ACKNOWLEDGEMENTS

The Anchorage Waterways Council (AWC) adapted this Quality Assurance Project Plan (QAPP), with permission, from one produced by the Cook Inlet Keeper of Homer, Alaska in 1998. Portions of their QAPP were adapted from similar plans developed by The Friends of Casco Bay (Maine) and Texas Watch. The United States Environmental Protection Agency (EPA), the Alaska Department of Environmental Conservation (ADEC) and the United States Geological Survey (USGS) provided guidance and cooperation in helping the Keeper develop and refine their QAPP.

The AWC QAPP was updated in 1999, 2002 and again in 2004.

The AWC would like to thank ADEC and USGS staff for their guidance in the preparation of this QAPP and to our volunteer monitors for their creek side efforts in establishing baseline data in this Citizens Environmental Monitoring Program (CEMP).

A2. TABLE OF CONTENTS

A3. DISTRIBUTION LIST:

Official copies of this QAPP and any subsequent revisions will be provided to:

U.S. Geological Survey
Alaska Water Resources Division (907) 786-7110
Bob Ourso, Stream Ecologist

Alaska Department of Environmental Conservation
Division of Water, Juneau (907) 465-5305
Jim Jendron, Quality Assurance Officer

Alaska Department of Environmental Conservation
Division of Water, Anchorage (907) 269-7515
Tim Stevens, Environmental Specialist

University of Alaska, Anchorage
Environmental and Natural Resources Institute (907) 257-2731
Dan Bogan, Environmental Scientist

Cook Inlet Keeper
Joel Cooper, Research Coordinator (907) 235-4068

Copies of this Quality Assurance Project Plan will be made available free to all volunteer monitors and partner organizations. Other interested parties may review the plan at the Anchorage Waterways Council office or purchase a copy for the cost of production and shipping by writing Anchorage Waterways Council, P.O. Box 241774, Anchorage AK 99524-1774; tel. (907) 277-9287; e-mail awc@alaska.net.

A4. PROJECT / TASK ORGANIZATION

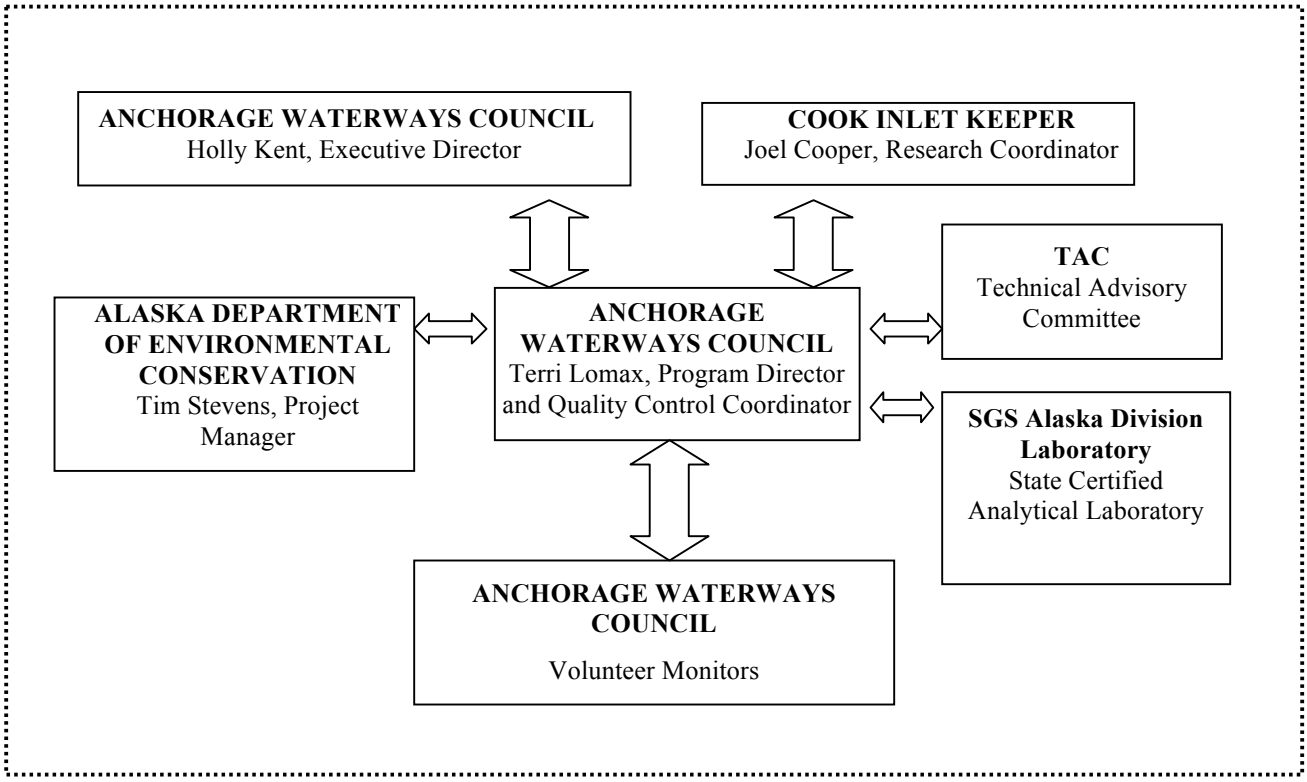

Figure F-1 Organizational Chart

Responsibilities of Anchorage Waterways Council Personnel

Terri Lomax, Monitoring Program Director and Quality Control Coordinator

Terri is responsible for recruiting, training and coordinating volunteer monitors, analyzing, analyzing, organizing and reporting data, quality control and quality assurance, administration of the program, and adherence to the QAPP.

Holly Kent, Executive Director

Holly oversees adherence to the Annual Plan and the Annual Budget, acts as a liaison to the community in representing the members in community planning efforts and issues related to the health of our waterways. Additionally, Holly supervises all AWC staff, attends all Board meetings linking the staff to the Board of Directors, is responsible for grant writing, maintains the membership database, and generally directs the efforts of the organization as dictated by the Board of Directors. Holly's

qualifications include several years in site assessment and environmental analysis with an environmental consulting firm as well as several years of supervising staff.

Volunteer Monitors

The monitors are responsible for following protocols, outlined in Section B, to collect physical and chemical information from pre-established sites on Anchorage streams. Additionally, current and former volunteer monitors who are interested in managing other volunteers and data are trained in Level 5 protocols to both train new volunteers as well as enter, edit and manage data.

Responsibilities of Alaska Department of Environmental Conservation

Tim Stevens, Project Manager

As the liaison between the project and the state, Tim provides an overview of the state's perspective on current and foreseen water quality issues within the project area. He additional provides technical advice, and assists with program management through feedback.

Responsibilities of SGS Alaska Division Laboratory

As the selected state certified laboratory, SGS provides analytical results for both Fecal coliform and Enterococci levels in selected water samples. Northern Testing Laboratories, a state certified laboratory was used in the sampling events in 2002 & 2003.

Responsibilities of Cook Inlet Keeper

Joel Cooper, Research Coordinator

Joel provides guidance in all technical aspects of the program, from developing a QAPP to protocol development. Joel has considerable sampling and monitoring experience with the U.S. Fish & Wildlife Service, National Park Service and the U.S. Forest Service.

Responsibilities of the Technical Advisory Committee

The Technical Advisory Committee is composed of six professionals, which represent diverse scientific backgrounds (See Appendix A for a full list of members). Each of these experts provide technical advice on an as-needed basis, as well provide information on local water quality issues from an academic, research and policy perspective.

Collected data is made available to all interested government agencies and the general public. Primary data users include: the staff and membership of the AWC, the Cook Inlet Keeper; the citizens of the Municipality of Anchorage and local citizen-based groups concerned with water quality protection; local environmental consultants; local, state and federal agencies and commissions, including the Municipality of Anchorage Watershed Management Section, who are involved in making resource management decisions affecting the Municipality's waterways.

A5. PROBLEM DEFINITION / BACKGROUND AND OVERALL OBJECTIVES

Between 1950 and 2003, the population in the Municipality of Anchorage increased from just over 30,000 to more than 260,000 people. Such growth accelerated surface runoff of trace elements, hydrocarbons, and bacteria to Anchorage streams. The EPA's 1998 list of water quality-limited waters showed that of the 58 waters in Alaska listed as "impaired," 15 are located in Anchorage.

While government, universities, and industry have done a number of studies; there is not enough baseline data available to determine the effects of non-point source pollution on the water quality of Anchorage creeks. Citizens, industry and resource managers need a comprehensive on-going water-quality monitoring program to understand the potential or actual affects of water pollution on these resources in order to make economically and environmentally sound decisions. As no long-term water-quality monitoring stations are operated in Anchorage, citizens have stepped in to gauge the health of creeks.

