## Appendix B: bSummary of Statistical Analysis of SCADA Survey

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### General Statistics: Totals utilities: 26 (small 15, Medium 8 and Large 3)

The response options for each survey question are in the left column of the table of responses following the question in this Appendix. Statistical analysis was done for the questions in terms of percentage for the three different size utilities, and collectively for all the utilities that participated in the survey.

Most of the data is presented here is the percentage (%) of the utilities of each size, followed by the number of utilities that% represents in parentheses (No.) Several of the questions provided that "more than one answer may be chosen"; in those cases, the totals reflect more than the number of utilities that responded.

**SCADA General Information:**

**Are you currently using any form of SCADA or Distributed Control System (DCS) to monitor or control your distribution system?** *Data is presented in percentage of utilities (number of utilities) format*

| Size | Small | Medium | Large |
|---|---|---|---|
| Yes: | 100 (15) | 100 (8) | 100 (3) |
| No: | 0 | 0 | 0 |

**Approximately how many years has your facility been utilizing some form of SCADA or remote monitoring and control technology?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 0-5: | 15 (4) | 26 (4) | 0 | 0 |
| 5-10: | 19 (5) | 20(3) | 25(2) | 0 |
| 10-15: | 11(3) | 13(2) | 12(1) | 0 |
| 15-20: | 15(4) | 20(3) | 12(1) | 0 |
| >20: | 38 (10) | 20(3) | 50(4) | 100(3) |
| Totals | 26 | 15 | 8 | 3 |

**Which of the following operating system platforms are used to run your SCADA software? (More than one answer may be selected.)** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Windows: | 76(20) | 73(11) | 87(7) | 66(2) |
| Mac: | 11(3) | 20(3) | 0 | 0 |
| Mission: | 3(1) | 0 | 12(1) | 0 |
| X-windows open-VMS: | 3(1) | 0 | 0 | 33(1) |
| In-touch Windowware: | 3(1) | 6(1) | 0 | 0 |
| Other: | 3(1) | 6(1) | 0 | 0 |
| Totals | 26 | 15 | 8 | 3 |

**Which of the following companies manufacture the SCADA software program are you currently using? (More than one answer may be selected.)** *Data is presented in percentage of utilities (number of utilities) format*

| Manufacturer | All | Small | Medium | Large |
|---|---|---|---|---|
| ABB: | 3(1) | 0 | 12(1) | 0 |
| GE: | 15(4) | 13(2) | 12(1) | 33(1) |
| Hach: | 3(1) | 6(1) | 0 | 0 |
| Indusoft: | 3(1) | 6(1) | 0 | 0 |
| Invensys: | 11(3) | 20(3) | 0 | 0 |
| Multritrode: | 3(1) | 6(1) | 0 | 0 |
| Rockwell: | 15(4) | 6(1) | 0 | 0 |
| Siemens: | 11(3) | 20(3) | 0 | 0 |
| Trihedral: | 3(1) | 0 | 12(1) | 0 |
| QEI: | 3(1) | 0 | 0 | 33(1) |
| Peragon: | 3(1) | 0 | 12(1) | 0 |
| Interlusion: | 3(1) | 0 | 12(1) | 0 |
| Iconics: | 7(2) | 0 | 12(1) | 33(1) |
| Honeywell: | 3(1) | 0 | 12(1) | 0 |
| No Response: | 7(2) | 13(2) | 0 | 0 |
| Microcorp: | 7(2) | 13(2) | 0 | 0 |
| Dexter: | 3(1) | 6(1) | 0 | 0 |
| SCADATA: | 3(1) | 6(1) | 0 | 0 |
| Proficy: | 3(1) | 6(1) | 0 | 0 |
| CPI: | 3(1) | 6(1) | 0 | 0 |
| Totals | 33 | 19 | 11 | 3 |

**Do you use more than one SCADA system to control/monitor different aspects of your operations? For instance, one system for security and another for treatment or distribution operations** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 23(6) | 20(3) | 25(2) | 33(1) |
| No: | 73(19) | 73(11) | 75(6) | 66(2) |
| Unsure: | 3(1) | 6(1) | 0 | 0 |
| No Response: | 0 | 0 | 0 | 0 |
| Totals | 26 | 15 | 8 | 3 |

