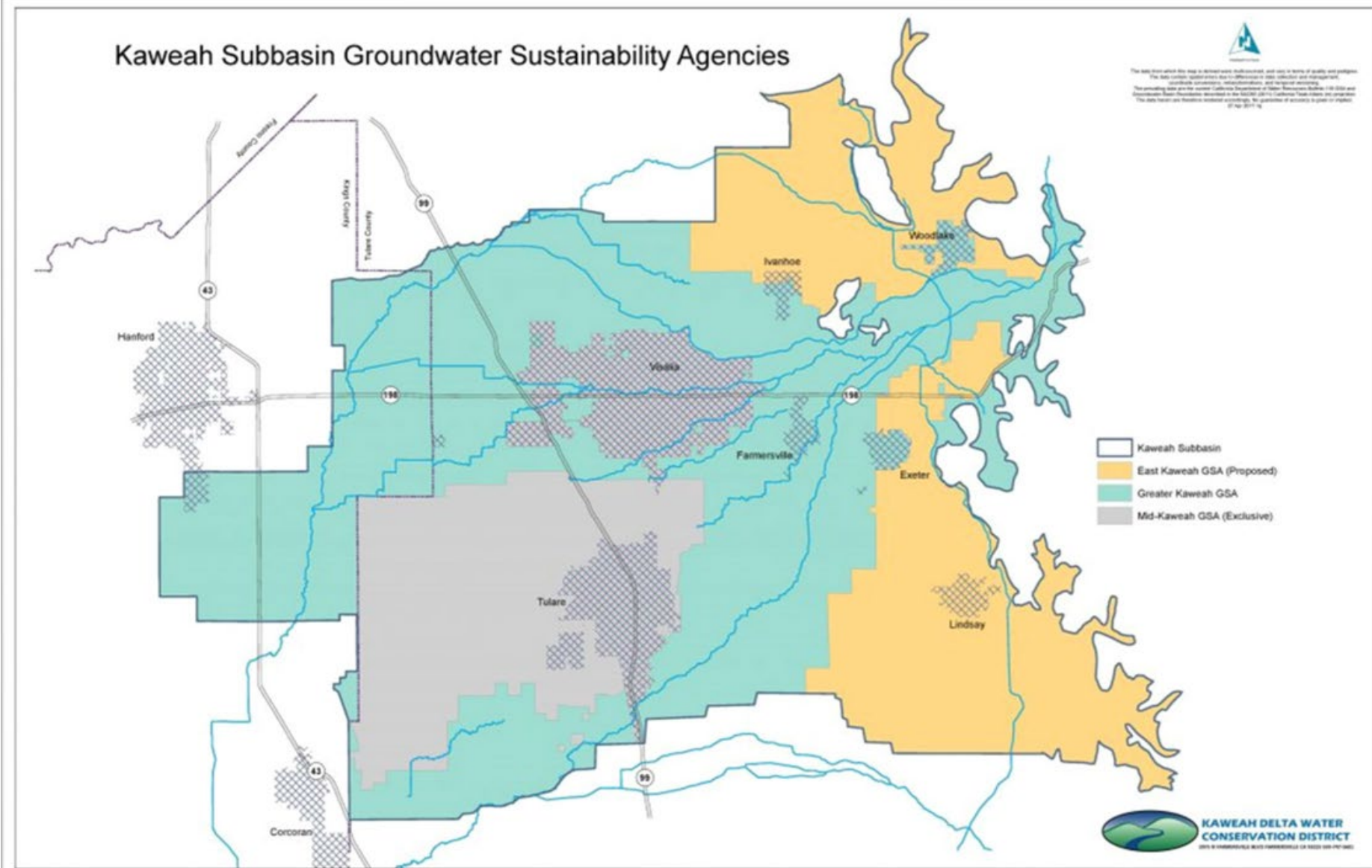
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Overview

The East Kaweah Groundwater Sustainability Agency on behalf of the Kaweah subbasin Groundwater Sustainability Agencies, contracted with the California Water Institute to investigate the functionality of water meter systems to **measure, collect, and aggregate** pump discharges from groundwater wells.