Additionally, the value of baseline data for Anchorage creeks is high as the ADEC is initiating TMDL plans for more than one creek and the Municipality of Anchorage is attempting to write the state's first watershed management plan for Chester Creek. Several creeks in the municipality are on the state's impaired waterbody list and it can be expected that in several years, the same management protocols will be applied. The data collected by AWC monitors has already been asked for by several agencies and entities such as the Army base.

A6. PROJECT / TASK DESCRIPTION

The AWC is a 501(c)(3) nonprofit organization based in Anchorage, Alaska, dedicated to protecting Anchorage waterways and the life they sustain. Because citizens are the true owners of public water resources, the AWC strives to involve them in hands-on activities aimed at improving and protecting habitat and water quality, promoting resource stewardship, and establishing an environmental database for the Anchorage Bowl.

To address the need for relevant water quality data, the AWC's Monitoring Program incorporates two types of monitoring regimes to collect needed information: Baseline and Discrete monitoring. Baseline data collection is performed through protocols adopted from the Citizens' Environmental Monitoring Program (CEMP). Discrete monitoring is performed on an as-needed basis and includes the use of analytical results.

Baseline

In 1999, the AWC initiated its water-quality monitoring program by selecting three sites on Chester Creek and West Chester Lagoon, one site each on Ship Creek and North Fork Campbell Creek. These sites were selected in cooperation with the Municipality's Watershed Management Program, Alaska Cooperative Extension's Master Watershed Steward Program (MWSP) and the University of Alaska's Environment and Natural Resources Institute (ENRI). Consideration was given to prior sampling history, USGS gauging stations, ENRI's bioassessment sites and both pristine and impaired reaches. Since the conception of the program, 26 fixed sites have been

established and monitored by AWC-trained volunteers. All sites in the program were selected based on previous datasets, and input from the TAC.

The CEMP has been adopted by other citizen-based, water-quality monitoring groups in Southcentral Alaska with the goal of involving citizens in the collection of baseline, water-quality conditions. The CEMP remains the only comprehensive, freshwater monitoring program in Anchorage. Currently, 44 volunteer monitors collect a wide array of chemical and physical data from 26 stationary creek sites, representing 12 watersheds in the Municipality of Anchorage.

Although numerous organizations have conducted a variety of tests and studies in Anchorage, the CEMP is the only program that has created and maintained a comprehensive, continuous water-quality monitoring program. Without this valuable information, the ability to properly manage and protect water resources is diminished.

Volunteer monitors take surface water samples using water test kits containing a combination of LaMotte, Hach, Hanna and Micrology Laboratories equipment and supplies. Monitor training courses are held periodically as needed and retraining/Quality Control (QC) sessions are held annually (see Section 8). Volunteers are instructed to monitor 16 times per year -- once each month from September through April and twice a month from May through August (see Table T-1). Preferred sampling times are the 2nd and 4th Sundays of the month between 12 noon and 5pm.

The volunteer monitors test surface water samples primarily for **water temperature**, **turbidity** (clarity), **pH**, and **dissolved oxygen**. Current monitoring protocols also include tests for watercolor, conductivity, total dissolved solids (TDS), and screening tests for nutrients (nitrate-nitrogen & ortho-phosphate), and bacteria (E. coli & total coliform). Additional tests at the sites are for macro invertebrates and these are in accordance with ENRI's Citizen's Bioassessment Protocol.

The objectives of the AWC's Baseline program are to:

- inventory baseline water quality in the waters of the Anchorage Bowl;
- detect and report significant changes and track water quality trends

To promote these objectives the AWC has selected water quality parameters that will enhance understanding of overall environmental health (see Section V. of the Volunteer Training Manual for a discussion of the importance of each testing parameter) and testing methods that have proven successful in citizen-based programs throughout the United States.

Citizens record narrative environmental data about their stream reaches, record weather conditions and photograph each site. These visual and other observations complement the quantitative physical and chemical data collected at each established monitoring site.

Data collected by volunteers is turned in to the AWC office. Duplicate information is sent to the Cook Inlet Keeper in Homer and to the DEC quarterly. Results are also documented on Alaska's

Cooperatively Implemented Information Management System (CIIMMS). Test results can then be evaluated through comparison with applicable state and federal water quality standards.

Yearly, the data is evaluated for errors, outliers and other quality control questions. The data is then submitted to the TAC for further analysis in the area of potential trends and relationships. This data is available on both the AWC's and the Keeper's web sites and a data analysis and summary report will be published annually and provided to ADEC, the MOA and other agencies. Water quality data collected by AWC volunteers using the Cook Inlet Keeper's approved QAPP but prior to approval of this AWC QAPP by DEC will be entered into the CEMP database but, for the record, it will be flagged and qualified to show that status.

Discrete

In 2002, the Alaska Department of Environmental Conservation granted the AWC monetary support for studying Fecal Coliform and Enterococci levels in selected Anchorage creeks, as well as support for installing water temperature data loggers to establish temperature trends.

Again in 2003, the Alaska Department of Environmental Conservation granted AWC monetary support for studying Fecal and E coli Coliform levels in selected Anchorage creeks, as well as support for conducting Biological habitat assessments and collecting discharge data. AWC will utilize ENRI's Citizen's Bioassessment Protocols for macroinvertebrate and habitat studies. The objective of the is study is to determine monthly geometric means for coliform and discharge rates. Thus, sampling will occur four times a month during all months where weather permits for a period of one year.

The AWC established protocols for these two projects and in the future, it is likely that other 'discrete' sampling regimes may be adopted to answer research questions about our creeks. Within this framework, the QAPP identifies all non-CEMP protocols to be developed and accepted by the ADEC as discrete protocols.

The objectives of the AWC's Discrete Program are to evaluate specific streams and sites for water quality parameters that either:

- require laboratory analysis; and/or
- require equipment or analysis not outlined in CEMP protocols

For all monitoring regimes, refinements in methods or additional testing parameters may be incorporated in the future if it is determined that such changes would enhance efforts to achieve project goals. Any such changes will be submitted for ADEC approval. Bacteria tests are collected three times in a 30-day period, 4 times a year. The 4 collection rounds will correspond to seasonal patterns, such as fall, winter, breakup and summer rains. Hobo meters will be collecting temperatures continuously and record a measurement once per hour. This may change to once every 15 minutes.

As understanding of Anchorage-area creeks' water quality conditions increases, the AWC will work with other interested parties to develop an Anchorage-specific water quality index. The AWC's Monitoring program is an on-going project designed to continue as long as funding

allows. Both Baseline and Discrete data collection regimes will be expanded as funding and equipment availability permits.

General comparisons will be made between data collected and state and federal water quality standards, as applicable. The data may be used by government agencies, landowners, and other resources managers to enhance understanding of basic water quality status and to identify water quality trends.

Table T-1: ANNUAL SCHEDULE OF BASELINE MONITORING TASKS

MAJOR TASK CATEGORIES	J	F	M	A	M	J	J	A	S	O	N	D
volunteer training				X			X			X		
volunteer retraining/quality control		X				X						
monthly testing	X	X	X	X	XX	XX	XX	XX	X	X	X	X
data entry	X	X	X	X	X	X	X	X	X	X	X	X
annual analysis report					X							
annual QAPP review											X	

Table T-2: ANNUAL SCHEDULE OF DISCRETE MONITORING TASKS

MAJOR TASK CATEGORIES	J	F	M	A	M	J	J	A	S	O	N	D
Bacteria sampling at targeted sites				X			X		X			X
Hobo data download			X			X			X			X
Bacteria sampling at targeted sites, monthly geometric mean	X	X	X	X	X	X	X	X	X	X	X	X
Stream discharge data collection, in conjunction with geometric bacteria sampling	X	X	X	X	X	X	X	X	X	X	X	X
Bioassessment					X				X			
Data entry			X	X		X	X		X			X
Annual analysis report					X							
Annual QAPP review											X	

A7. DATA QUALITY OBJECTIVES FOR MEASUREMENT DATA

Table T-3 shows objectives for precision and accuracy for each parameter tested. In each case the sampling matrix is water. Objectives for precision, accuracy, representativeness, comparability and completeness are also summarized below. These Data Quality Objectives (DQOs) have been established to ensure that the AWC water monitoring program meets its overall objectives as described in Section 6, above – establishing a basic water quality inventory and detecting significant changes and trends. Laboratory analysis is performed by SGS or Northern Testing Laboratories, a DEC certified lab, and their QMP is on file at the DEC. Project DQOs may be revised in the future if funding becomes available for additional training and equipment or if the Technical Committee determines that different objectives would be more effective in meeting program objectives. Any changes in DQOs will be submitted to ADEC for approval before implementation.