**Do you use hydraulic modeling software (e.g., EPANet, WaterCad, or KYPipe) to support water distribution system operations?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 53(14) | 26(4) | 87(7) | 100(3) |
| No: | 34(9) | 60(9) | 0 | 0 |
| Unsure: | 11(3) | 13(2) | 12(1) | 0 |
| Totals | 26 | 15 | 8 | 3 |

**Which of the following hydraulic modeling software programs do you use in your distribution system? (More than one answer may be selected.)** *Data is presented in percentage of utilities (number of utilities) format*

| | All-yes | All-unsure | Small – yes | Small-unsure | Medium-yes | Medium-unsure | Large-yes |
|---|---|---|---|---|---|---|---|
| KYPipe: | 28(4) | 33(1) | 50(2) | 50(1/2) | 42(3) | 0 | 0 |
| Infowater: | 35(5) | 0 | 25(1/4) | 0 | 28(2) | 0 | 66(2) |
| EPANET: | 7(1) | 0 | 0 | 0 | 0 | 0 | 33(1) |
| Synergee: | 7(1) | 0 | 0 | 0 | 14(1) | 0 | 0 |
| No Response: | 21(3) | 66(2) | 25(1/4) | 50(1) | 14(1) | 100(1) | 0 |
| RTIS: | 7(1) | 0 | 0 | 0 | 0 | 0 | 33(1) |
| Totals | 15 | 3 | 4 | 2 | 7 | 1 | 4 |

**How recently has your SCADA system received upgrades?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1-2: | 19(5) | 20(3) | 25(2) | 0 |
| 2-3: | 11(3) | 6(1) | 25(2) | 0 |
| >3: | 3(1) | 6(1) | 0 | 0 |
| Never: | 15(4) | 26(4) | 0 | 0 |
| Unknown | 0 | 0 | 0 | 0 |
| Ongoing: | 3(1) | 0 | 0 | 33(1) |
| Less Than 1 Year: | 46(12) | 60(6) | 50(4) | 66(2) |
| Totals | 26 | 15 | 8 | 3 |

## Security Monitoring:

**Do you have security monitoring capabilities for your distribution system?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 53(14) | 46(7) | 62(5) | 66(2) |
| No: | 38(10) | 46(7) | 37(3) | 0 |
| Unsure: | 3(1) | 6(1) | 0 | 0 |
| Limited: | 3(1) | 0 | 0 | 33(1) |
| Totals | 26 | 15 | 8 | 3 |

**Are you using SCADA to monitor security system features within your distribution system?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 53(14) | 46(7) | 62(5) | 66(2) |
| No: | 38(10) | 53(8) | 25(2) | 0 |
| Unsure: | 3(1) | 0 | 12(1) | 0 |
| Limited: | 3(1) | 0 | 0 | 33(1) |
| Totals | 26 | 15 | 8 | 3 |

**Does your utility use a contamination warning/event detection system such as Whitewater Security's Blue Box or Hach Guardian Blue within the distribution system?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 3(1) | 0 | 0 | 33(1) |
| No: | 92(24) | 100(15) | 87(7) | 66(2) |
| No idea: | 3(1) | 0 | 12(1) | 0 |
| Totals | 26 | 15 | 8 | 3 |

**Ambient Air/Water Quality Monitoring:**

**Please indicate the approximate percentage of water quality and hydraulic measurements that are performed by SCADA sensors.** *Data is presented in percentage of utilities (number of utilities) format*

Part a: Water Quality Measurements

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Less than 25 %: | 26(7) | 20(3) | 37(3) | 33(1) |
| 25-50%: | 19(5) | 13(2) | 12(1) | 66(2) |
| 50-75%: | 11(3) | 13(2) | 12(1) | 0 |
| 75-100%: | 19(5) | 13(2) | 38(3) | 0 |
| None: | 23(6) | 40(6) | 0 | 0 |

Part b: Hydraulic Measurements

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Less than 25%: | 15(4) | 6(1) | 37(3) | 0 |
| 25-50%: | 15(4) | 20(3) | 12(1) | 0 |
| 50-75%: | 23(6) | 13(2) | 25(2) | 66(2) |
| 75-100%: | 34(9) | 40(6) | 25(2) | 33(1) |
| None: | 11(3) | 20(3) | 0 | 0 |
| Totals | 26 | 15 | 8 | 3 |