Evaluation Process

1. Development of **System View** for evaluation of water meters, telemetry units, and cloud data platforms
2. A **questionnaire** based on the agreed criteria was sent to each water meter, telemetry, and data platform vendor which allowed all of the vendors to provide information on their product's conformance with the evaluation criteria
3. A **literature search** of water meter technology to use published information to determine the conformance of the products to the evaluation criteria
4. Center for Irrigation Technology's Hydraulic **Laboratory testing**:
 - A. The testing of a series of **water meters** to determine their accuracy and head loss functions and conform to the water meter evaluation criteria
 - B. The ability of **telemetry systems** to conform to the evaluation criteria to read, collect, and upload the water meter output to a cloud data platform
 - C. The ability of the **cloud data platform** to conform to the evaluation criteria to store, display, and download data

Flow Meter System view



Measurement

The part that gets wet



Electronics

The part that converts measurements into data



Communications

The part that moves the data out of the field



Data/Backend

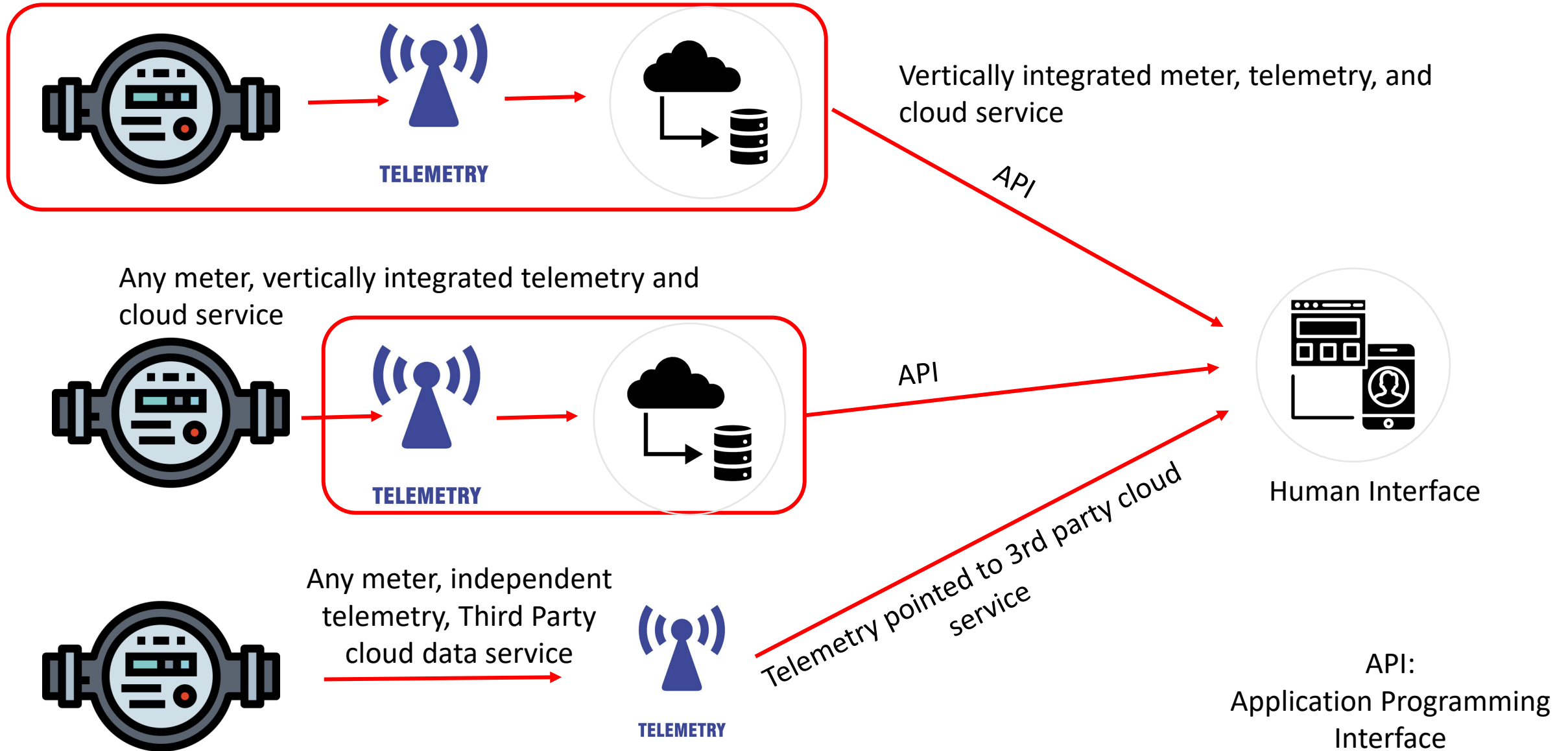
Where the data goes



UI/Frontend

What the humans see

System realization, in practice



Non-Standard Meter Installation

Goal: demonstrate how non-standard installations impact meter accuracy

Configurations tested:

- 90 bend upstream
- 90 bend downstream
- Check Valve upstream
- Check Valve downstream
- Pump discharge/well head

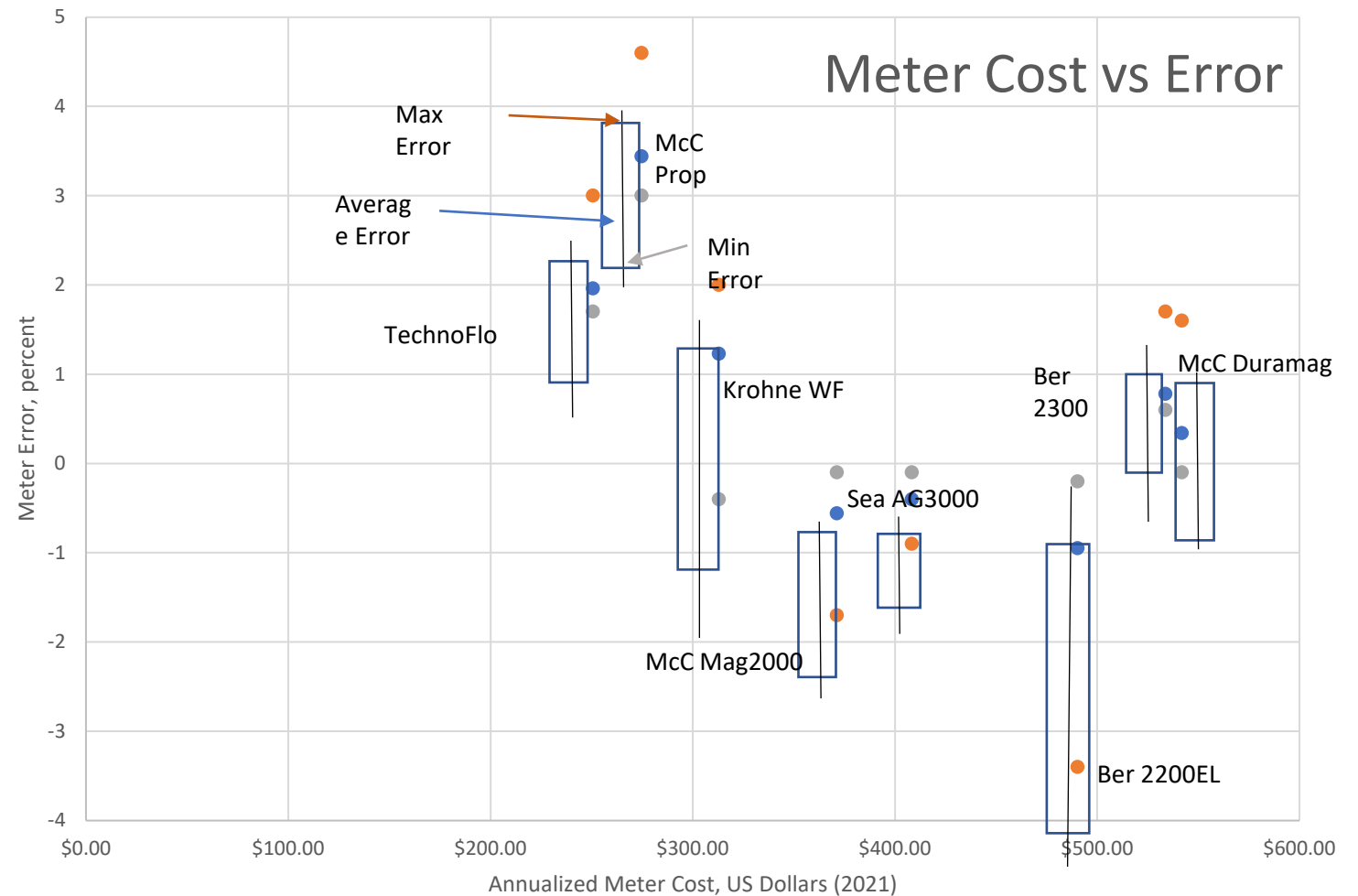
Velocities: 2, 8, and 14 fps



Non-Standard Meter Installation

The five meters with selected from the previous testing for Non-Standard Installation testing were:

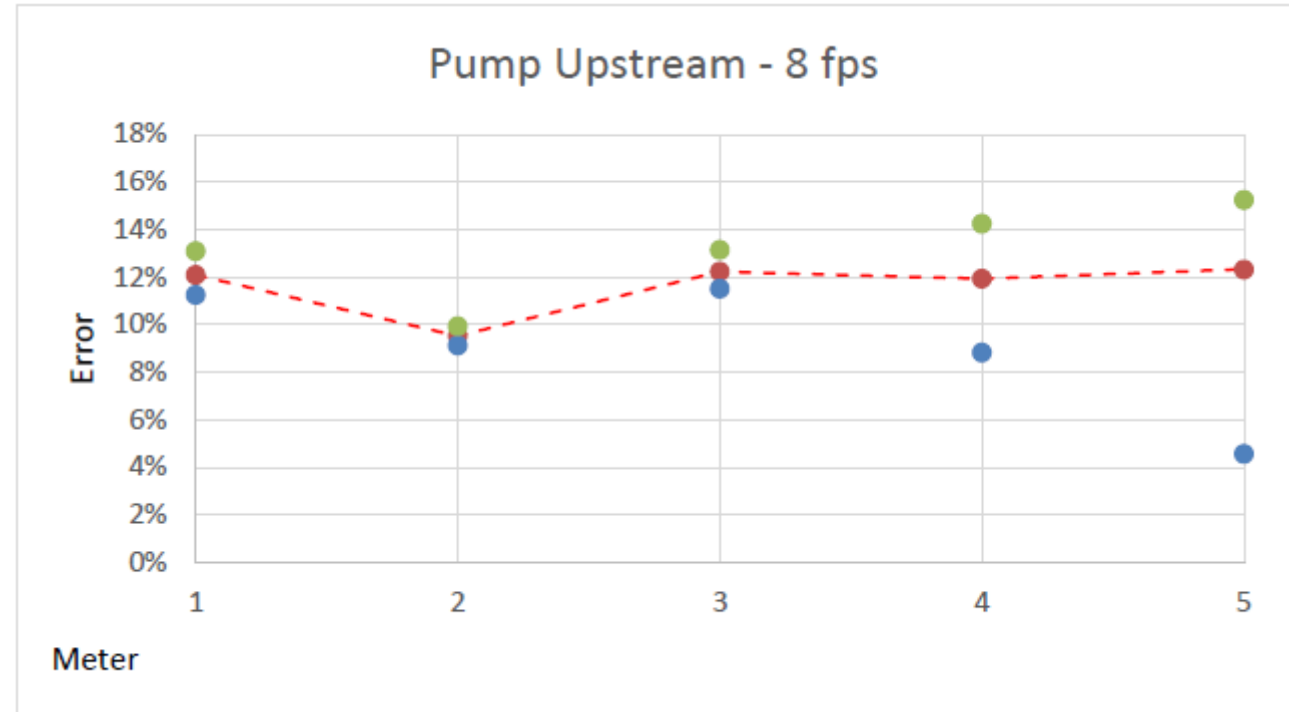
1. Bermand Euromag 2300
2. Krohne WF
3. McCrometer Duramag
4. Seametrics AG 3000
5. Technoflow PS32-06



