# APPENDIX H

# PARAMETERS, DETECTION LEVELS, HOLDING TIMES AND ANALYTICAL RECOVERIES

**Appendix H. Parameters, Detection Levels, Holding Times and Acceptable Analytical Recoveries (Revised Aug 2007)**

| Constituent | Laboratory | Minimum Sample Size | Units | Method | RL | Field Duplicate RPD/Recovery | Holding Time/ Preservation | Container | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| Dissolved Oxygen | CVRWQCB | 500 mL | mg/L | a/360.1 | 0.1 | N/A | on site | 500 mL Polyethylene | 95% |
| pH | CVRWQCB | 500 mL | None | a/150.1 | 0.1 | N/A | on site | 500 mL Polyethylene | 95% |
| Specific Conductance | CVRWQCB | 500 mL | umhos/cm | a/b/120.1 | 1 | RPD<10% | 28 days - Cool, 4 °C in the dark | 500 mL Polyethylene | 95% |
| Temperature | CVRWQCB | 500 mL | $^{o}$C | a/temperature | 0.1 | N/A | on site | 500 mL Polyethylene | 95% |
| Turbidity | CVRWQCB | 500 mL | NTU | a | 1 | RPD<10% | on site | 500 mL Polyethylene | 95% |
| Total Alkalinity | SFL | 800 mL | mg/L | SM2320B | 5.0 | RPD<15% | 14 days - Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |

**Appendix H. Parameters, Detection Levels, Holding Times and Acceptable Analytical Recoveries (Revised Aug 2007) continued…**

| Constituent | Laboratory | Minimum Sample Size | Units | Method | RL | Field Duplicate RPD/Recovery | Holding Time/ Preservation | Container | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| Total Dissolved Solids | SFL | 300 mL | mg/L | SM2540C | 10 | RPD<15% | 7 days - Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |
| Total Hardness | SFL | 500 mL | mg/L | EPA 130.2 | 5.0 | RPD<15% | 180 days- Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |
| Total Suspended Solids | SFL | 1000 mL | mg/L | SM2540D | 1.0 | RPD<20% | 7 days - Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |
| **Metals in Water** | | | | | | | | | |
| Arsenic, Total & Dissolved[d] | SFL | 500 mL | µg/L | SM3114B | 2 | 4-20 ±4 At concentrations greater than the ranges shown, acceptable recovery is 80 - 120% | 180 days - When preserved to a pH < 2 using nitric acid within 24 hours of sample collection | 500 mL/1 L Polyethylene | 95% |
| Cadmium, Total & Dissolved[d] | SFL | 500 mL | µg/L | SM3113B to MDL | 0.1 | 0.1-10 ±3 At concentrations greater than the ranges shown, acceptable recovery is 80 - 120% | 180 days - When preserved to a pH < 2 using nitric acid within 24 hours of sample collection | 500 mL/1 L Polyethylene | 95% |

**Appendix H. Parameters, Detection Levels, Holding Times and Acceptable Analytical Recoveries (Revised Aug 2007) continued…**

| Constituent | Laboratory | Minimum Sample Size | Units | Method | RL | Field Duplicate RPD/Recovery | Holding Time/ Preservation | Container | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| Copper,Total & Dissolved[d] | SFL | 500 mL | µg/L | SM3113B | 1 | 1-20 ± 5 At concentrations greater than the ranges shown, acceptable recovery is 70 - 130% | 180 days - When preserved to a pH < 2 using nitric acid within 24 hours of sample collection | 500 mL /1 L Polyethylene | 95% |
| Lead, Total & Dissolved[d] | SFL | 500 mL | µg/L | SM3113B | 3 | 5-25 ± 8 At concentrations greater than the ranges shown, acceptable recovery is 60 - 140% | 180 days - When preserved to a pH < 2 using nitric acid within 24 hours of sample collection | 500 mL/1 L Polyethylene | 95% |
| Mercury, Total & Dissolved[d] | SFL | 500 mL | µg/L | SM3112B to MDL | 0.1 | 0.1-10 ±.5 At concentrations greater than the ranges shown, acceptable recovery is 70 - 130% | 28 days- Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |
| Nickel, Total & Dissolved[d] | SFL | 500 mL | µg/L | EPA 249.2 | 3 | 5-25 ± 6 At concentrations greater than the ranges shown, acceptable recovery is 65-135% | 180 days - When preserved to a pH < 2 using nitric acid within 24 hours of sample collection | 500 mL/1 L Polyethylene | 95% |
| Zinc,Total & Dissolvedd | SFL | 500 mL | µg/L | SM3111B | 2 | 1-20 ± 6 - At concentrations greater than the ranges shown, acceptable recovery is 70 - 130% | 180 days - When preserved to a pH < 2 using nitric acid within 24 hours of sample collection | 500 mL/1 L Polyethylene | 95% |