**The following table contains a list of common hydraulic and water quality sensor types. Please choose location(s) that correspond to the sensor types in use within your distribution system that are currently monitored by SCADA. If a sensor is placed in a location that is not listed please specify the sensors relative location in its corresponding text box. Any sensor types in use within your system that are not listed in the table may be manually entered in the "Other" field at the bottom of the table. This question is not mandatory, but if you are able to please answer to the best of your ability.** *Due to the spread of responses between numerous options, statistical analysis of all utilities is presented below. The data is presented in percentage of utilities (number of utilities) format.*

| Parameter | Water Tower | Pump Station | Storage Reservoir | Water Main |
|---|---|---|---|---|
| Flow | 23(6) | 53(14) | 15(4) | 23(6) |
| Level | 61(16) | 7(2) | 42(11) | 3(1) |
| Pressure | 15(4) | 77(20) | 11(3) | 15(4) |
| Depth | 27(7) | 11(3) | 27(7) | 3(1) |
| pH | 15(4) | 23(6) | 3(1) | 23(6) |
| Temperature | 23(6) | 19(5) | 11(3) | 19(5) |
| Total Organic Carbon | 3(1) | 3(1) | | 3(1) |
| Turbidity | 15(4) | 23(6) | 27(7) | 15(4) |
| Dissolved Oxygen | | 7(2) | 3(1) | |
| Suspended Solids | | 3(1) | | 3(1) |
| Dissolved Solids | | 3(1) | | 3(1) |
| Hardness | | 3(1) | | 11(3) |
| Chlorine | 15(4) | 42(11) | 11(3) | 23(6) |
| Chloramines | 3(1) | 3(1) | | |
| Ammonia | 3(1) | 3(1) | 3(1) | |
| Iron | | 3(1) | 3(1) | |
| Nitrate | | 3(1) | 3(1) | |
| Fluoride | 3(1) | 7(2) | 3(1) | 7(2) |
| COD | | 3(1) | | 3(1) |
| Sodium | | 3(1) | 3(1) | 3(1) |
| Conductivity/Resistivity | 3(1) | 11(3) | 3(1) | 3(1) |

**Has your utility used programs such as InfoWater SLM (Sensor Location Manager) or EPA's TEVA-SPOT to assist with selection of optimal locations for sensor placement in your distribution system?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 3(1) | 0 | 0 | 33(1) |
| No: | 77(20) | 93(14) | 62(5) | 33(1) |
| No idea: | 15(4) | 6(1) | 37(3) | 0 |
| Convenience Station: | 3(1) | 0 | 0 | 33(1) |
| Totals | 26 | 15 | 8 | 3 |

## Equipment Monitoring:

**Does your SCADA system provide equipment status monitoring such as run-time, oil pressure, or temperature?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium, | Large |
|---|---|---|---|---|
| Yes: | 53(14) | 53(8) | 62(5) | 33(1) |
| No: | 46(12) | 46(7) | 37(3) | 66(2) |
| Totals | 26 | 15 | 8 | 3 |

**Is data collected from equipment sensors used for maintenance prediction or repair/replacement forecasting?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 42(11) | 40(6) | 50(4) | 33(1) |
| No: | 50(13) | 46(7) | 50(4) | 66(2) |
| No Response: | 7(2) | 13(2) | 0 | 0 |
| Totals | 26 | 15 | 8 | 3 |

## Data Management:

**What mode/modes of SCADA telemetry (data transmission) are used to transmit information from distribution system SCADA components to your SCADA system? (Choose all that apply.)** *Data is presented in percentage of utilities (number of utilities) format*.

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Wireless radio: | 73(19) | 86(13) | 50(4) | 66(2) |
| Fiber optic: | 46(12) | 26(4) | 62(5) | 100(3) |
| Leased line: | 15(4) | 6(1) | 12(1) | 66(2) |
| Internet: | 11(3) | 6(1) | 12(1) | 33(1) |
| Wi-Fi: | 11(3) | 0 | 0 | 66(2) |
| AT&T-T1: | 3(1) | 0 | 0 | 33(1) |
| Satellite: | 3(1) | 0 | 12(1) | 0 |
| Cellular: | 11(3) | 6(1) | 25(2) | 0 |
| Hardwire: | 3(1) | 6(1) | 0 | 0 |
| Other: | 3(1) | 6(1) | 0 | 0 |
| Totals | 48 | 22 | 14 | 11 |