Table T-3: DATA QUALITY OBJECTIVES

Parameter	Method/Range	Units	Sensitivity (a)	Precision	Accuracy	Calibration Method (d)
Temperature	Thermometer, Water -5.0 to +50.0 °C	Degrees Celsius (°C)	0.5°C	±1.0°C (b)	±0.5°C (b)	NIST Certified Thermometer
	Thermometer, Air -40 to 120 °F	Degrees Fahrenheit (°F)	1° F	±1 °F	±1 °F	NIST Certified Thermometer
	Hanna Meter HI 98129 0.0 to 60.0 °C; 32.0 to 140.0 °F	°C °F	0.1 °C 0.1 °F	(c) ±1.0°C ±1.0°F	(c) ±0.5° C ±1 °F	NIST Certified Thermometer
	Hobo Meter 0 to 50 °C	Degrees Celsius (°C)	.02 °C	.02 °C	±0.2 °C	NIST Certified Thermometer
pH	pH Octet, Comparator Lamotte 5858 3.0 to 10.0 units	Standard pH units	0.25 units	±0.6 units (b)	±0.4 units (b)	Checked against Hach pH Meter
	Hanna Combo HI98129 0.0 to 14.0	Standard pH units	0.01 units	±0.02 units (c)	± 0.01 units (c)	Standard Solutions Method
	Hach Model 5005 Electrometric Method -2.00 to 19.99 pH units	Standard pH units	0.01 units	±0.02 units	±0.05 units	Standard Solutions Method
Dissolved Oxygen	Micro Winkler Azide Modification Lamotte 5856 0.0 to 20.0 mg/l	Milligrams per liter (mg/l)	0.1 mg/l	±0.6 mg/l (b)	±0.3 mg/l (b)	Checked against LaMotte DO Meter
	LaMotte Model DO 4000 0 to 19.99 mg/l	Milligrams per liter (mg/l)	0.1 mg/l	±0.05 mg/l	±0.1 mg/l	Saturated air calibration
Turbidity	Jackson Turbidity Units Lamotte 7519 0 to 200 JTU	Jackson Turbidity Units (JTU)	5 JTU	±5 units (c)	±5 units at 0 - 200 JTU (c)	Checked against LaMotte meter
	Sechhi Disk Lamotte 0171 0 to 30 units	Meters (m)	0.5 m	NA	NA	Line Markings Checked with Tape
Specific Conductance	Hanna Combo HI98129 0 to 3999 microS/cm	Micro-Siemens/cm (µS/cm) (converted to 25 C)	1 µS/cm	±2%Full Scale (c)	±2% Full Scale (c)	Standard Solutions Method
Apparent Color	Borger Color System 147 standard colors	Color index number	1 to 2 Color Numbers	NA	NA	Checked against Hach Spectrophotometer
Stage	Water Gauge Reading, USGS Staff Gage 0-3.32ft, 3.32-6.72ft	Feet	.02 ft	NA	NA	Measurement
Flow	Global Flow Probe FP101-201 0.3 to 25 (fps) 0.1 to 8 (mps)	Feet per Second Meters per second	(c) 0.1 fps 0.1 mps	NA	(c) 0.1 fps 0.1 mps	Computer calibration & Mechanical friction calibration of propeller bushing
Nitrate-Nitrogen	Zinc reduction (Colorimetric) Lamotte 3354, 0 to 20 ppm	ppm (mg/l)	0.1 ppm	±0.5 ppm (c)	±0.5 ppm (c)	Standard Solutions Methods
Ortho-Phosphate	Ascorbic acid reduction (Colorimetric) Hach PO-19, Low Range 0 to 1 ppm (0 to 1.0mg/l)	ppm (mg/l)	0.02 ppm	±5% (c)	±5% (c)	Standard Solutions Methods
Total Dissolved Solids	Hanna Combo Meter HI98129 0 to 2000 ppm	ppm	1 ppm	±2% Full Scale	±2% Full Scale	Standard Solutions Method
Fecal Coliform	Fecal Coliform Membrane Filtration (SM18 9222 D)	Number of colony forming units(CFU) per 100 ml	1 CFU/ 100 ml (e)	NA	NA	Send water sample to EPA/ADEC Certified Lab
Enterococci	Enterococci MPN (SM 9230 B)	Most Probable Number (MPN) Per 100 ml	1 CFU/ 100 ml (e)	NA	NA	Send water sample to EPA/ADEC Certified Lab
Total Coliforms	EasyGel Coliscan Chromogenic agents in medium, detects *E.* coli & total coliform 0 to 60 CFU	Number of colony forming units (CFU) per 100 ml	1 CFU/ 100 ml	NA	NA	Control Checks of Sterility, temperature
	Total Coliform MPN (SM18 9223B)	Most Probable Number (MPN) Per 100 ml	1 – 2419.6 CFU/ 100 ml (e)	NA	NA	Send water sample to EPA/DEC Certified Lab
E. coli	EasyGel Coliscan Chromogenic agents in medium, detects *E.* coli & total coliform 0 to 60 CFU	Number of colony forming units (CFU) per 100 ml	1 CFU/100 ml	NA	NA	Control Checks of Sterility, temperature
	E Coli MPN (SM18 9223B)	Most Probable Number (MPN) Per 100 ml	1 – 2419.6 CFU/ 100 ml (e)	NA	NA	Send water sample to EPA/DEC Certified Lab

NA = not available

(a) Determined by the increments measurable with the stated method reflecting estimation where allowed.

(b) Data taken from the Quality Assurance Project Plan for Friends of Casco Bay, 1995, p. 21; based on data taken from EPA Volunteer Water Monitoring: A Guide for State Managers, 1990, EPA 440/4-90-010, p. 39; and the Quality Assurance Project Plan for the Chesapeake Bay Citizen Monitoring Program, Section 5, p. 2.

(c) Data taken from the manufacturer's instruction manuals.

(d) Calibration according to schedule in Section 16, page 23 of this QAPP.

(e) Data obtained from EPA/DEC Certified Lab

Precision

Precision is the degree of agreement among repeated measurements of the same characteristic, or parameter, and gives information about the consistency of methods. Each volunteer monitor will perform replicate sample analyses during all monitor training sessions and biannual quality control (QC) sessions. Variation of duplicate values for each parameter must not exceed the range of precision specified in Table T-3.

Replicate testing is performed routinely for dissolved oxygen. Monitors are instructed to collect and titrate three replicate dissolved oxygen (DO) samples during each sampling event. Monitors are instructed to do an additional titration if any one sample collected shows a reading differing from the others by greater than 0.6mg/L (upper warning limit). If any one bottle titration shows a value differing from the others by greater than 0.6 mg/L (upper control limit), the results are not entered into the CEMP data system; the average of the remaining, closer values is instead recorded. If a volunteer reports DO values differing by greater than 0.6mg/L for two consecutive sampling events at a particular site, the volunteer is contacted to determine the cause of the problem. A site visit may be necessary if equipment and/or procedure questions persist.

Accuracy

Accuracy is a measure of confidence that describes how close a measurement is to its "true" value. In this program, accuracy is measured by comparative sampling. Volunteer monitor values are compared against values generated by the Project QC Coordinator or a Certified Monitor Trainer at QC sessions and during random site visits (see Section 14). Monitor values must fall within the specific range for each parameter as indicated in Table T-3. Accuracy of procedures and equipment used in the AWC monitoring program will be verified using standard testing materials for each specific test. A detailed description of calibration procedures is given in Table T-2 and in section 16 of this document.

Representativeness

Representativeness is the extent to which measurements actually represent the true environmental condition. Representativeness of data collected by CEMP volunteers is considered in project design and sampling site selection. Representativeness will not be routinely monitored throughout the project, but is incorporated when necessary in interpreting the data. It is obvious that water flowing past a given location on land is constantly changing in response to dynamic inflow, weather, season, etc. Regular periodic collection of data from any given location can help develop a better understanding of the variance associated with time series measurements of selected environmental variables. Such data collection can also provide increased resolution and sensitivity to localized and short-term effects of events within individual hydrologic units, along tributary margins and within specific lagoons and estuaries. Representativeness for any given location, area, and region within the Anchorage Bowl will be more defined as historical water data is collected and compared at each site over time.

Comparability

Comparability is the degree to which data can be compared directly to similar studies. Using standardized sampling, analytical methods and units of reporting with comparable sensitivity helps ensure comparability. The AWC has selected testing methods that are EPA-approved and/or currently being employed by other water-quality monitoring programs throughout the country. All volunteer monitors are trained to follow the same standard protocol for each parameter. As the program expands, site selection will favor locations where previous water-quality monitoring has taken place. Efforts will be made to duplicate the effort of past studies where possible. For greater comparability, conductance measurements will be converted to 25°C when entered into the data system.

