Water Pollution Sensor Priorities: Arsenic

March 9, 2016

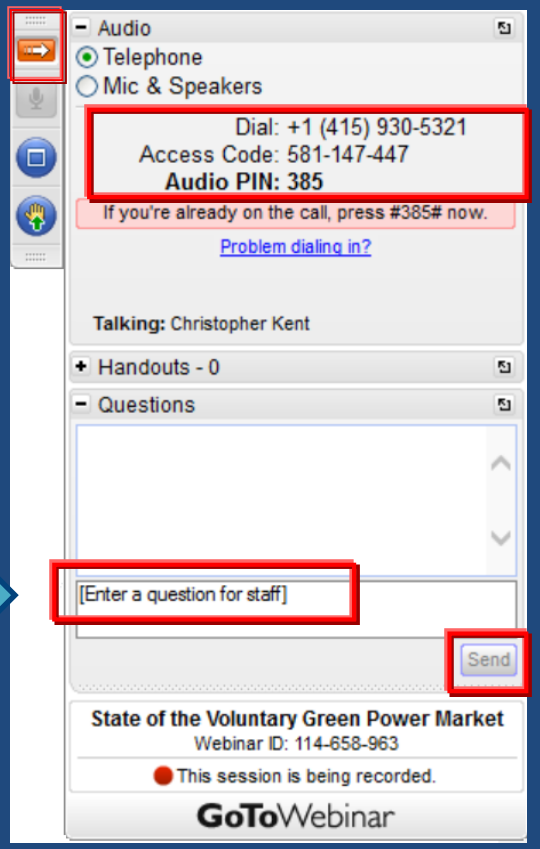
EPA

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

ERG

Webinar Logistics

Open and close your control panel



Audio is available via your computer's microphone and speakers (VoIP) or telephone:
+1 (562) 247-8422
ID: 856-904-197

Type in your questions here

Hit "send" to submit your questions

If you experience technical difficulties, please contact Grant Strauss at: Grant.Strauss@erg.com

Hosts

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Office of Research and Development, U.S. EPA

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U.S. Bureau of Reclamation

Purpose

- Advancing water sensor technologies & data analytics a priority for EPA & the nation
- Part of effort to accelerate development & use of sensors for:
  - **Arsenic**
  - **Harmful algal bloom (HAB) toxins**
  - **Total nitrogen and phosphorus**
  - ***E. coli & Enterococcus***
- NWQMC meeting in May 2016 to share requirements & explore steps to implementation

Collaborators

- Association of Clean Water Administrators
- Association of State Drinking Water Administrators
- National Water Quality Monitoring Council
- U.S. Bureau of Reclamation
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- U.S. Geological Survey
- U.S. Park Service
- Water Environment Federation

Current Approach – Arsenic Monitoring

- **Laboratory Methods**
  - Colorimetry ✓
  - Hydride Generation Atomic Absorption Spectrometry ✓
  - Electrothermal Atomic Absorption Spectrometry ✓
  - Inductively Coupled Plasma-Atomic Emission Spectrometry ✓
  - Inductively Coupled Plasma-Mass Spectrometry ✓
- **Field and on-line methods**
  - On-line voltammetry instruments ✗
  - Field test strips ✗

✓	EPA-Approved
✗	Not EPA-Approved

Drawbacks to Current Approach

- Lab-based methods:
  - Time lag from sample collection to data
  - Difficult to make real-time decisions (e.g. process control)
- High per-sample collection & analysis cost
- Limited data (due to cost)
- Lab instruments require trained analysts

Potential Benefits & Applications of Advanced Arsenic Sensors

Benefits

- "Real-time" data
- Easy to operate
- Continuous monitoring
- Field-deployable
- Portable
- Affordable