**Which communication protocols (e.g., IEC 60870, Profinet, Hart) are being used to communicate within your SCADA system? (More than one Response is allowed, if unknown you may skip question)** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Modbus: | 19(5) | 13(2) | 12(1) | 66(2) |
| SNP-GE: | 7(2) | 6(1) | 0 | 33(1) |
| Modicon-Ethernet, Ethernet, Trasnet, SQL, EM, IP, Profinet, FW,WEB,BSAP: | 19(5) | 13(2) | 12(1) | 66(2) |
| No Response: | 69(18) | 80(12) | 75(6) | 0 |
| Totals | 30 | 17 | 8 | 5 |

**Data collected manually or through the use of SCADA sensors can be used for a myriad of managerial purposes. The following list contains several common managerial uses of data with respect to the water industry and in general. Please indicate which are done with the assistance of manually collected data, SCADA data, or a combination of both.** *Data is presented in percentage of utilities (number of utilities) format*

A. Historical trending of water quality

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 23(6) | 26(4) | 25(2) | 0 |
| SCADA: | 26(7) | 26(4) | 0 | 100(3) |
| Combination: | 34(9) | 26(4) | 62(5) | 0 |
| N/A: | 3(1) | 6(1) | 0 | 0 |
| No Response: | 11(3) | 13(2) | 12(1) | 0 |
| Totals | 26 | 15 | 8 | 3 |

B. Water usage

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 46(12) | 46(7) | 50(4) | 33(1) |
| SCADA: | 26(7) | 20(3) | 25(2) | 66(2) |
| Combination: | 15(4) | 20(3) | 12(1) | 0 |
| N/A: | 7(2) | 6(1) | 12(1) | 0 |
| No Response: | 3(1) | 6(1) | 0 | 0 |
| Totals | 26 | 15 | 8 | 3 |

C. Regulatory

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 34(9) | 33(5) | 37(3) | 33(1) |
| SCADA: | 7(2) | 6(1) | 12(1) | 0 |
| Combination: | 46(12) | 40(6) | 50(4) | 66(2) |
| N/A: | 3(1) | 6(1) | 0 | 0 |
| No Response: | 7(2) | 13(2) | 0 | 0 |
| Totals | 26 | 15 | 8 | 3 |

D. Financial

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 38(10) | 46(7) | 25(2) | 33(1) |
| SCADA: | 0 | 0 | 0 | 0 |
| Combination: | 15(4) | 13(2) | 12(1) | 33(1) |
| N/A: | 26(7) | 20(3) | 50(4) | 0 |
| No Response: | 19(5) | 20(3) | 12(1) | 33(1) |
| Totals | 26 | 15 | 8 | 3 |

E. Incident Response

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 34(9) | 40(6) | 25(2) | 33(1) |
| SCADA: | 7(2) | 6(1) | 0 | 33(1) |
| Combination: | 3(1) | 6(1) | 0 | 0 |
| N/A: | 23(6) | 20(3) | 37(3) | 0 |
| No Response: | 38(10) | 26(4) | 37(3) | 33(1) |
| Totals | 26 | 15 | 8 | 3 |

F. System Performance

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 11(3) | 13(2) | 12(1) | 0 |
| SCADA: | 15(4) | 13(2) | 12(1) | 33(1) |
| Combination: | 38(10) | 40(6) | 37(3) | 33(1) |
| N/A: | 11(3) | 13(2) | 12(1) | 0 |
| No Response: | 23(6) | 20(3) | 25(2) | 33(1) |
| Totals | 26 | 15 | 8 | 3 |

G. Equipment Maintenance Scheduling and Performance Analysis

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 26(7) | 26(4) | 25(2) | 33(1) |
| SCADA: | 11(3) | 6(1) | 12(1) | 33(1) |
| Combination: | 34(9) | 33(5) | 37(3) | 33(1) |
| N/A: | 11(3) | 13(2) | 12(1) | 0 |
| No Response: | 15(4) | 20(3) | 12(1) | 0 |
| Totals | 26 | 15 | 8 | 3 |

H. Control plant processes

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 19(5) | 20(3) | 12(1) | 33(1) |
| SCADA: | 30(8) | 26(4) | 25(2) | 66(2) |
| Combination: | 34(9) | 40(6) | 37(3) | 0 |
| N/A: | 7(2) | 6(1) | 12(1) | 0 |
| No Response: | 7(2) | 6(1) | 12(1) | 0 |
| Totals | 26 | 15 | 8 | 3 |

I. Historical trend analysis

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 19(5) | 13(2) | 25(2) | 33(1) |
| SCADA: | 50(13) | 53(8) | 37(3) | 66(2) |
| Combination: | 15(4) | 20(3) | 12(1) | 0 |
| N/A: | 0 | 0 | 0 | 0 |
| No Response: | 15(4) | 13(2) | 25(2) | 0 |
| Totals | 26 | 15 | 8 | 3 |