Completeness

Completeness is the comparison between the amount of usable data collected versus the amount of data called for in the sampling plan. In the AWC monitoring program, completeness is measured as the percentage of total samples collected and analyzed as a whole and for individual parameters and sites as compared to the goals set out by the project design

Validity is the comparison between the results of individual parameters collected by volunteers with the acceptable range, precision and sensitivity of the test. In the AWC monitoring program, validity is measured as the percentage of validated data collected and analyzed as compared to the total data collected during the project.

Monitors are asked to collect data throughout the year. Monitoring is currently being performed bimonthly from May through August and monthly from September through April, totaling 16 samples per site per calendar year at all sites. However, it is assumed that some months may be missed due to vacations, illness, and severe weather. To minimize missed data events, volunteers who alone monitor a site are asked to notify the MPD in advance if the date will be missed. The MPD then works to find a replacement, and if none is found, the MPD monitors that site.

A complete data set has been initially set at 12 sampling events per year or 75% of the target number. At no time should two consecutive scheduled sampling events be missed for any one site. In this way the project can assure reasonable representativeness of conditions through seasonal and other variations over time. If less than 12 samples are taken from a site in a given year data from that site will be qualified when considering trend analysis in annual reports.

A8. TRAINING REQUIREMENTS / CERTIFICATION

Baseline Monitoring Regime

Volunteer monitor training for the AWC monitoring program involves five phases. Monitors receive a certificate upon completion of phases I through III. (Appendix B). Volunteers are re-certified upon successful completion of phase IV and Monitor Trainers are certified after completing phase V. Training sessions are conducted by the AWC Monitoring Program

Coordinator or by other AWC-Certified Monitor Trainers. Volunteer performance is evaluated during training and QC sessions. Trainers make note of each volunteer's precision and accuracy for all testing methods and comment on overall understanding of monitoring procedures and the watershed concept. Each volunteer's training history is recorded on the AWC Monitor Training Record forms (Appendix C) and kept on file at the AWC office.

Phase I: In two, three to four (3-4) hour sessions new volunteers are introduced to water quality testing kits and the watershed concept. Monitors are given extensive instructions on protocols for collecting samples and testing for each of the AWC's primary and secondary parameters. These sessions also include an explanation of logistical, safety and other factors associated with citizen involvement in the AWC monitoring program. Lectures, handouts, demonstrations and hands-on activities by participants are the primary tools used to train citizens in a laboratory setting. The CIK Environmental Monitoring Coordinator or an AWC-Certified Monitor Trainer evaluates volunteer performance and offers additional instruction as necessary to ensure that each volunteer is capable of performing all testing protocols. Open discussions are encouraged during all training sessions.

Phase II: This phase entails hands-on training to ensure that each volunteer monitor is capable of conducting the relevant sampling and testing protocols whether working alone or in a monitoring group in a typical field environment. Volunteers practice sampling, testing, and safety procedures in a field setting. Trainers emphasize the importance of safety, standardization of testing procedures, and chain-of-custody protocols throughout this participatory session. The average time for Phase II (Field) training is three to four (3-4) hours.

Phase III: Trainers work with each citizen volunteer and monitoring group to establish and maintain individual monitoring stations and to ensure accurate site location and documentation. In addition, this training session provides assurance that all required testing protocols are met for each designated monitoring site. The average time spent with volunteers in Phase III (Site) training is two to three (2-3) hours.

Additional on-site training sessions may be necessary before some individual monitors are allowed to proceed. Only fully oriented, trained and competent volunteers are encouraged to participate in monitoring site activities. The Project QC Coordinator or a Certified Monitor Trainer conducts periodic and regular oversight reviews of each monitoring station to ensure that citizen volunteers are comfortable with and competent to properly implement all components of the monitoring program. If improper procedures are observed if data are questionable the QC Coordinator will arrange to personally meet with the volunteer monitor to review their procedures. (See also Section 24, page 29).

Recertification (Phase IV): Once a trainee has successfully completed Phase I through Phase III and participated in gathering water quality data he/she is required to attend at least one quality control and re-certification session per year.

These follow-up workshops are scheduled once per year, and include replicate testing for each parameter to compare volunteer test results to those obtained by the Project QC Coordinator or a Certified Monitor Trainer as well as sharing of experiences, suggestions for improvement of the

CEMP, a laboratory practicum, and analysis of data collected by volunteers. The average time for the Phase IV Yearly Re-certification and Quality Control workshop is four (4) hours.

Advanced Training (Phase V): This level of training describes both advanced training for experienced monitors, who want to become Certified Monitor Trainers, as well as specialized training for new volunteers who will use discrete monitoring protocols.

Certified Monitor Training

The AWC offers an advanced level 'trainer of water quality volunteer monitors' workshop for these individuals. This 8-hour workshop teaches experienced monitors, and leaders of local organizations, to design and run their own volunteer water-monitoring training sessions coordinated with the AWC. Sessions include techniques in conducting Phase I - Phase III volunteer monitor training sessions, data collection, review, management and reporting, and quality assurance and quality control.

Discrete Monitoring Training

To prepare a volunteer, or staff member, to perform field work where water quality data will be gained through a state-certified analytical laboratory, the AWC uses training methods adopted from the "USGS National Field Manual for the Collection of Water-Quality Data."

This training is limited to volunteers who have previous field experience in water quality assessments, or laboratory procedures. Thus, any volunteer involved in the CEMP program is eligible. The training takes 4 hours and the following elements are covered:

- quality control sampling
- prevention of cross-contamination
- location of sampling at a site (always in-situ)
- Maintenance of field folders and computer files
- Logging of samples (both with the appropriate Chain of Custody form provided by the State Certified Water Quality Testing Lab as well as internal field sheets)
- Disposal of waste
- Sampling equipment maintenance

Each volunteer's training history for discrete sampling is kept on file at the AWC office (see Appendix C). The training takes place inside the AWC office as well as field locations and the State Certified Water Quality Testing Lab facility. Once volunteers or staff have demonstrated competency in these areas, then they are assigned to a pre-determined field sampling day. The QC Coordinator oversees the first sampling day to provide assistance and to double check the volunteers competency. Volunteers involved with field collection maintain field sheets, record their volunteer time and are reimbursed for mileage.

As part of every CEMP training program, the AWC provides all citizen volunteers with a copy of AWC's Volunteer Training Manual (Appendix D). This manual describes the monitoring process and outlines in detail test procedures, proper care and handling of equipment, safety precautions, and data reporting procedures. The CEMP Training Manual is the definitive

reference guide for volunteers to properly implement the CEMP. Copies of other informative references, including LaMotte's The Monitors Handbook and EPA's Volunteer Estuary /River/ Stream/Lake Monitoring: Methods Manual series are available for review by volunteer monitors. A water quality, hydrology and watershed education reference library is being established in the AWC office and specific information is available to volunteers to expand their knowledge of various aspects of water quality and the watershed concept.

A9. DOCUMENTATION AND RECORDS

All data gathered by AWC volunteers is recorded on site at the time sampling occurs using the AWC Monitor Data Sheet (Appendix E). Monitors are instructed to fill out Monitor Data Sheets legibly and completely and to use the decimal points provided when entering numeric information. (See Volunteer Training Manual, Section V, Sub-section F.)

Monitors are also instructed to use the comment section of the data sheet to report any problems or abnormalities with sampling procedures or equipment. (See Volunteer Training Manual, Section VI, Sub-section C under "Comments & Observations"). This form is then returned to the AWC office where the Project QC Coordinator, trained volunteer, and/or Program Director checks the data as described in Section 19 of this plan. Data are then entered in the AWC database for analysis. Once the STORET-compatible database is installed (expected Spring 2003), all data will then be uploaded to the STORET database at the end of each quarter. Original copies of all data sheets are kept on file indefinitely at the AWC office and copies are sent via mail or e-mail to the Keeper office. Volunteers are asked to make a copy of their data forms to be filed in a field notebook that is maintained by each monitoring team.

In addition to any written report, data collected for a project will be provided electronically to ADEC quarterly via a 3.5" diskette, CD-ROM, ZIP disk or Email ZIP file. Both the original application file and a comma delimited text file will be provided. The text file will be an ASCII (text) file, with fields separated by commas (comma de-limited; often "CSV") text enclosed in quotes. Spaces are not permitted between fields. Blank lines are not permitted in the file. All dates must be formatted as "MM-DD-YYYY".

Volunteers are instructed to send their data forms immediately after the date of collection so any data collection concerns can be addressed as quickly as possible. Volunteers are notified via a postcard if their data has not been received at the AWC office within thirty (30) days of the scheduled monitoring date. If problems are found with any information on the data form, a telephone call, letter or personal meeting is arranged with the Project QC Coordinator to clarify or rectify the concern.