**Appendix H. Parameters, Detection Levels, Holding Times and Acceptable Analytical Recoveries (Revised Aug 2007) continued…**

| Constituent | Laboratory | Minimum Sample Size | Units | Method | RL | Field Duplicate RPD/Recovery | Holding Time/ Preservation | Container | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| **Minerals in Water** | | | | | | | | | |
| Bicarbonate | SFL | 200 mL | mg/L | SM2320B | 5.0 | RPD<15% | 14 days - Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |
| Calcium | SFL | 500 mL | mg/L | SM3111B | 0.1 | RPD<15% | 180 days- Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |
| Chloride | SFL | 50 mL | mg/L | EPA 300.0 | 1.0 | RPD<15% | 28 days - Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |
| Magnesium | SFL | 500 mL | mg/L | EPA 242.1 | 0.02 | RPD<15% | 180 days - Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |
| Potassium | SFL | 500 mL | mg/L | EPA 258.1 | 0.10 | RPD<15% | 180 days - Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |
| Sodium | SFL | 500 mL | mg/L | SM3111B | 0.10 | RPD<15% | 180 days - Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |

**Appendix H. Parameters, Detection Levels, Holding Times and Acceptable Analytical Recoveries (Revised Aug 2007) continued…**

| Constituent | Laboratory | Minimum Sample Size | Units | Method | RL | Field Duplicate RPD/Recovery | Holding Time/ Preservation | Container | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| Sulfate | SFL | 100 mL | mg/L | EPA 300.0 | 0.5 | RPD<15% | 28 days - Cool, 4 °C in the dark | 500 mL/1 L Polyethylene | 95% |
| **Nutrients in Water** | | | | | | | | | |
| Ammonia as N[d] | Basic | 300 mL | mg/L | 350.1 | 0.05 | 80 – 120% Recovery | 28 days - Cool, 4 C, H2SO4 to pH <2 | Polyethylene | 95% |
| Ammonia[d] | SFL | 300 mL | mg/L | EPA 350.3 | 0.20 | 80 – 120% Recovery | 28 days - Cool, 4 C, H2SO4 to pH <2 | Polyethylene | 95% |
| Nitrate as N | Basic | 100 mL | mg/L | 353.2 | 0.05 | 80 – 120% Recovery | 2 days - Cool, 4 °C in the dark | Polyethylene | 95% |
| Nitrate | SFL | 100 mL | mg/L | EPA 300.0 | 0.05 | 80 – 120% Recovery | 2 days - Cool, 4 °C in the dark | Polyethylene | 95% |

**Appendix H. Parameters, Detection Levels, Holding Times and Acceptable Analytical Recoveries (Revised Aug 2007) continued…**

| Constituent | Laboratory | Minimum Sample Size | Units | Method | RL | Field Duplicate RPD/Recovery | Holding Time/ Preservation | Container | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorous[d] | Basic | 150 mL | mg/L | SM 4500P | 0.05 | 80 – 120% Recovery | 28 days - Cool, 4 °C in the dark | Polyethylene | 95% |
| Ortho Phosphate[d] | Basic | 150 mL | mg/L | SM 4500P-E | 0.05 | 80 – 120% Recovery | 2 days - Cool, 4 °C | Polyethylene | 95% |
| Ortho Phosphate[d] | SFL | 150 mL | mg/L | EPA 365.3 | 0.01 | 80 – 120% Recovery | 2 days - Cool, 4 °C in the dark | Polyethylene | 95% |
| Total Kjldahl Nitrogen[d] | Basic | 300 mL | mg/L | 351.2 | 0.2 | 80 – 120% Recovery | 28 days - Cool, 4 °C in the dark, H2SO4 to pH <2 | Polyethylene | 95% |
| Total Kjldahl Nitrogen[d] | SFL | 300 mL | mg/L | EPA 351.3 | 0.50 | 80 – 120% Recovery | 28 days - Cool, 4 °C in the dark, H2SO4 to pH <2 | Polyethylene | 95% |

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| Constituent | Laboratory | Minimum Sample Size | Units | Method | RL | Field Duplicate RPD/Recovery | Holding Time/ Preservation | Container | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| Total Phosphorous[d] | Basic | 150 mL | mg/L | SM 4500P | 0.05 | 80 – 120% Recovery | 28 days - Cool, 4 °C in the dark | Polyethylene | 95% |
| Total Phosphorous[d] | SFL | 150 mL | mg/L | EPA 365.2 | 0.02 | 80 – 120% Recovery | 2 days - Cool, 4 °C in the darkC | Polyethylene | 95% |
| **Freshwater Toxicity** | | | | | | | | | |
| 48h % Survival, *Ceriodaphnia* | SFL | 1000 mL | Adult Count (% survival) | EPA 821-R-02-012, Table 12 | | Significant difference, or RPD<20% | 36 Hr - Cool, 4 °C in the dark | 1L Glass | 95% |
| 96h % Survival, Fathead Minnow (*Pimephales*), non-renewal | SFL | 1000 mL | % Survival | EPA 821-R-02-012, Table 14 | | Significant difference, or RPD<20% | 36 Hr - Cool, 4 °C in the dark | 1L Glass | 95% |
| 96h Algae (*Selenastrum*) growth | SFL | 1000 mL | Cell Count (growth or reduction) cell/mL | EPA 821-R-02-013, 1003.0 | | Significant difference, or RPD<20% | 36 Hr - Cool, 4 °C in the dark | 1L Glass | 95% |