J. Event Prediction

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 26(7) | 20(3) | 37(3) | 33(1) |
| SCADA: | 15(4) | 6(1) | 12(1) | 66(2) |
| Combination: | 23(6) | 26(4) | 25(2) | 0 |
| N/A: % | 15(4) | 20(3) | 12(1) | 0 |
| No Response: | 19(5) | 26(4) | 12(1) | 0 |
| Totals | 26 | 15 | 8 | 3 |

K. Materials consumption

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 26(7) | 26(4) | 25(2) | 33(1) |
| SCADA: | 23(6) | 13(2) | 25(2) | 66(2) |
| Combination: | 19(5) | 20(3) | 25(2) | 0 |
| N/A: | 11(3) | 13(2) | 12(1) | 0 |
| No Response: | 19(5) | 26(4) | 12(1) | 0 |
| Totals | 26 | 15 | 8 | 3 |

L. Calibration

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 23(6) | 20(3) | 25(2) | 33(1) |
| SCADA: | 19(5) | 6(1) | 25(2) | 66(2) |
| Combination: | 7(2) | 0 | 25(2) | 0 |
| N/A: | 30(8) | 46(7) | 12(1) | 0 |
| No Response: | 19(5) | 26(4) | 12(1) | 0 |
| Totals | 26 | 15 | 8 | 3 |

M. Optimizing Alarm Handling and Response

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Manual: | 7(2) | 6(1) | 12(1) | 0 |
| SCADA: | 30(8) | 33(5) | 25(2) | 33(1) |
| Combination: | 19(5) | 33(5) | 0 | 0 |
| N/A: | 23(6) | 6(1) | 50(4) | 33(1) |
| No Response: | 19(5) | 20(3) | 12(1) | 33(1) |
| Totals | 26 | 15 | 8 | 3 |

**Do you have data storage and analysis system (Historian/ODMS) that stores data collected from sensors, water meters, or the like?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 50(13) | 53(8) | 37(3) | 66(2) |
| No: | 42(11) | 40(6) | 50(4) | 33(1) |
| No idea: | 7(2) | 6(1) | 12(1) | 0 |
| Totals | 26 | 15 | 8 | 3 |

**On average, how long is data collected by SCADA able to be stored before it is "dumped" or erased?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Indefinite: | 42(11) | 40(6) | 37(3) | 66(2) |
| 6-yr: | 19(5) | 26(4) | 12(1) | 0 |
| 3-6month: | 15(4) | 13(2) | 25(2) | 0 |
| 45days: | 3(1) | 0 | 0 | 33(1) |
| 3 years: | 7(2) | 6(1) | 12(1) | 0 |
| No idea: | 3(1) | 6(1) | 0 | 0 |
| No Response: | 7(2) | 6(1) | 12(1) | 0 |

**Do you have remote access (Other than your primary control interface) to your SCADA data?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | medium | Large |
|---|---|---|---|---|
| Yes: | 76(20) | 73(11) | 87(7) | 66(2) |
| No: | 15(4) | 20(3) | 12(1) | 0 |
| No idea: | 3(1) | 6(1) | 0 | 0 |
| Limited: | 3(1) | 0 | 0 | 33(1) |

**Process Control:**

**Is your SCADA system used to remotely control physical processes (e.g., Pumps, valves, etc.) in the distribution system?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 73(19) | 66(10) | 75(6) | 100(3) |
| No: | 26(7) | 33(5) | 25(2) | 0 |

**Are process control features of your SCADA system able to be accessed from locations other than the primary SCADA control interface?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 76(20) | 73(11) | 75(6) | 100(3) |
| No: | 23(6) | 26(4) | 25(2) | 0 |

## Alarm Handling:

**Please select any of the following areas that currently have alarm notification capabilities within your SCADA system. (Additional areas may be entered manually)** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Air: | 38(10) | 33(5) | 37(3) | 66(2) |
| Change: hydraulic: | 88(23) | 93(14) | 75(6) | 100(3) |
| Security: | 53(14) | 46(7) | 62(5) | 66(2) |
| Energy: | 15(4) | 6(1) | 12(1) | 66(2) |
| Water quality: | 76(20) | 60(9) | 100(8) | 100(3) |
| Equipment: | 46(12) | 33(5) | 62(5) | 66(2) |
| Other: | 11(3) | 13(2) | 0 | 33(1) |