Once a year, all compiled data is released to the public in the AWC's "State of the Creeks Report." The goal of the report is to not only communicate with the public regarding AWC activities, but also update the community on the condition of our watersheds. The report is organized into chapters determined by watersheds, some with information from more than one creek. Each chapter then identifies the issues surrounding the creeks, AWC activities on the creeks, and data collected by AWC volunteer monitors. The data is presented for each sampling

site in tabular and graphic form. Additionally, we provide an explanation of creek monitoring methods and parameters in Appendix A.

A CEMP Monitor Training Record is maintained for each volunteer monitor (Appendix C). These forms are used to record training attendance and volunteer performance. Original copies are kept on file at the AWC office indefinitely. Upon successful completion of training phases I through III volunteers receive a Certificate of Achievement (Appendix B). All volunteers, regardless of the sampling regime they volunteer for, fill out an application and receive a position description. These are kept on file at the AWC office.

Monitoring equipment and supplies are inspected upon receipt and again during QC sessions, and a Water Quality Kit Inspection Form (Appendix F) is kept up to date for each kit.

Bacteria Sampling Field forms are completed for discrete analytical sampling and kept on file indefinitely at the AWC office. Holding times for bacteria analysis are determined by the State Certified Water Quality Testing Lab, and all copied chain or custody forms are kept on file in the AWC office, while the originals are kept at the State Certified Water Quality Testing Lab. Hobo meters log data electronically which is downloaded to the computer files at the AWC office.

Measurement/Data Acquisition

B1. SAMPLING PROCESS DESIGN

Sample Site Selection

In order to obtain useful baseline inventory and monitoring information as described in Section 6, it is critical to select sampling sites, which are representative of the various hydrologic, geographic, biologic, land use, and other conditions within the watershed. Because of the variability and distribution of human population densities in the Municipality of Anchorage, site selection should ensure a balance between more impacted and less impacted areas. In the challenging transitional and sub-arctic climate of Southcentral Alaska, it is also necessary to select sites, which are safely and reasonably accessible. Before any site is selected, the TAC and ADEC are consulted on the site's appropriateness in terms of data gaps and future management plans. Finally, to maintain volunteer involvement, it is important to select monitoring sites in which volunteer team members have a personal interest.

Applying the above criteria, the AWC has established 24 freshwater sampling stations in 10 watersheds. These creek sites represent impacted and pristine sites, glacial and non-glacial creeks, and a variety of gradients and sizes. (See Appendix G for Sampling Station Map). Data collected from established project sites prior to approval of this QAPP is included in the CEMP data system and will be identified as such in annual reports.

Each site is given a name and identified by a site number and a location description as well as by its latitude, longitude and elevation as determined using USGS 1:63,360 scale topographical maps and/or on site GPS readings. Site selection for future monitoring within the Municipality will be based on similar factors.

Sites where discrete sampling occur are a selected subset of all baseline monitoring sites, consisting of three watersheds: Ship, Campbell and Chester Creeks. Sites where bacteria sampling occurs and hobos are dispatched were chosen based on their representativeness of the watershed. Because of financial constraints, there are more hobo meters deployed than sites identified for bacteria sampling.

Sites where monthly discrete sampling occur consist of two watersheds: Little Campbell and Little Survival. Site were chosen based on representativeness of entire watershed.

Sampling Parameters & Collection Frequency

As described in Section 6, testing parameters are selected based on their usefulness in inventorying water quality and projecting the general "health" of the water bodies in question. Due to cost concerns, only the more affordable sampling parameters have been selected to ensure the viability of long term monitoring. The baseline sampling parameters we use from the CEMP program for surface water testing include: water temperature, turbidity (clarity), pH, and dissolved oxygen; secondary parameters include: color, conductivity, total dissolved solids (TDS), and screening test for nutrients (nitrate-nitrogen and ortho-phosphate), and bacteria (E.coli, fecal coliform and total coliform). All samples are collected from freshwater systems and don't include soil, or any other matrix.

Baseline Surface water samples are taken at all monitoring stations monthly between September and April, and twice monthly from May through August for a total of 16 sampling events per site per year. The sampling period is designated as the last Sunday of each month (as well as the second Sunday of each month from May through August), plus or minus two days (i.e. Friday through Tuesday). The recommended time for sampling is 2:00 PM, and the time allowance range is from 1:00 PM to 5:00 PM. The predetermined time of 2:00 PM was chosen based off of other credible programs such as Texas watch and Casco Bay Keeper.

Discrete bacteria samples are taken three to four times in a 30-day period to determine a mean, depending on study design with the decision for which days to sample resting with the volunteer and the MPD. Selection of sampling days is dependent on a combination of factors, involving weather and availability and hours of operation of the State Certified Water Quality Testing Lab .

Monitors are assigned to teams of two or more volunteers with one volunteer monitor identified as the team leader. If volunteers cannot conduct a scheduled sampling, they are instructed to contact their team leader or the MPC as soon as possible so that an alternate monitor can be found.

The impact of rain events on water quality is a factor to be considered in the AWC program. Monitors are asked to maintain a regular monitoring schedule regardless of precipitation and to

document past and present weather conditions at the time of sampling. Given the climate of Southcentral Alaska it is likely that some sites may not be reasonably accessible on the appointed sampling date. The MPC will make efforts to reschedule samplings as weather allows but, since this may not always be possible, a total of 12 sampling events per year at any one site will be considered the minimum to be a complete set of data for that site. Table T-2 summarizes the water quality parameters currently monitored by the baseline program.

Site Safety Plans

Sampling sites are selected, in part, because they are safely accessible. AWC personnel make an effort to visit each selected site before sampling begins to locate safe access routes and identify any potential hazards. If sites, or access routes to sites, are located on private property, written permission from landowners is obtained prior to the first sampling event. Monitors are instructed to use safe access routes and warned of site-specific hazards.

Whenever possible, monitors are to conduct samplings as a team. In winter months, monitors are instructed to exercise caution in sampling sites with no direct road or winter trail access and not to sample when weather conditions are extreme. Monitors may, at times, be required to chop and maintain holes in ice covered fresh water sites but they are instructed not to monitor if ice conditions are such that monitors cannot conduct testing safely or if cold temperature is extreme.

Volunteers are provided with rubber gloves and are expected to wear them, as well as goggles or eyeglasses at all times during sampling and analysis. Monitors who must sample their sites by wading in from shore are instructed to wear rubber boots, and all monitors are advised to dress appropriately and be prepared for variable weather conditions, which may include wearing extra layers of warm clothing and waterproof outer gear during all seasons.

Volunteer safety is an integral part of monitor training and is covered in greater detail in Section IV of the Volunteer Training Manual (Appendix D).

B2. SAMPLING METHODS REQUIREMENTS

General Surface Water Procedures

Baseline

Regular volunteer sampling in the CEMP program involves ambient measurements collected and processed in the field with the following possible exceptions: 1) the titration phase of the dissolved oxygen test (when necessary, DO samples may be collected and fixed on-site, then titrated within six hours after collection); 2) the bacteria screening test (coliscan plating and incubation is done off site up to 6 hours after collection, and the Total Coliform and *E. coli* counting phases must be done 24 to 48 hours after plating), and 3) determination of nutrients (colorimetric tests for nitrates & phosphates may be performed up to 6 hours after collection). In the case of each of these parameters, samples temperature is maintained between +4°C to +10°C

during storage and data from samples with a holding times of greater than 6 hours will not be compared with data from samples held for less than 6 hours.

Monitors will sample freshwater sites that have been established using GPS equipment and/or USGS 1:63,360 scale topographical maps. These sites are routinely located using recognizable local natural features or nearby fixed structures. Preferably sites are located at easily identifiable features such as stream confluences or natural bends, bridges, piers, bulkheads, docks, etc.

All samples for baseline monitoring are taken from a bucket at the site, while all discrete monitoring samples are taken in-situ. Baseline water samples are collected using a 2 1/2 -gallon plastic bucket with an attached cord if necessary. Section VI, Sub-section D of the Volunteer Training Manual outlines sample collection procedures.

For reference Section VI, Sub-section E of the Volunteer Training Manual describes equipment and testing procedures for each parameter in complete detail. Types of sampling equipment is also outlined in Table T-2 and listed both in the Water Quality Test Kit Inspection Form (Appendix F) and in Section V, Sub-section E of the Volunteer Training Manual.

Discrete

Hobo temperature meters are deployed at pre-determined sites where volunteer monitoring is also occurring. A tree, or any fixed object in the water is used as an anchor and the meter itself is connected to this anchor by a plastic-coated cable. Data logged on the Hobo temperature meters is downloaded to the AWC database monthly.