Non-Standard Meter Installation

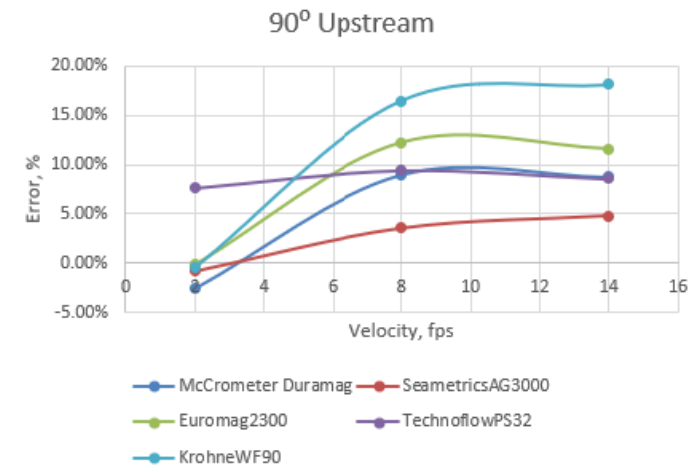
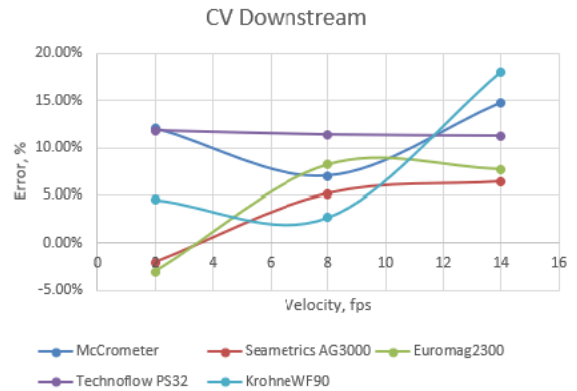
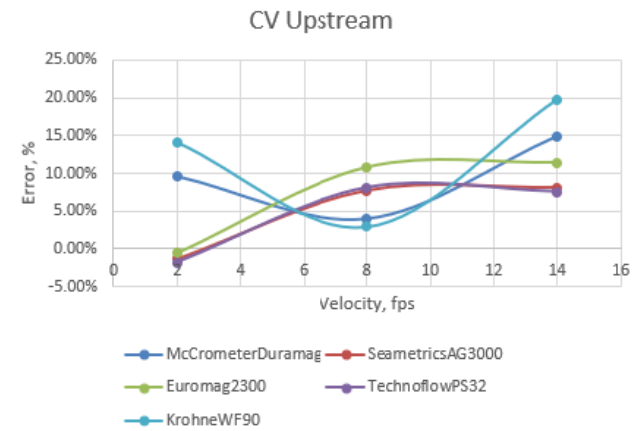
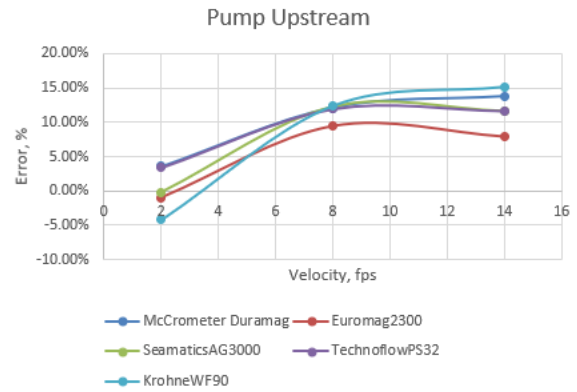
Testing Results at 8 Feet per Second

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Non-Standard Meter Installation