**How does SCADA system notify operators/responders of an alarm? (Please check all that apply.)** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Page: | 19(5) | 26(4) | 12(1) | 0 |
| Email: | 7(2) | 0 | 12(1) | 33(1) |
| SMS: | 19(5) | 13(2) | 25(2) | 33(1) |
| Phone: | 50(13) | 73(11) | 25(2) | 0 |
| Pop-up: | 65(17) | 46(7) | 87(7) | 100(3) |
| Plant intercom: | 3(1) | 0 | 0 | 33(1) |
| Other: | 3(1) | 6(1) | 0 | 0 |
| Alarm sounds on computer: | 3(1) | 6(1) | 0 | 0 |
| Audible: | 3(1) | 6(1) | 0 | 0 |

**Approximately what percentage of alarms generated are false or nuisance alarms?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 5-10: | 30(8) | 40(6) | 12(1) | 33(1) |
| 10-15: | 11(3) | 6(1) | 12(1) | 33(1) |
| 15-20: | 7(2) | 0 | 25(2) | 0 |
| >20: | 7(2) | 6(1) | 12(1) | 0 |
| 50: | 11(3) | 13(2) | 12(1) | 0 |
| No idea: | 7(2) | 6(1) | 12(1) | 0 |
| Not many: | 3(1) | 0 | 0 | 33(1) |

| | | | | |
|---|---|---|---|---|
| No Response: | 19(5) | 26(4) | 12(1) | 0 |

**Do you group alarms into categories based on priority?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 50(13) | 53(8) | 32(3) | 66(2) |
| No: | 42(11) | 40(6) | 62(5) | 0 |
| No Response: | 3(1) | 6(1) | 0 | 0 |
| Only 2: | 3(1) | 0 | 0 | 33(1) |

## Cost:

**What is the estimated replacement value of your entire SCADA system? (Please provide your best estimate for replacement of all hardware and software.)** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 25-50: | 12(3) | 13(2) | 12(1) | 0 |
| 50-75: | 7(2) | 13(2) | 0 | 0 |
| 75-100: | 7(2) | 13(2) | 0 | 0 |
| 100: | 42(11) | 33(5) | 62(5) | 33(1) |
| 30-50: | 3(1) | 0 | 0 | 33(1) |
| 1.2M: | 3(1) | 0 | 0 | 33(1) |
| No Response: | 23(6) | 26(4) | 25(2) | 33(1) |

**What are your approximate annual SCADA expenditures related to system upkeep/maintenance? (Please provide your best estimate of annual maintenance costs.)** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| $0-$5,000: | 46(12) | 66(10) | 25(2) | 0 |
| $5,000-$10,000: | 7(2) | 6(1) | 12(1) | 0 |
| >$10,000: | 38(10) | 26(4) | 37(3) | 100(3) |
| No Idea: | 7(2) | 0 | 25(2) | 0 |

**What percentage of time would you estimate your SCADA system to be completely operational and not experiencing a "downtime" event due to hardware or software failures?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 90-100: | 96(25) | 100(15) | 87(7) | 100(3) |
| No Response: | 4(1) | 0 | 12(1) | 0 |

**What is your utility' s approximate annual budget? (If unknown leave blank)** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 0-1M: | 15(4) | 26(4) | 0 | 0 |
| 2-10M: | 19(5) | 26(4) | 12(1) | 0 |
| 11-50M: | 7(2) | 6(1) | 0 | 33(1) |
| >100M: | 3(1) | 0 | 0 | 33(1) |
| No Response: | 53(14) | 40(6) | 87(7) | 33(1) |

**Does the use of SCADA provide a noticeable cost savings (e.g., reduction in staff time to necessary to maintain operations, reduction in material/ energy consumption, etc) in annual operating expenses?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Yes: | 69(18) | 66(10) | 62(5) | 100(3) |
| No: | 19(5) | 20(3) | 12(1) | 0 |
| Unsure: | 11(3) | 13(2) | 12(1) | 0 |

**Opinion:**

**Data collected by SCADA sensors is equally reliable as manually collected data.** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Agree: | 50(13) | 53(8) | 50(4) | 33(1) |
| Strongly agree: | 38(10) | 46(7) | 25(2) | 33(1) |
| Neither Agree nor Disagree: | 3(1) | 0 | 12(1) | 0 |
| Disagree: | 3(1) | 0 | 12(1) | 0 |
| Can be: | 3(1) | 0 | 0 | 33(1) |