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| Constituent | Laboratory | Minimum Sample Size | Units | Method | RL | Field Duplicate RPD/Recovery | Holding Time/ Preservation | Container | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| Chronic Toxicity, *Ceriodaphnia* | SFL | 1000 mL | Adult Count (% survival) | EPA 821-R-02-013, 1002.0 | | Significant difference, or RPD<20% | 36 Hr - Cool, 4 °C in the dark | 1L Glass | 95% |
| Chronic Toxicity, *Ceriodaphnia* | SFL | 1000 mL | Larval Count (num/rep) | EPA 821-R-02-013, 1002.0 | | Significant difference, or RPD<20% | 36 Hr - Cool, 4 °C in the dark | 1L Glass | 95% |
| Chronic Toxicity, Fathead Minnow (*Pimephales*) | SFL | 1000 mL | % Survival | EPA 821-R-02-013, 1000.0 | | Significant difference, or RPD<20% | 36 Hr - Cool, 4 °C in the dark | 1L Glass | 95% |
| Chronic Toxicity, Fathead Minnow (*Pimephales*) | SFL | 1000 mL | Weight (mg/ind) | EPA 821-R-02-013, 1000.0 | | Significant difference, or RPD<20% | 36 Hr - Cool, 4 °C in the dark | 1L Glass | 95% |
| **Bacteria in Water** | | | | | | | | | |
| Total & Fecal Coliform, 15 tube Multiple tube fermentation | SFL | 125 mL | MPN/100 mL | SM9221B, E | e | | 6 Hr to lab, 8h to analysis - Cool, 4 °C in the dark | Sterile Plastic | 95% |
| Total Coliform & E. Coli, MTF + MUG | SFL | 125 mL | MPN/100 mL | SM9221B + MUG | e | | 6 Hr to lab, 8h to analysis - Cool, 4 °C in the dark | Sterile Plastic | 95% |

**Appendix H. Parameters, Detection Levels, Holding Times and Acceptable Analytical Recoveries (Revised Aug 2007) continued…**

| Constituent | Laboratory | Minimum Sample Size | Units | Method | RL | Field Duplicate RPD/Recovery | Holding Time/ Preservation | Container | Completeness |
|---|---|---|---|---|---|---|---|---|---|
| Total Coliform | CVRWQCB | 100 mL | MPN | Colilert® 18 by Idexx | | 95% CI | 6 Hr - Cool, 4 °C in the dark | 100 mL Polyethylene | 95% |
| *E. Coli* | CVRWQCB | 100 mL | MPN | Colilert® 18 by Idexx | | 95% CI | 6 Hr - Cool, 4 °C in the dark | 100 mL Polyethylene | 95% |
| **Organics in Water** | | | | | | | | | |
| Total Organic Carbon | SFL | 100 mL / 125 mL | mg/L, % | SM5310C | 0.20 | RPD<20% | 28 days - Cool, 4 °C in the dark, H2SO4 to pH <2 | 250 mL Glass-Amber | 95% |
| **Biological Oxygen Demand** | | | | | | | | | |
| BOD 5-Day | SFL | 2000 ml | mg/L | SM 5210 B | 1.0 | RPD<20% | 48 Hr - Cool, 4 °C in the dark | Polyethylene | 95% |
| BOD 10-Day | SFL | 2000 ml | mg/L | SM 5210 B | 1.0 | RPD<20% | 48 Hr - Cool, 4 °C in the dark | Polyethylene | 95% |

a. A YSI 6600 and a 600XLM Instrument is used to determine field SC, pH, Temp, DO, Turb.

b. A YSI 3200 Bench Top conductivity meter is used to determine lab SC.

c. Laboratory is determined through SWAMP - SJSU Master Contract

d. Samples analyzed as part of the Grassland Bypass Program and are set based on those Waste Discharge Requirements.

e. low range2-2400; mid range 20-2400; high range 200-240000; very high range 2000-2400000

*Carlson, R.M. 1978. Automated separation and conductimetric determination of ammonia and dissolved carbon dioxide. Analytical Chemistry 50:1528-1531.

*Carlson, R.M. 1986. Continuous flow reduction of nitrate to ammonia with granular zinc. Analytical Chemistry 58:1590-1591.

**Yu, Z., Northup, R.R. and Dahlgren, R.A. 1994. Determination of dissolved organic nitrogen using persulfate oxidation and conductimetric quantification of nitrate-nitrogen. Commun. Soil Sci. Plant Anal. 25:3161-3169.

*** low range 2-2400; mid range 20-24000; high range 200-240000; very high range 2000-2,400,000

SFL = Sierra Foothill Laboratory
Basic = Basic Laboratory
CVRWQCB = in house processing in the Central Valley Regional Water Quality Control Board laboratory

Eaton, A. D. ed., Clesceri, L. S. ed., Greenberg, A. E. ed. 1995. Standard Methods for the Examination of Water and Wastewater. 19th edition. American Public Health Association, American Water Works Association, Water Environment Federation.