Bacteria tests are taken according to protocols adopted from the USGS National Field Manual for the Collection of Water-Quality Data, most notably sections A4. Samples are collected with a sterile collection container and is discarded after one use. Samples are not taken directly from the site. The AWC QC Coordinator is responsible for taking corrective action. Sampling volumes are determined by the State Certified Water Quality Testing Lab and the holding time for both Fecal Coliform and Enterococci is 24 hours.

The AWC office and the SGS laboratory act as support facilities for this program.

B3. SAMPLE HANDLING AND CUSTODY REQUIREMENTS

At this time, baseline monitoring and testing procedures are routinely conducted by the AWC staff and volunteer monitors in the field. If any sample appears, at any time, to require additional testing in a laboratory, it will be handled following the discrete monitoring method for chain of custody procedure:

- Samples will be collected by the MPC and will be handled according the analytical laboratories Chain of Custody procedures.
- In the field, samples will be the responsibility of, and will stay with, AWC staff until relinquished to the laboratory

- Holding times are determined by the State Certified Water Quality Testing Lab and are currently 24 hours for bacteria

The CEMP commitment includes the investigation of additional testing. As other tests are identified which require different sample custody procedures, they will be specifically developed and added to this section.

B4. ANALYTICAL METHODS REQUIREMENTS

Baseline Sampling
Standard methods are used in accordance with the EPA and ADEC. Documentation of methods used, along with precision and accuracy information, is provided in Table T-2. Section V of the Volunteer Training Manual details the analytical methods and equipment used in monitoring each parameter. The AWC QC Coordinator is responsible for taking corrective action, where necessary (as described further in other sections).

Primary parameters [water temperature, turbidity, pH, & dissolved oxygen] are measured using standard EPA approved procedures and/or methods that are in use by established citizens volunteer monitoring programs (e.g., Friends of Casco Bay's Citizen's Water-quality monitoring Program and Texas Watch's Volunteer Environmental Monitoring Program).
Each of these procedures, as well as those used in measuring secondary parameters, is taken from the Volunteer Estuary/Lake/River/Stream Monitoring: A Method's Manual series published by USEPA. All methods used are consistent with those recommended by the test kit manufactures (LaMotte, Hanna, Hach and Micrology Laboratories).

Water Temperature
Water temperature is tested using two separate instruments:

1) Armored alcohol-filled thermometer factory calibrated against thermometer standards traceable to N.I.S.T. (The National Institute of Standards and Technology); Model 545; range -5.0°C to +50.0°C in 0.5°C increments -- LaMotte Chemical Products; Cat. No. 1066.

2) Hanna "Combo" Meter, wide range 0.0°C to 60.0 °C units in 0.1°C unit increments; accuracy ± 0.5°C -- Hanna Instruments 98129.

Turbidity
One or both of the following means test water clarity:

1) Water with a depth of greater than 3 meters is tested using a 20 cm diameter Secchi disk with black and white quadrants attached to a 30 meter calibrated stretch-resistant line marked at 0.5 meter intervals -- LaMotte Chemical Products; Cat No. 0171-CL.

2) Shallower water is tested using turbidity columns (Jackson Turbidity Tube with 25ml/50ml levels noted); range 0 JTU to 200+ JTU in 5 JTU increments;

accuracy ± 5 JTU -- LaMotte Chemical Products Cat No. 7519 and Standard Turbidity Reagents; Cat No. 7520.
Note: For ease in comparability, JTU correlate directly to the more commonly used Nephelometric Turbidity Units (NTU).

pH

pH is tested and verified in both of the following ways:

1) Octet color comparator test kits; wide range 3.0 to 10.0 pH units in 0.5 unit increments; accuracy ±0.4 pH units -- LaMotte Chemical Products; Cat. Nos. 2117/P-3100 (3.0 to 10.0 units) and 2110/P-CR (7.2 to 8.6 units).*

2) Hanna "Combo" Water Test Meter; wide range 0.0 to 14.0 pH units in 0.01 unit increments; accuracy ±0.01 units -- Hanna Instruments 98129.

Dissolved Oxygen

Volunteers use precision dissolved oxygen two phase (fixation and titration) test kits; azide modification of Winkler titration method; range 0 to 20 mg/l in 0.1 mg/l increments; reagents sufficient for 25 tests at 0 to 20 mg/l range; accuracy ± 0.3 mg/l -- LaMotte Chemical Products; Cat. No. 5856/XDO.

Color

Water color is monitored by describing the apparent color of sample water and comparing the color to numbered color chips in the Borger Color System booklet – LaMotte Chemical Products; Cat. No. 1580

Specific Conductance

Hanna "Combo" Water Test Meter; range from 0 to 3999 micro-seimens/cm in 1 micro-seimens/cm increments; accuracy ± 2% full scale units -- Hanna Instruments 98129.

Total Dissolved Solids

TDS is measured using a Hanna "Combo" Water Test Meter; wide range 0-2000 parts per million, in 1 ppm increments; accuracy ± 2% full scale units -- Hanna Instruments 98129

Nitrate-Nitrogen

Volunteers use a two tablet reagent Octa-Color Slide system to screen for nitrate-nitrogen from 0 to 20ppm (0 to 66ppm as nitrate); accuracy ± 0.5 ppm – LaMotte Chemical Products; Cat. No.3354.

Ortho-Phosphate

Monitors use ascorbic acid reduction and an Octet Comparator to screen for ortho-phosphate from 0 to 1.0ppm; accuracy ± 5%– LaMotte Chemical Products; Cat. No. 3121.

E. Coli and Total Coliform Bacteria

Analysis is conducted using the Coliscan screening technique developed by Micrology Laboratories.[1] . This method is currently in use by a number of volunteer monitoring

[1] Micrology Laboratories LLC. 1996. Coliscan ™**Easygel**™- *Procedures & Detection of Waterborne*

organizations (e.g., Washington State Dept. of Ecology, Lower Colorado River Authority-River Watch, Global River Environmental Education Network, Indiana Dept. of Natural Resources-River Watch).

Discrete Sampling

Fecal Coliforms
Analysis is conducted by the selected EPA/ADEC Certified Lab using the EPA-approved method for Fecal Coliform detection: SM 9222 D. The turnaround time for results is no more than 12 working days.

E Coli
Analysis is conducted by the selected EPA/ADEC Certified Lab using the EPA-approved method for Fecal Coliform detection: SM 9223B. The turnaround time for results is no more than 12 working days.

Total Coliforms
Analysis is conducted by the selected EPA/ADEC Certified Lab using the EPA-approved method for Fecal Coliform detection: SM 9223B. The turnaround time for results is no more than 12 working days.

Enterococci
Analysis is conducted by the selected EPA/ADEC Certified Lab using the EPA-approved method for Fecal Coliform detection: SM 9230 B. The turnaround time for results is no more than 12 working days.

Temperature
Water temperature is collected with the HOBO Water Temp Pro logger from Onset Computer Corporation. Each datalogger comes with a certificate of accuracy which verifies traceable calibration against NIST standards.

Method References

Table T-3 references the methods used for each testing parameter. Most methods used in this program are traceable to EPA approved or EPA recommended methods. For parameters where EPA approved methods are not in use, efforts will be made to obtain approval through use of EPA accepted comparability testing procedures. A complete discussion of sampling methods is found in the Volunteer Training Manual (Appendix D).

Coliforms and Fecal Coliforms, 6p. RCS, Goshen, Indiana

Table T-4: Methods Reference

Parameter	Method	Reference	Modification
Temperature	Thermometer	(a)	Alcohol-filled thermometer
	Electrometric	(b)	
pH	Colorimetric	(c)	
	Electrometric (Hanna)	(b)	
	Electrometric (Hach)	(d)	
Dissolved Oxygen	Azide Modified Winkler Titration	(e)	Micro method; 60 ml bottle
	Electrometric	(f)	
Salinity	Gravimetric	(g)	
Turbidity (Clarity)	Secchi Disk Depth	(h)	
	Jackson Turbidity	(c)	
	Electrometric	(i)	
Conductance	Electrometric	(b)	
Total Dissolved Solids	Electrometric	(b)	
Apparent Color	Borger Color System	(c)	
Nitrate-Nitrogen	Colorimetric	(c)	
Ortho-Phosphate	Colorimetric	(j)	
Coliforms (Total & E. coli)	"Coliscan"	(k)	

(a) U.S. EPA. 1979 (revised 1983). Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020. Method 170.1. Environmental Monitoring and Support Laboratory, Cincinnati, OH. ***In*** The Friends of Casco Bay. 1995 Quality Assurance Project Plan. Pg. 15. Friends of Casco Bay, South Portland, ME.

(b) Hanna Instruments. 1996. The Water Analysis Handbook. Hanna Instruments, Woonsocket, RI. ***And*** manufacturer's instructions.

(c) Campbell, G. & Wildberger, S. 1992. The Monitor's Handbook. LaMotte, Chestertown, MD.