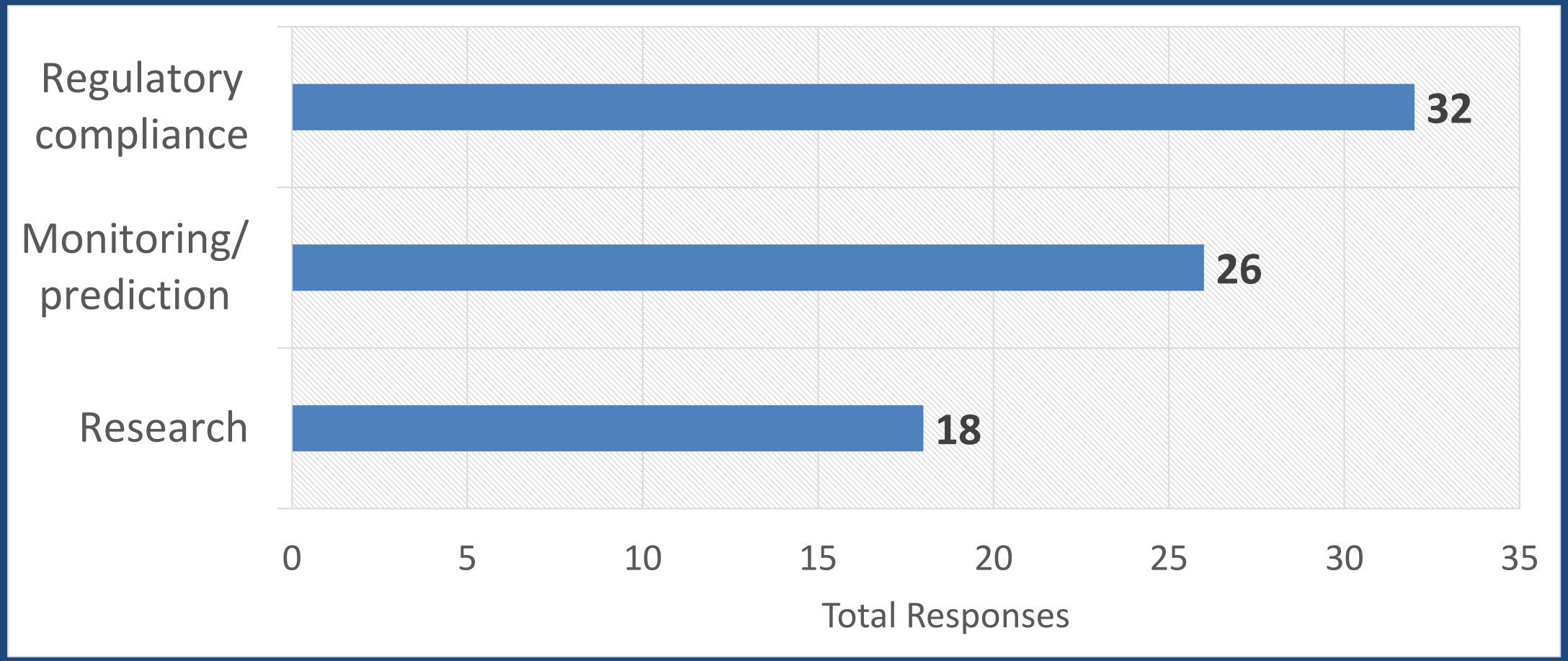
Applications

- Drinking water:
  - Source monitoring
  - Point of use monitoring
  - Treatment optimization
- Wastewater treatment
- Contaminated site monitoring

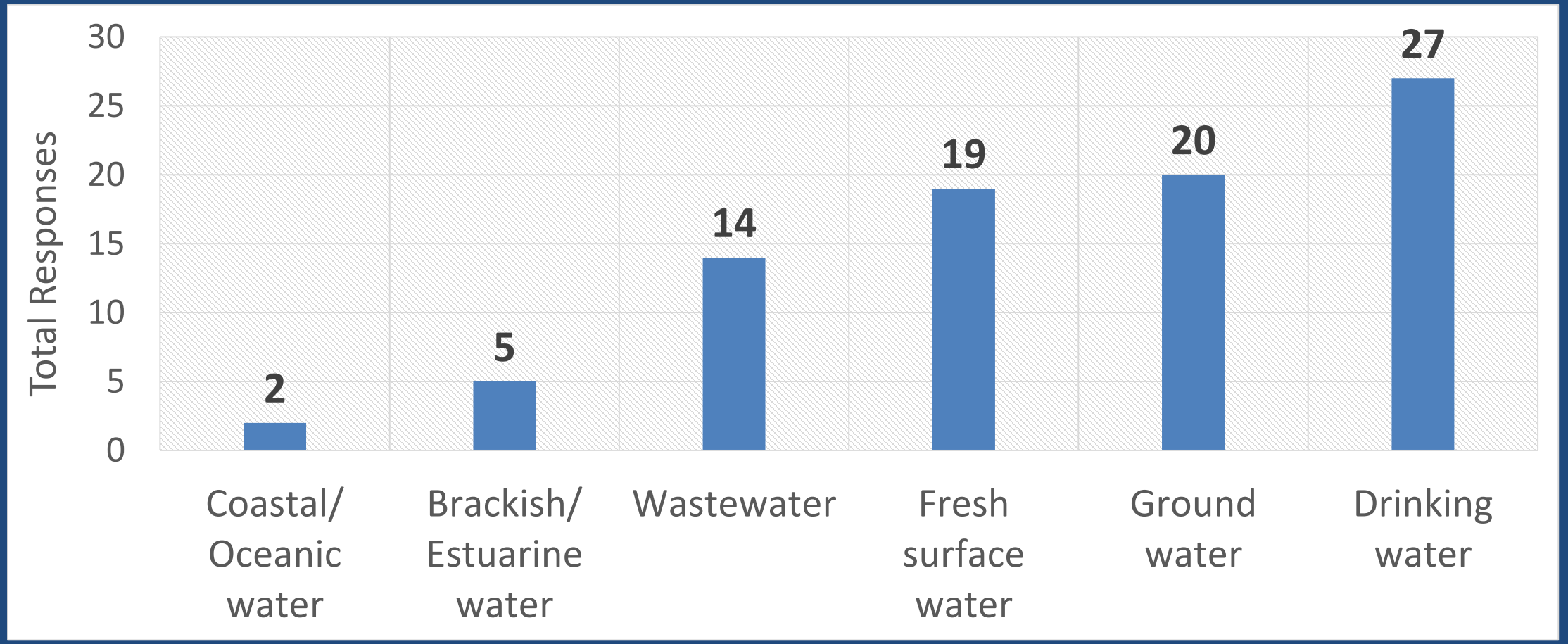
Feedback on requirements

- Reasons for monitoring
- Sample results response time
- Desired measurement frequency
- Sample environment
- Concentration range desired (lower and upper LOD)
- Price points