**Continuous real-time monitoring of equipment status (vibration pattern analysis, temperature, oil pressure, etc.) should be a critical part of your maintenance program.** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Agree: | 46(12) | 53(8) | 50(4) | 33(1) |
| Strongly Agree: | 23(6) | 20(3) | 25(2) | 0 |
| Neither Agree nor Disagree: | 23(6) | 26(4) | 25(2) | 0 |
| Disagree: | 7(2) | 0 | 0 | 66(2) |

**Do you believe cloud or internet based SCADA software/networks pose a serious security risk with respect to distribution operations?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Agree: | 15(4) | 20(3) | 12(1) | 0 |
| Strongly Agree: | 26(7) | 26(4) | 0 | 100(3) |
| Neither Agree nor Disagree: | 50(13) | 40(6) | 87(7) | 0 |
| Disagree: | 7(2) | 13(2) | 0 | 0 |

**Rank areas in which the use of historical data would provide the greatest benefit to your operations.** *Data is presented in percentage of utilities (number of utilities) format*

Reporting (regulatory, financial, etc.):

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1: | 42(11) | 53(8) | 12(1) | 66(2) |
| 2: | 30(8) | 13(2) | 62(5) | 33(1) |
| 3: | 19(5) | 26(4) | 12(1) | 0 |
| No Response: | 7(2) | 6(1) | 12(1) | 0 |

Trending (historical water quality, water use, etc):

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1: | 57(15) | 60(9) | 50(4) | 66(2) |
| 2: | 23(6) | 13(2) | 37(3) | 33(1) |
| 3: | 11(3) | 20(3) | 0 | 0 |
| No Response: | 7(2) | 6(1) | 12(1) | 0 |

Analysis (system optimization, unit process effectiveness, etc.):

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1: | 30(8) | 46(7) | 12(1) | 0 |
| 2: | 19(5) | 20(3) | 12(1) | 33(1) |
| 3: | 46(12) | 33(5) | 62(5) | 66(2) |
| No Response: | 3(1) | 0 | 12(1) | 0 |

**Do you believe there is any risk in allowing access to operational SCADA data over the internet?** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Some: | 46(12) | 53(8) | 50(4) | 0 |
| Extreme: | 26(7) | 26(4) | 0 | 100(3) |
| No: | 7(2) | 6(1) | 12(1) | 0 |
| Slight: | 7(2) | 13(2) | 0 | 0 |
| Not Applicable/Neutral: | 11(3) | 0 | 37(3) | 0 |

**Having too many alarm conditions could lead to an important alarm being missed.** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Agree: | 38(10) | 40(6) | 37(3) | 33(1) |
| Disagree: | 26(7) | 26(4) | 25(2) | 33(1) |
| Strongly Agree: | 15(4) | 13(2) | 12(1) | 33(1) |
| Neither Agree nor Disagree: | 15(4) | 20(3) | 12(1) | 0 |
| No Response: | 3(1) | 0 | 12(1) | 0 |

**Please rank the following SCADA functions in order of their importance to your operations with one being the most important. Not all choices have to be ranked.**
*Data is presented in percentage of utilities (number of utilities) format*

Water/Air Quality Monitoring:

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1: | 30(8) | 40(6) | 25(2) | 0 |
| 2: | 11(3) | 6(1) | 12(1) | 33(1) |
| 3: | 11(3) | 6(1) | 25(2) | 0 |
| 4: | 11(3) | 0 | 12(1) | 66(2) |
| 5: | 7(2) | 13(2) | 0 | 0 |
| 6: | 11(3) | 13(2) | 12(1) | 0 |
| 7: | 3(1) | 0 | 12(1) | 0 |
| No Response: | 11(3) | 20(3) | 0 | 0 |

Process Control:

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1: | 38(10) | 40(6) | 37(3) | 33(1) |
| 2: | 7(2) | 13(2) | 0 | 0 |
| 3: | 7(2) | 6(1) | 0 | 33(1) |
| 4: | 3(1) | 6(1) | 0 | 0 |
| 5: | 11(3) | 6(1) | 12(1) | 33(1) |
| 6: | 15(4) | 13(2) | 25(2) | 0 |
| 7: | 3(1) | 0 | 12(1) | 0 |
| No Response: | 11(3) | 13(2) | 12(1) | 0 |