(d) Eaton, A., Clesceri, L., & Greenberg, A. (Editors). 1995. Standard Methods for Examination of Water and Wastewater, (19th Edition). American Public Health Association, Washington, D.C. Method 2580-B.

(e) Eaton, A., Clesceri, L., & Greenberg, A. (Editors). 1995. Standard Methods for Examination of Water and Wastewater, (19th Edition). American Public Health Association, Washington, D.C. Method 4500-0C. ***And,*** Campbell, G. & Wildberger, S. 1992. The Monitor's Handbook. LaMotte, Chestertown, MD.

(f) Eaton, A., Clesceri, L., & Greenberg, A. (Editors). 1995. Standard Methods for Examination of Water and Wastewater, (19th Edition). American Public Health Association, Washington, D.C. Method 4500-0G. ***And,*** Campbell, G. & Wildberger, S. 1992. The Monitor's Handbook. LaMotte, Chestertown, MD. ***And*** manufacturer's instructions.

(g) U.S. EPA. 1993. Volunteer Estuary Monitoring: A Methods Manual. EPA-842-B-93-004. USEPA, Washington, D.C. ***And,*** Campbell, G. & Wildberger, S. 1992. The Monitor's Handbook. LaMotte, Chestertown, MD.

(h) U.S. EPA. 1991. Volunteer Lake Monitoring: A Methods Manual. EPA-440/4-91-002. USEPA, Washington, D.C. ***And,*** Campbell, G. & Wildberger, S. 1992. The Monitor's Handbook. LaMotte, Chestertown, MD.

(i) Eaton, A., Clesceri, L., & Greenberg, A. (Editors). 1995. Standard Methods for Examination of Water and Wastewater, (19th Edition). American Public Health Association, Washington, D.C. Method 2130-B. ***And,*** Campbell, G. & Wildberger, S. 1992. The Monitor's Handbook. LaMotte, Chestertown, MD. ***And*** manufacturer's instructions.

(j) U.S. EPA. 1997. Volunteer Stream Monitoring: A Methods Manual. EPA-841-B-97-004. USEPA, Washington, D.C. ***And,*** Campbell, G. & Wildberger, S. 1992. The Monitor's Handbook. LaMotte, Chestertown, MD. ***And*** manufacturer's instructions.

(k) Micrology Laboratories, LLC. 1996. Coliscan® for Coliform and Fecal Coliform Testing. Micrology Laboratories, Goshen, IN.

B5. QUALITY CONTROL REQUIREMENTS

Baseline Sampling
All monitors for each parameter perform replicate sample analysis during initial training and at annual QC sessions. The Project QC Coordinator or a Certified Monitor Trainer will perform replicate analysis at 10 to 20 percent of all sites (randomly selected) during each sampling period. Volunteer monitor accuracy for each parameter is determined by standard comparative analysis with results obtained by a Certified Monitor Trainer or the Project QC Coordinator. Variation of duplicate values for each parameter must not exceed the range of precision and accuracy specified in Table T-2. Any problems found with data collected by volunteer monitors are noted on the Monitor Data Sheet. The Project QC Coordinator or Certified Monitor Trainer initials any changes to the data. Data that do not meet project accuracy and precision objectives are not entered in the CEMP data system and will not be used in annual water quality analysis reports. The Project QC Coordinator is responsible for contacting monitors to determine the cause of data errors and arranging for monitor re-training if necessary.

As described in Section 7:

- Monitors are re-trained in a 4-hour recertification session for once a year for every year they monitor
- Blind samples and duplicates are taken at 10% of all sampling sites.
- Monitors fix and titrate three replicate samples for dissolved oxygen analyses during each sampling event and only those values which fall within the specified range for precision are entered into the CEMP data system.
- If the Project QC Coordinator determines that results of coliform bacteria screening tests are higher than expected for a particular site the Project QC Coordinator will arrange to re-sample that site. These samples will be split and the Project QC Coordinator will perform replicate analysis or an outside, EPA approved laboratory.
- Each sampling event for the selected EPA/ADEC Certified Lab bacteria includes one QC duplicate and trip blank.

B6. INSTRUMENT / EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

The Field Procedure Checklist describes the proper handling and maintenance of equipment. Proper equipment handling and maintenance is also emphasized during all training and QC sessions. Monitors are asked to contact the Project QC Coordinator if any equipment fails to operate properly.

All equipment, meters, and kits are checked upon receipt by the Project QC Coordinator to ensure that operations are within technical specifications before use. Each reagent bottle is dated with the expiration date prior to being issued. A Water Quality Test Kit Inspection Form (Appendix F), which includes reagent expiration dates, is completed for each kit and kept on file at the AWC office. This form is updated each time a kit receives new or replacement equipment

or reagents. Hanna "4-in-1" Water Test Meters are inspected quarterly by the Project QC Coordinator and maintenance logs are kept on each meter.

Before each sampling event volunteers are asked to inspect all equipment. Thermometers (air and water), bottles and test tubes, color comparators, hydrometer, droppers, and other related testing equipment are checked for cracks, breaks, or malfunctions. Chemicals are checked for expiration date, sufficient quantity and discoloration. All testing equipment is to be clean and in good working order before it is used for monitoring. If any equipment or chemical reagent is found to be defective in any way, monitors are instructed to contact the Project QC Coordinator for immediate replacement.

Equipment is also evaluated at annual QC sessions. Any faulty equipment or reagent is replaced and a new kit inspection form is created

The QC Coordinator maintains a supply of replacement equipment and reagents at the AWC office. This supply includes: one to two, assembled kits; all equipment and reagents needed to supply at least three additional kits; extras of commonly lost or broken equipment; enough reagents to re-supply all monitors for at least three months.

Requested replacements are picked up, hand delivered or sent by return mail in a timely manner. The quantity of reagent needed for most tests is anticipated to assure that monitors receive replacements before their supplies become exhausted, usually every 3 to 4 months. Reagent stocks are rotated out every four to six months or according to manufacturer's recommendation.

B7. INSTRUMENT CALIBRATION PROCEDURES

The Project QC Coordinator checks the calibration of the following instruments when they are received: thermometers and Hanna Combo Meters. Thereafter Hanna Meters are calibrated by volunteer monitors on the day of their sample event. Calibration of all monitoring equipment is checked in the course of training and biannual quality control sessions. Calibration of all instruments will be documented in an instrument calibration/maintenance log. If, at any time, there are data quality concerns which might be related to equipment error, monitors are asked to bring the equipment in question to the AWC office. Calibration procedures for each of the primary and secondary parameters are as follows:

Temperature

Thermometer calibration is checked against a thermometer that is certified against equipment whose calibration is traceable to the National Institute of Standards and Technology (NIST). This calibrating thermometer is supplied with a certificate of calibration with correction to the nearest 0.1^{o}C; range -1^{o}C to +51^{o}C in 0.1^{o}C increments – VWR Scientific, catalog #61054-503. Comparisons are made with the NIST thermometer for two different temperature solutions within the -1^{o}C to +51^{o}C range.

Temperature: Hobo Meters

Each Hobo meter comes with its own Certificate of Accuracy, which is kept on file, and describes the reference instrument, when it was calibrated, the results and other documentation.

Turbidity

The accuracy of turbidity measurements taken using Jackson Turbidity Tubes is checked during training and QC sessions and during random site visits. While JTU's do not correlate directly to Nephelometric Turbidity Units (the units of measurements used for regulatory purposes), this method is valuable as a screening parameter which can be evaluated for trends and as an indicator of runoff.

pH

Calibration of pH test kits is checked during training and QC sessions and at random site visits by comparative measurements against an electrometric pH meter. Hach, EC10pH/mV/Temp Meter, model 5005, range –2.00 to 19.99 pH units in 0.01 unit increments; accurate to ±0.05 units. In the field, monitors are asked to double check any samples that appear to match the lowest or highest readings on the narrow-range comparator by measuring a second sample against the wide-range comparator.

Hach 5005 pH meter is calibrated before each sampling event against standard pH buffer solutions (typical range 0.00 to 14.00 pH units in 0.01 unit increments; accuracy ±0.02 pH at 25 C/77 F) and pH buffer reference standards (4.01, 7.01, and 10.01 pH units) as applicable.

Dissolved Oxygen

Results obtained using precision dissolved oxygen test kits are compared to readings taken with a dissolved oxygen meter[2] during annual QC sessions and random site visits – LaMotte Chemical Products; model DO 4000, Cat. No. 1903; range 0 to 19.99 mg/l in 0.1 mg/l increments; accurate to ±0.1 mg/l.

LaMotte DO 4000 meter will be calibrated before each sampling event with water-saturated air.