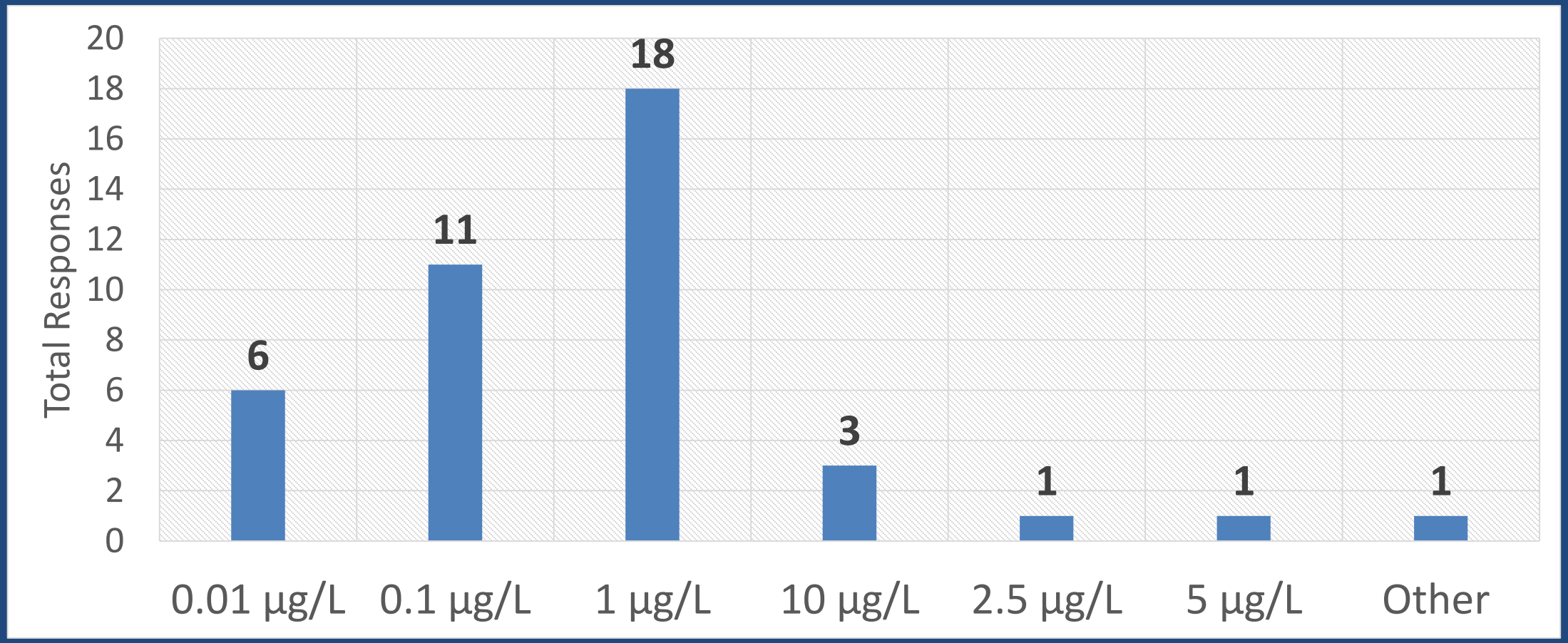
Reasons for Monitoring



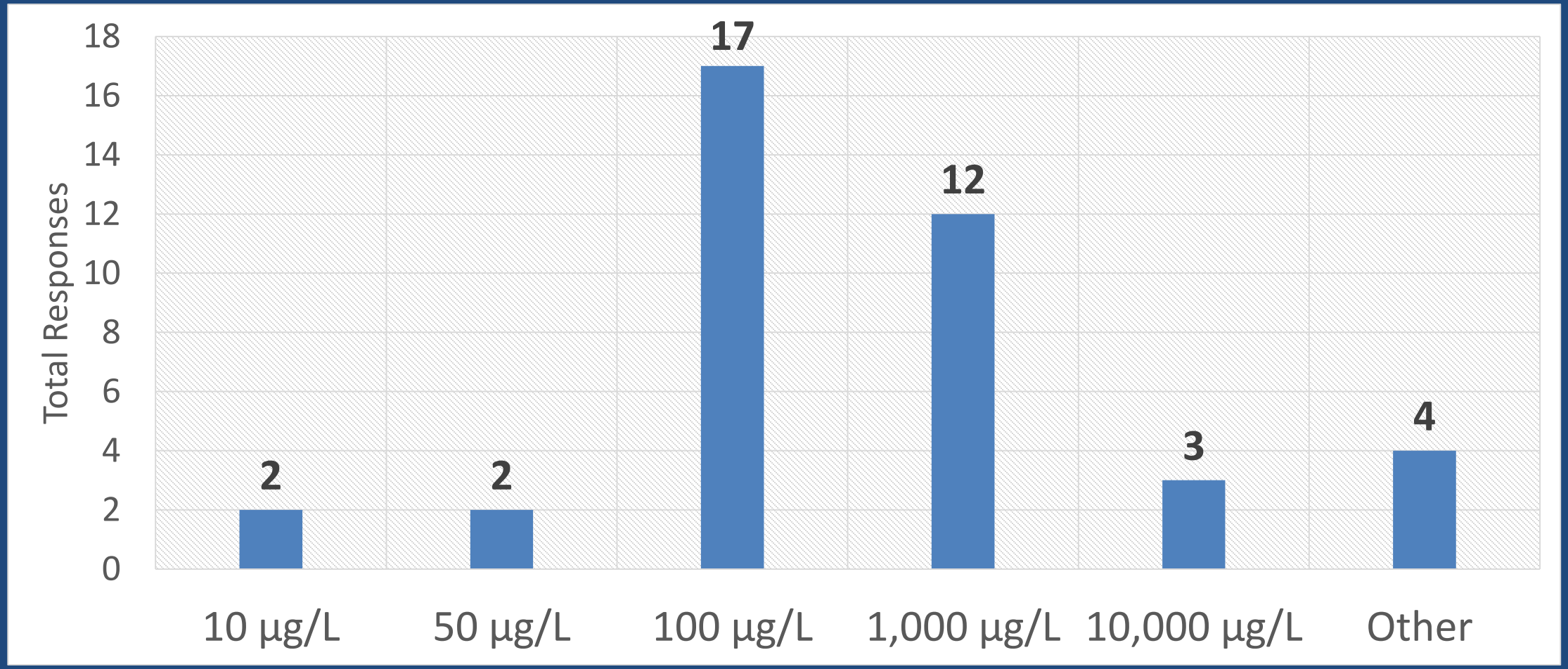
Environment



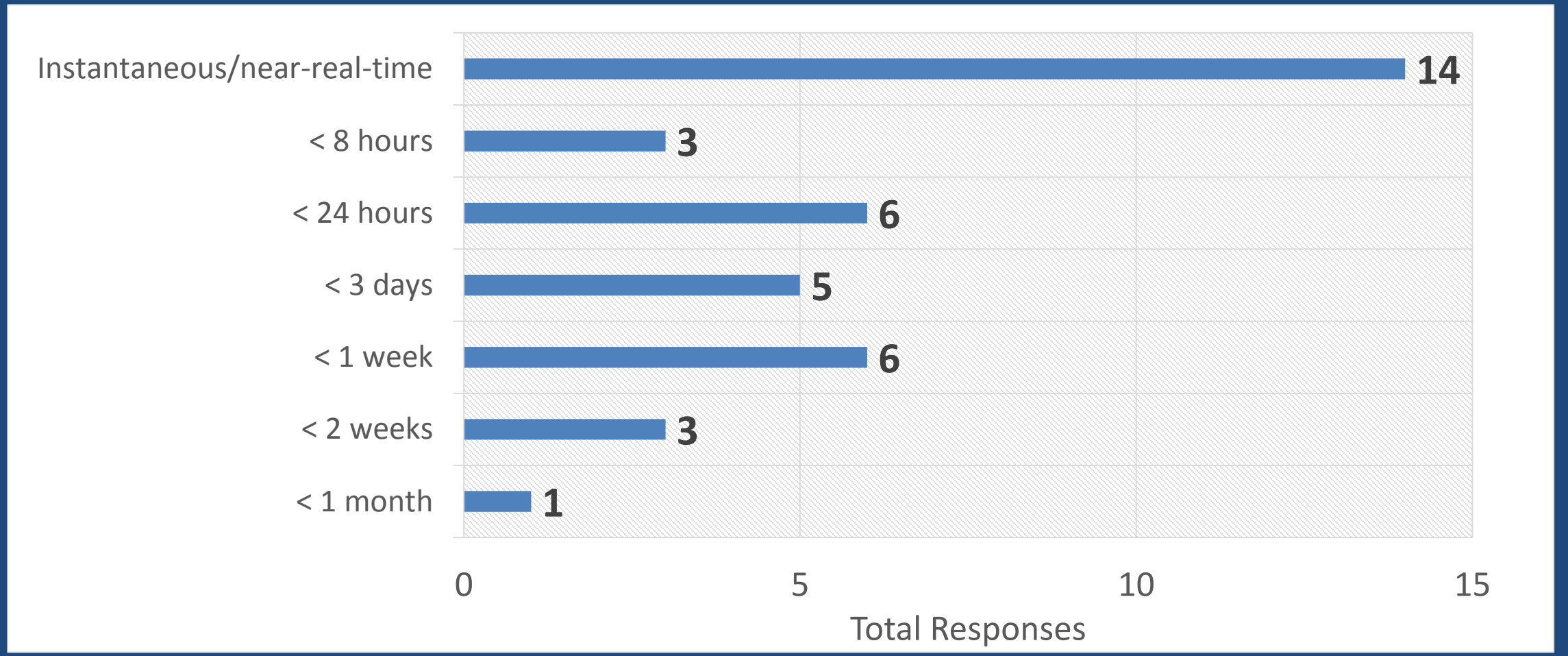
Limit of Detection - Lower



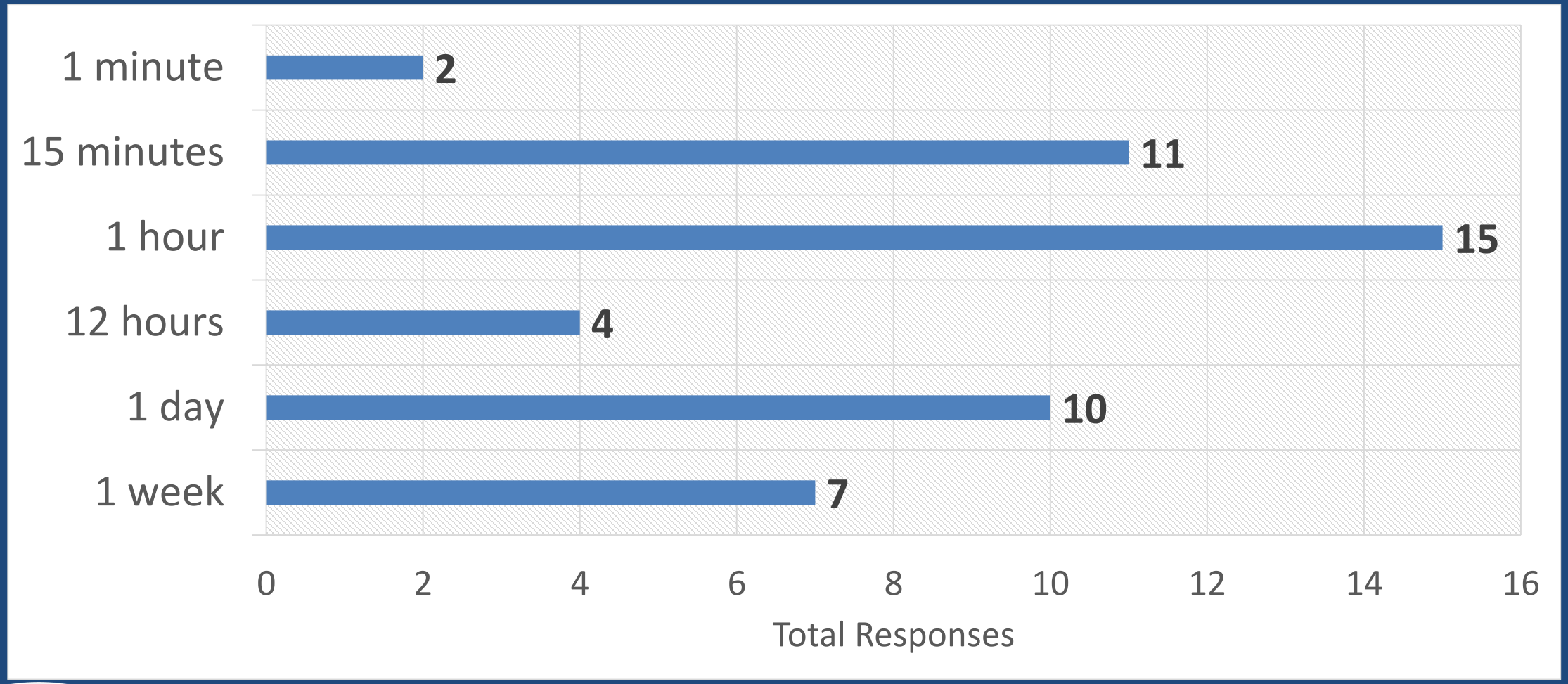
Limit of Detection - Upper



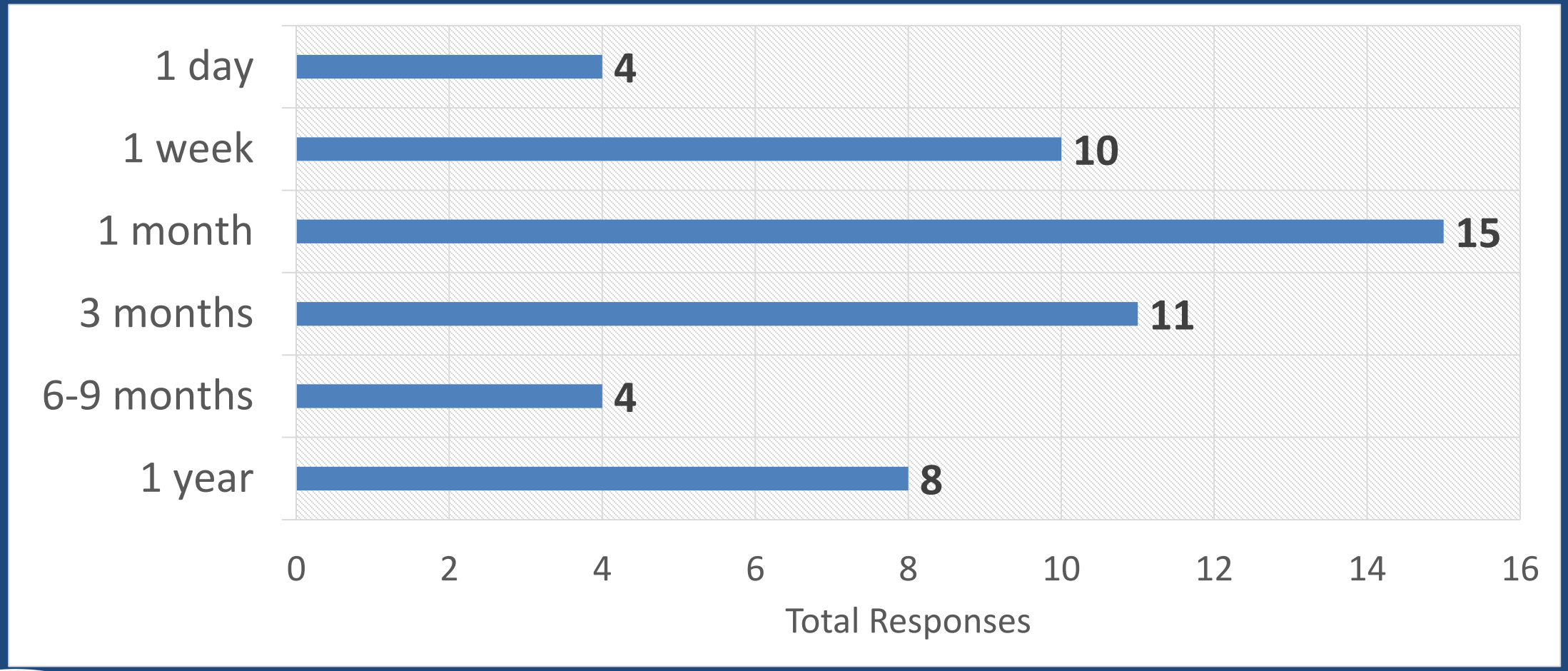
Sampling Results Response Time



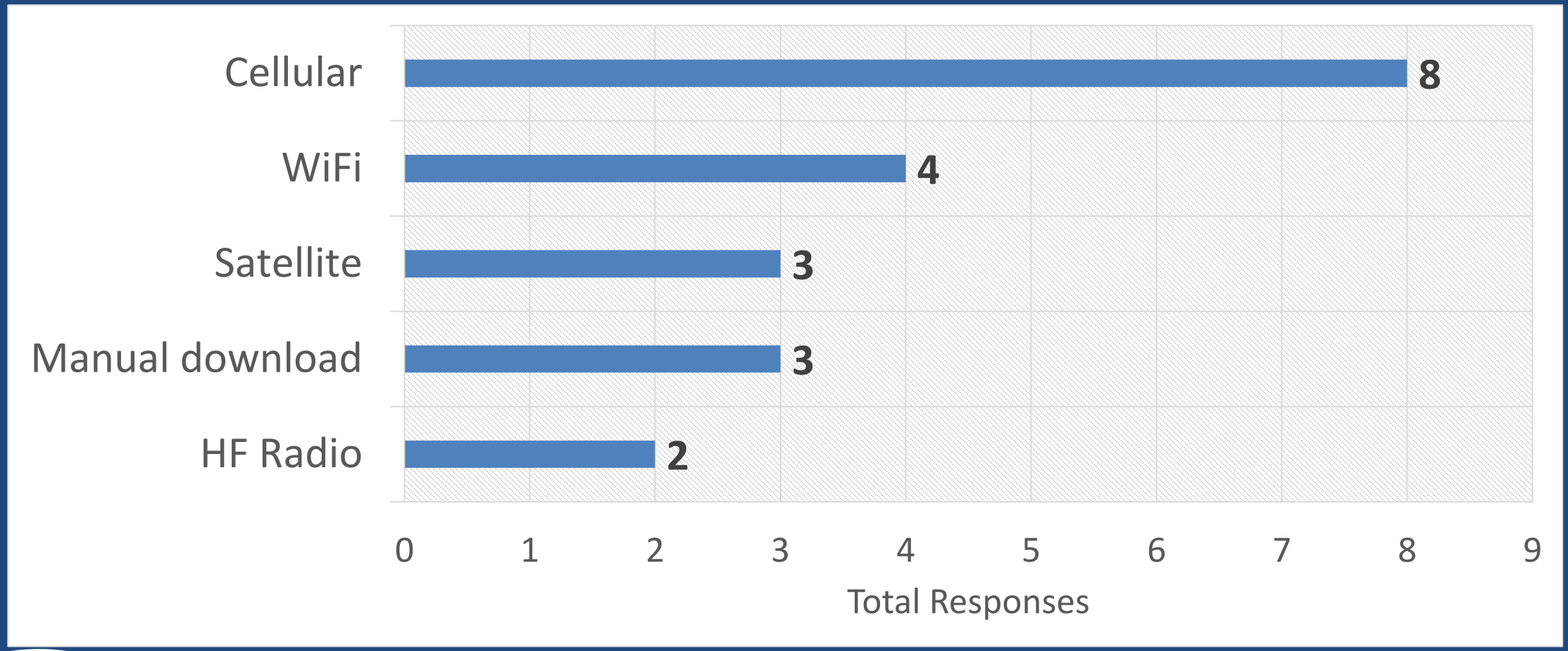
Desired Measurement Frequency