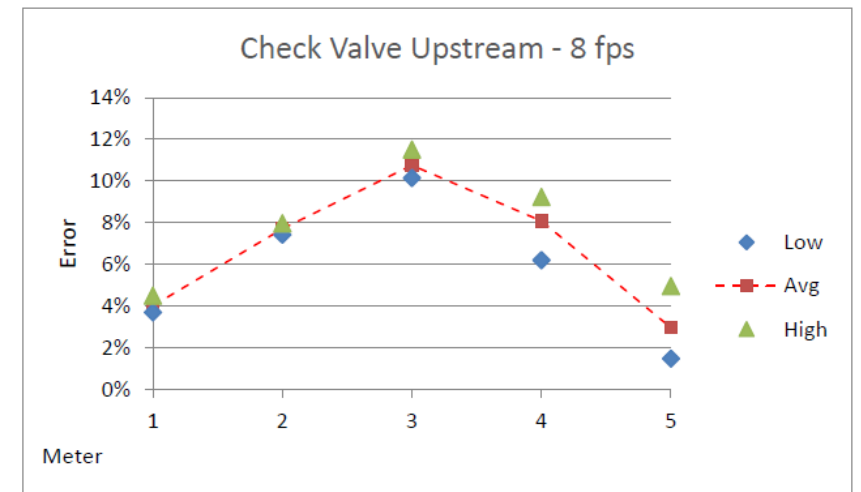
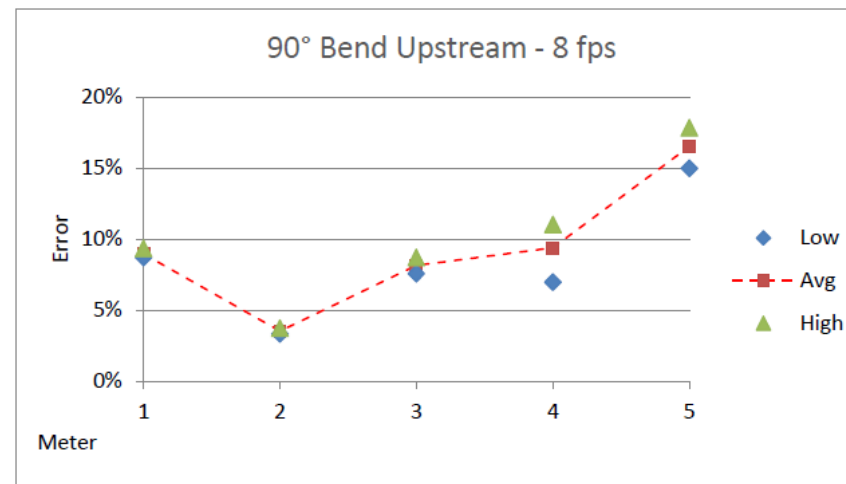
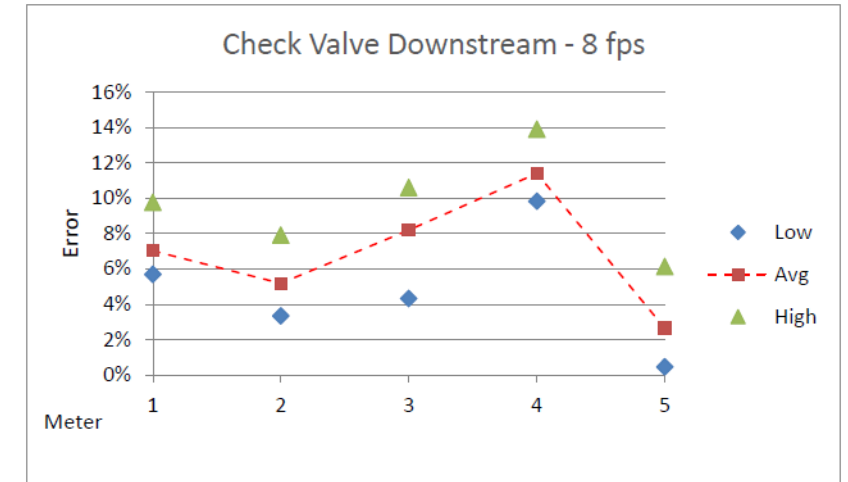
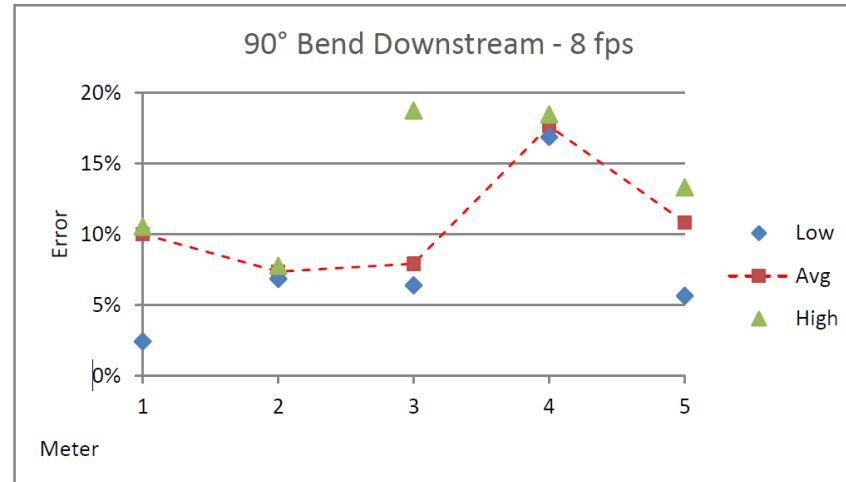
Configuration Velocity Error Graphs



Non-Standard Meter Installation

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Conclusions and Recommendations

- None of the five water meters tested in the non-standard configurations performed within the accuracy standard. We recommend that water meters only be installed in standard configurations.
- The analysis and testing revealed that all telemetry units tested performed as stated in the publications and as claimed by the vendors. Some telemetry units were easier to install, configure, and connect to a cloud data platform than others that were tested.
- All of the platforms met the developed criteria. Therefore, we do not recommend a particular cloud data platform based on its capabilities and configurations.

Questions?