Data Management:

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1: | 11(3) | 6(1) | 12(1) | 33(1) |
| 2: | 11(3) | 6(1) | 12(1) | 33(1) |
| 3: | 15(4) | 20(3) | 0 | 33(1) |
| 4: | 15(4) | 20(3) | 12(1) | 0 |
| 5: | 15(4) | 13(2) | 12(1) | 0 |
| 6: | 11(3) | 6(1) | 25(2) | 0 |
| 7: | 7(2) | 13(2) | 0 | 0 |
| No Response: | 11(3) | 6(1) | 25(2) | 0 |

Equipment Monitoring:

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1: | 7(2) | 13(2) | 0 | 0 |
| 2: | 15(4) | 13(2) | 25(2) | 0 |
| 3: | 7(2) | 13(2) | 0 | 0 |
| 4: | 19(5) | 13(2) | 25(2) | 33(1) |
| 5: | 11(3) | 13(2) | 12(1) | 0 |
| 6: | 11(3) | 13(2) | 0 | 33(1) |
| 7: | 19(5) | 13(2) | 25(2) | 33(1) |
| No Response: | 7(2) | 6(1) | 12(1) | 0 |

Security:

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1: | 11(3) | 6(1) | 12(1) | 33(1) |
| 2: | 7(2) | 13(2) | 12(1) | 0 |
| 3: | 15(4) | 20(3) | 0 | 33(1) |
| 4: | 15(4) | 20(3) | 25(2) | 0 |
| 5: | 19(5) | 6(1) | 12(1) | 0 |
| 6: | 11(3) | 6(1) | 25(2) | 33(1) |
| 7: | 7(2) | 13(2) | 0 | 0 |
| No Response: | 11(3) | 6(1) | 12(1) | 0 |

Alarm condition notification:

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1: | 50(13) | 40(6) | 37(3) | 33(1) |
| 2: | 3(1) | 6(1) | 0 | 0 |
| 3: | 7(2) | 6(1) | 0 | 33(1) |
| 4: | 3(1) | 13(2) | 0 | 0 |
| 5: | 11(3) | 6(1) | 12(1) | 33(1) |
| 6: | 3(1) | 13(2) | 25(2) | 0 |
| 7: | 3(1) | 0 | 12(1) | 0 |
| No Response: | 11(3) | 6(1) | 25(2) | 0 |

Energy Management:

| | All | Small | Medium | Large |
|---|---|---|---|---|
| 1: | 7(2) | 13(2) | 0 | 0 |
| 2: | 19(5) | 6(1) | 37(3) | 33(1) |
| 3: | 7(2) | 13(2) | 0 | 0 |
| 4: | 15(4) | 13(2) | 25(2) | 33(1) |
| 5: | 7(2) | 13(2) | 0 | 0 |
| 6: | 11(3) | 13(2) | 0 | 0 |
| 7: | 19(5) | 13(2) | 25(2) | 33(1) |
| No Response: | 7(2) | 13(2) | 12(1) | 0 |

**Having a SCADA expert on staff is vital to maintaining a functional and safe SCADA system.** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Agree: | 23(6) | 26(4) | 25(2) | 0 |
| Disagree: | 15(4) | 20(3) | 12(1) | 0 |
| Strongly Agree: | 34(9) | 13(2) | 50(4) | 100(3) |
| Neither Agree nor Disagree: | 23(6) | 33(5) | 12(1) | 0 |
| Strongly Disagree: | 3(1) | 6(1) | 0 | 0 |

**What are the biggest deterrents when deciding to implement new features to an existing SCADA system? (Choose any that apply.)** *Data is presented in percentage of utilities (number of utilities) format*

| | All | Small | Medium | Large |
|---|---|---|---|---|
| Multivendor: | 26(7) | 26(4) | 12(1) | 0 |
| Availability: | 15(4) | 6(1) | 12(1) | 66(2) |
| Establishing New Procedures: | 7(2) | 6(1) | 12(1) | 0 |
| Reliability: | 23(6) | 13(2) | 37(3) | 33(1) |
| Financial: | 50(13) | 60(9) | 37(3) | 33(1) |
| System Downtime: | 15(3) | 20(3) | 12(1) | 0 |
| If Its Not Broken: | 15(3) | 20(3) | 12(1) | 0 |
| Retraining Operators: | 23(6) | 20(3) | 25(2) | 33(1) |
| Others: | 3(1) | 6(1) | 0 | 0 |