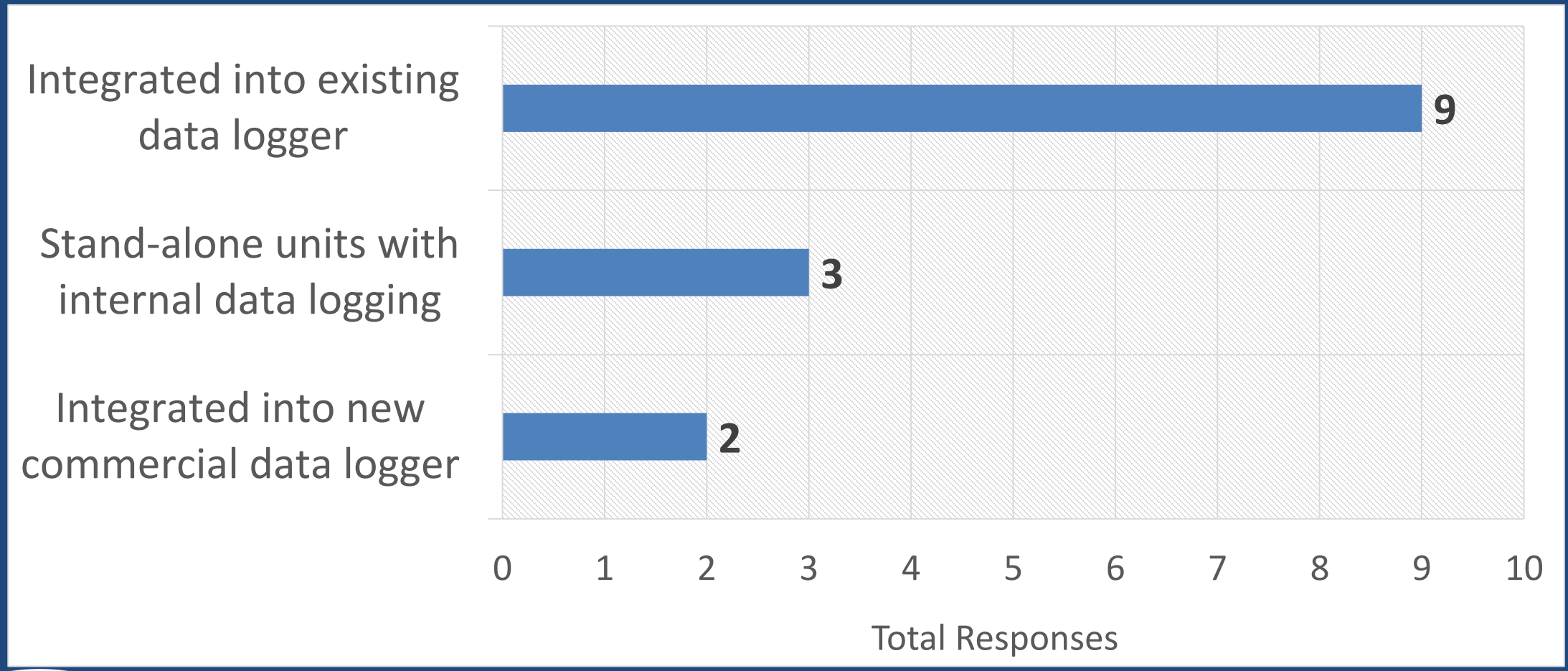
Deployment Duration



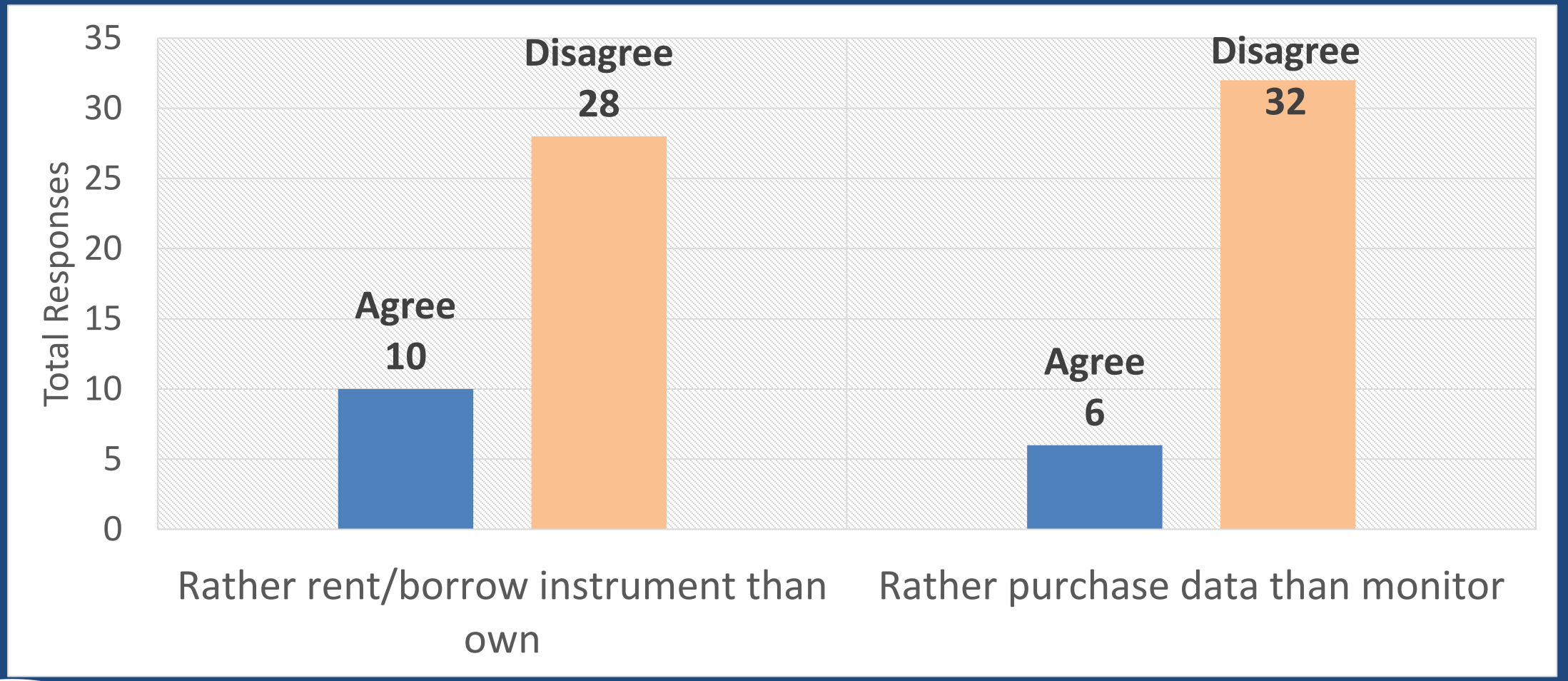
Data Transmission Method



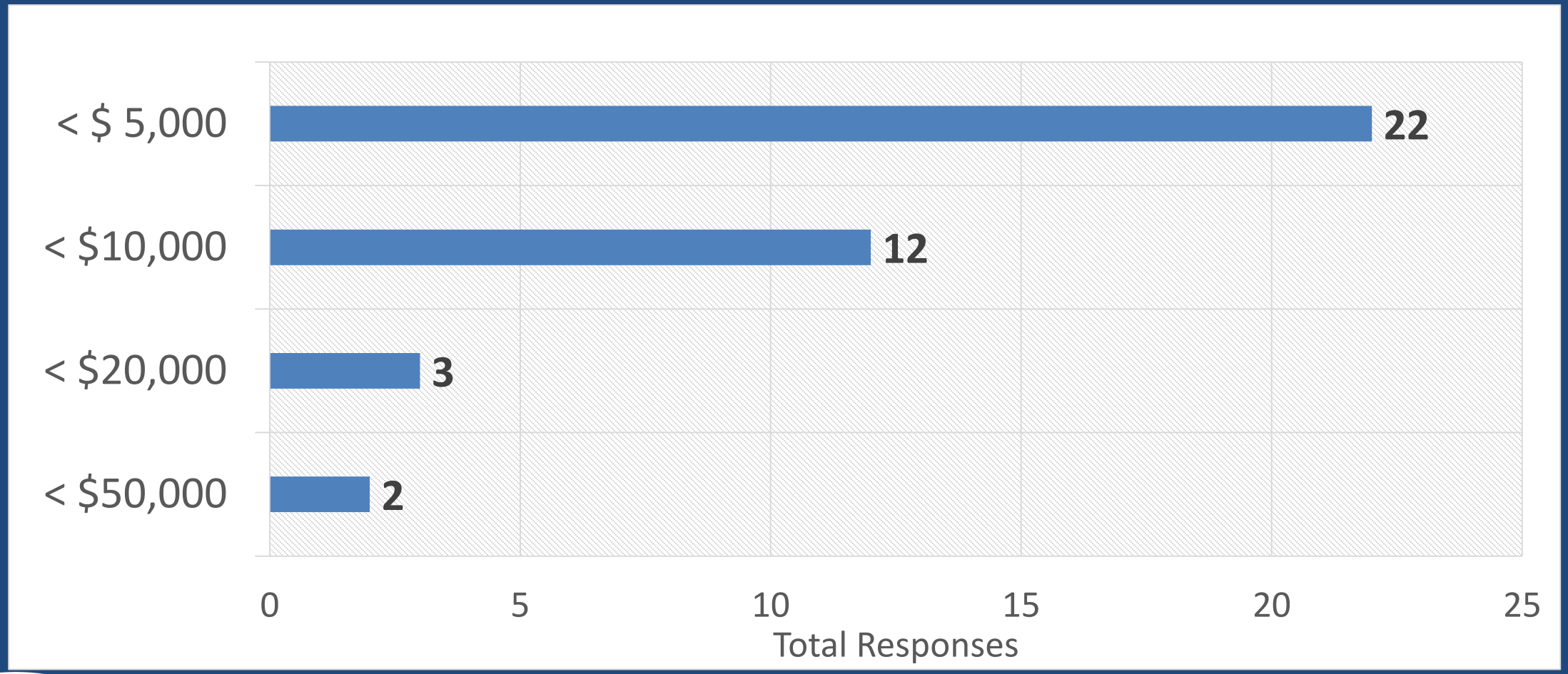
Data Logging Integration



Data and Instrument Access Preferences



Price Point



Next Steps

- Draft arsenic sensor technology needs report
- Presentation & discussion at National Water Quality Monitoring Conference, May 2-6 2016, Tampa, FL
