5A Monitoring Parameters

Appendix 4A. Monitoring Parameters Methods

Parameter	Method and Range	Kit and/or Method Number[1]	Environmental Indications	Resolution and Accuracy	Considerations	Appropriate Use
Physical						
Temperature	Glass thermometer	SM 2550	Seasonal Patterns Heated effluents form Industrial plant	0.1-0.5°C 1% fullscale	Pre- and post-event calibration recommended	Volunteer or municipal staff
	Digital thermometer	SM 2550	Seasonal Patterns Heated effluents form Industrial plant	0.1 °C 1% fullscale	Pre- and post-event calibration recommended; very fast	Volunteer or municipal staff
Conductivity	Conductivity meter 1-19,000ms	SM 2510	Influence of seawater or high dissolved solids concentrations	10 ms	Pre- and post-event calibration against purchased standard required. Can be used to measure "Practical Salinity"	Volunteer or municipal staff
pH	Optical comparator to pH indicator solutions pH range: 4-10	Hach	General Conditions Illicit discharges (very low or high)	0.5 pH units	Not very accurate or precise	Volunteer or educational
	Electrometric probe inserted into solution to be measured pH range: 0-14	SM 4500-H^+ pH meter	General Conditions Illicit discharges (very low or high)	0.2 pH units or better Precision varies with instrument; 0.1 unit common	Accurate and reproducible if calibrated against standard according to manufacturer's recommendations	Volunteer or municipal staff
Dissolved Oxygen	Modified Winkler titration 0-10 mg/L	LaMotte SM 4500-OB	High oxygen demand (low) High productivity (high) Nutrient influences (high)	0.2 mg/L 1% of true concentration	Some interferences Used as the basis of Biochemical Oxygen Demand	Volunteer or municipal staff
	Membrane electrode	SM 4500-OG	High oxygen demand (low) High productivity (high) Nutrient influences (high)	0.1 mg/L accuracy 0.05 mg/L potential precision	Reported precision high, though in practice cannot be better than Winkler titrations	Volunteer or municipal staff

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Parameter	Method and Range	Kit and/or Method Number[1]	Environmental Indications	Resolution and Accuracy	Considerations	Appropriate Use
Clarity	Turbidity	SM 2130	Sedimentation (high - natural or illicit sources) Productivity (low)	Accuracy depends on calibration of meter with appropriate standards	Onsite with optical comparator or meter	Volunteer or educational
	Total Suspended Solids	SM 2540 D	Sedimentation (high - natural or illicit sources) Productivity (low)	Accuracy is very high although depends on represent-ativeness of samples	Requires laboratory analysis, though can be done in simple setting Most suitable for calculating loads	Volunteer or municipal staff
Chemical						
Detergents	Solvent extraction and colorometric indicator	SM 5540C	Illicit connections Improper washdown practices	0.1 ppm	Common runoff component in residential and commercial zones	Volunteer or municipal staff
Phenols			Cleaning compounds Urban runoff	10% of true value	Common runoff component in residential and commercial zones	Volunteer or municipal staff
Oil and Grease	Visual	No reliable kit procedure	Illicit connections General runoff Illicit dumping	Depends on method used	Requires laboratory analysis - procedures in flux	Municipal staff Laboratory Volunteer for visual observation

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Parameter	Method and Range	Kit and/or Method Number[1]	Environmental Indications	Resolution and Accuracy	Considerations	Appropriate Use
Biological						
Indicator Bacteria	Multiple-tube fermentation of serial dilutions	Total Coliform SM 9221B Fecal Coliform SM 9221E Enterococcus SM 9230B	Illicit connections Pet/livestock wastes Wildlife populations	Resolution depends on number of serial dilutions Precision may be low among replicates	Requires laboratory analysis - may be conducted in any facility with appropriate sterile and temperature control capabilities	Municipal staff Laboratory Volunteer/Educators under some conditions
	Selective media with indicator dyes show fecal or strep bacteria Range depends on serial dilutions of sample MPN or CFU/100 mL	Coli Kits and Membrane filtration of sample	Illicit connections Pet/livestock wastes Wildlife populations	Resolution depends on number of volume of sample precision may be low among replicates	Requires laboratory analysis - may be conducted in any facility with appropriate sterile and temperature control capabilities	
Nutrients						
Nitrates	SM 4500-NO_3 E	Laboratory No reliable kit procedure	Illicit connections Fertilizers moving off site	Accuracy poor with test kits	Requires laboratory analysis	Municipal staff Laboratory
	SM 4500-NO_3 D	Selective-ion electrode	Illicit connections Fertilizers moving off site	2.5% of concentration	Relatively costly probes	
Ammonia	SM 4500-NH_3 F	Laboratory No reliable kit procedure	Illicit connections Fertilizers moving off site	Accuracy poor with test kits	Requires laboratory analysis	Municipal staff Laboratory
	SM 4500-NH_3 D	Selective-ion electrode	Illicit connections Fertilizers moving off site	Reported recoveries of 91-96% [1]	Relatively costly probes	

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Parameter	Method and Range	Kit and/or Method Number[1]	Environmental Indications	Resolution and Accuracy	Considerations	Appropriate Use
Phosphates		No reliable kit procedure	May indicate detergents Fertilizers moving off site	Accuracy poor with test kits	Requires laboratory analysis	Municipal staff Laboratory

[1] - Method numbers refer to specific sections of *Standard Methods for the Evaluation of Water and Wastes, 18th edition*. Holding times and container requirements are listed for most tests in 40 CFR 136.3.

References for Established Numerical Limits/ Water Quality Standards

EPA. Ambient Water Quality Criteria for Bacteria - 1986. Body Contact Standards for Recreational Waters

EPA. Ambient Water Quality Criteria for Ammonia - 1986 (Freshwater), 1989 (Seawater)

Water Quality Control Plan - Central Coast Region. 1994. Numerical limits may vary by beneficial use classification.

State Water Resources Control Board. 1993. Water Quality Control Plan for Ocean Waters of California (California Ocean Plan).