- Arsenic Sensor Challenge

RECLAMATION
Managing Water in the West

U.S. Department of the Interior
Bureau of Reclamation

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Learn more at www.usbr.gov/research/challenges

Advanced Water Treatment Technologies

What's our Objective?

Reclamation believes advanced water treatment technologies can do more to expand our Nation's useable water supplies.

What Do We Do About It?

Reclamation sponsors and conducts research in this area to help advanced the technologies so that they are more broadly used for this purpose.

Reclamation Uses for Improved Arsenic Sensors

Undeveloped Source Characterization

- Identify best source for new water supply
- Understand source variability and treatment needs

Advanced Water Treatment

- Real-time adjustment of treatment process operation
- Process optimization to reduce treatment costs

New Water Supply

- Confirm treated water meets requirements for public health

Treatment Residuals

- Ensure treatment residuals meet discharge requirements to protect the environment

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Discussion

- What other sensor features should be included?
- Besides an affordable sensor, what is your biggest challenge in arsenic monitoring?

Thank you for your input!

- Please attend the other webinars in this series:
  - HAB* toxins - March 16th, 2-3 PM (ET)
  - Total N & Total P - March 23rd, 2-3 PM (ET)
  - *E. coli* & *Enterococcus* - March 30, 2-3 PM (ET)
- New website for sensor R&D funding:
  - https://www.sbir.gov/Sensor-technology-for-the-21st-century
- Questions/additional feedback?
  - innovation@epa.gov

*Harmful Algal Blooms