Hanna Combo Water Test Meter

Hanna Meters are numbered upon receipt with a water proof marker and a calibration/ maintenance log is kept for each meter showing date of purchase and verifying condition and calibration prior to first use and at quarterly inspections thereafter.

Calibration and temperature compensation is automatic, while the EC / TDS conversion factor and temperature coefficient factor (ß) are user adjustable for application specific measurements

> **Temperature:** Calibrated against a thermometer that is certified against equipment whose calibration is traceable to the National Institute of Standards and Technology (NIST). This calibrating thermometer is supplied with a certificate of calibration with correction to the nearest 0.1^{o}C; range -1^{o}C to +51^{o}C in 0.1^{o}C increments – VWR Scientific, catalog #61054-503. Comparisons are made with the NIST thermometer for two different temperature solutions within the -1^{o}C to +51^{o}C range.
>
> **pH:** Calibrated against double point buffer reference standards (4.0 and 7.0 pH units).

[2] Ref: Ibid. Method 4500-OG

Conductance: Calibrated with manual double point trimmer using standard reference conductivity solutions (1413 µS/cm @ 25°C) corrected to temperature/conductance table printed on the standard solution label.

Total Dissolved Solids: Calibrated by conductivity method.

Nitrate/Nitrogen

Colorimetric test kit readings are checked during training and QC sessions and during random site visits using standard nitrate-nitrogen solutions. (nitrate-nitrogen concentrations of 1.0mg/l and 10.0mg/l)

Ortho-Phosphate

Results obtained with colorimetric test kits are checked during training and QC sessions and during random site visits using standard phosphorus solution. (ortho-phosphate concentration of 0.2mg/l)

Total & Fecal Coliform Screening

The accuracy of coliscan testing kits is verified when samples are split and sent to an outside, EPA approved laboratory for replicate analysis. Split samples will be sent for outside replicate analysis at the discretion of the QC Coordinator whenever coliform readings for a particular site are higher than expected levels.

B8. INSPECTION AND ACCEPTANCE REQUIREMENTS FOR SUPPLIES

Monitoring equipment and supplies are ordered from LaMotte Chemical Co., Hanna Instruments, Inc., the Hach Co. and Micrology Laboratories, and are inspected upon arrival by the Project QC Coordinator. A Water Quality Test Kit Inspection Form, (Appendix F) which includes reagent expiration dates is completed for each kit and kept on file at the AWC office. Broken bottles, incomplete kits and reagents or instruments that do not meet AWC standards are shipped back to the manufacturer for replacement.

B9. DATA ACQUISITION REQUIREMENTS

Required longitude and latitude information for monitoring sites is derived by using USGS topographic maps at 1:63,360 or by using GPS coordinates taken at the site by AWC personnel. Sites are plotted and spatially checked using a Geographic Information System (GIS) computer-mapping program (ArcView) by AWC. This information is used by the Citizens Environmental Monitoring Program to identify monitoring sites and assign site names and numbers for entry into the CEMP data system.

Data gathered from sources other than CEMP monitors are used for information only and not for data entry into the CEMP data system or for decision making. Therefore, quality assurance of

acquired data is not considered in this QAPP. Standards for evaluating water quality have been taken from state and federal water quality standards as applicable.

B10. DATA MANAGEMENT

Volunteer monitors collect and report data on the AWC Monitor Data Sheets (Appendix E) provided by the Citizens' Environmental Monitoring Program. All observational data, water quality data and field measurements are recorded at the time of sampling and analysis. Data sheets are signed by all monitoring team members. Monitor teams are instructed to retain a copy of their data sheets in an organized file and send the original data sheet to the Environmental Monitoring Coordinator at the AWC office immediately after each sampling event. The purpose of these volunteer team data files is to prevent potential loss of data and to facilitate discussion of any questions that should arise regarding reported data. Volunteer data files are collected and reviewed for completeness during biannual QC sessions

Data sheets are reviewed by the Project QC Coordinator for decimal point errors, precision, completeness, anomalous data, and general problems. Monitors are contacted by phone to answer questions about data that appear to be in error or don't fall within the expected range. Contact with the volunteers regarding data problems is the responsibility of the Project QC Coordinator.

After adjustment and review, the Project QC Coordinator is responsible to see that data are accurately entered into the CEMP data system. This system is accessed by a network of PC's in AWC office and consists of a relational database in MS Access (see Appendix I for example of Access data entry form). As an additional quality control, the database is designed to flag values which do not fall within the normal expected range for each parameter.

Data are reviewed quarterly by the Project QC Coordinator, and will be presented each May in an annual report (see Section 21). In the future, data will also be made available on the AWC web site, which will include interactive ArcView software so that site information can be visually related to site location. Computer data records as well as original data sheets are maintained at the AWC office indefinitely.

Additionally, once the STORET compatible database is installed (expected Spring 2003), all data entered will then be uploaded to the STORET database at the end of each quarter.

Hobo deployment, and identification is recorded in excel, while the Box Car Pro software is used to download and display temperature results.

Assessments and Oversight

C1. ASSESSMENTS AND RESPONSE ACTIONS

Volunteer monitors are required to attend the CEMP training program (see Section 8) and complete minimum training requirements before monitoring. Each volunteer's training history, including comments on performance during training sessions, is recorded on a CEMP Monitor Training Record (Appendix C) and kept on file at the AWC office.

As described in Section B5, the Project QC Coordinator or a Certified Monitor Trainer performs replicate analysis at randomly selected sites during each sampling period. Blind samples and duplicates are taken at 10% of all sampling sites. If problems are found with data collected by volunteer monitors, the Project QC Coordinator contacts them to ensure that proper procedures are being adhered to and/or makes arrangements for monitor retraining.

The activities included in QC sessions constitute performance and system audits. Two QC sessions are conducted each year by the Project QC Coordinator. Monitors are required to attend at least one QC session annually. Results of QC exercises conducted at these sessions provide a measure of how well monitors perform individually and as a group. Data collected at QC sessions is used to assess the accuracy and precision of the data collected in this program. If accuracy and precision goals are not being met, QC sessions will be scheduled more frequently.

As described in Section 19, all monitor data sheets are reviewed by the Project QC Coordinator and the Program Director before data are entered into the CEMP data system. The database program is designed to detect anomalous values and quarterly data reviews are performed by the Project QC Coordinator and Program Director to detect deficiencies. If problems are discovered with data quality or management, it is the responsibility of the Project QC Coordinator to address them in a timely manner.

Procedures for inspection, acceptance, calibration and maintenance of equipment and supplies are described in detail in Sections 15, 16 and 17. If problems with data quality are traceable to equipment failure, inspection, calibration and maintenance will be scheduled more frequently.

The Technical Advisory Committee and CEMP partnership will review this QAPP and the overall project design annually and may suggest procedural refinements or additional testing procedures. This may include new parameters to be measured (such as macro invertebrates*, heavy metals, hydrocarbons and sediments) or changes to procedures currently in use. Any such changes will be subject to EPA and ADEC approval. The project is open to EPA or ADEC system audits at their discretion.

*See the AWC's companion QAPP for Citizen Rapid Bioassessment, on file with the ADEC

C2. REPORTS

Annual reports will be produced in May of each year and will describe activities during the previous calendar year. These reports will consist of data results, interpretation of data, information on project status, volunteer highlights, results of QC audits and internal assessments.

The Project Officer is responsible for report production and distribution. Annual reports will be forwarded to ADEC, and all other parties listed in Section 3 of this document as well as to the AWC Board of Directors, the Technical Advisory Committee and all volunteer monitors. Summaries of all reports, highlighting the assessment results, project status and volunteer achievements will be distributed to the AWC members and be available to the general public.

In the future, the AWC web site will include continually updated monitoring data displayed in conjunction with interactive ArcView software. Data users will have quick access to current water quality information. They will be able to locate monitoring sites and relate them to possible sources of pollution.

Data Validation and Usability

D1. DATA REVIEW, VALIDATION AND VERIFICATION REQUIREMENTS

All data collected by the Citizens Environmental Monitoring Program will be reviewed by the Project QC Coordinator to determine if the data meet QAPP objectives. Decisions to reject or qualify data are made by the Program Director and/or the Project QC Coordinator. Data that does not fall within the generally expected ranges is further reviewed for adherence to sampling and calibration protocols. Data may be rejected for non-adherence to sampling and calibration protocols or qualified if site conditions warrant values outside the expected ranges.

D2. VALIDATION AND VERIFICATION METHODS

Monitor data sheets must be filled out completely and signed by all monitors present at the time of sampling and analysis. The Project QC Coordinator and the Program Director check each data sheet for precision, missing or illegible information, errors in calculation and values outside of the expected range. If questions arise, monitors are contacted for clarification. The Project QC Coordinator is responsible for ensuring that maintenance and calibration records show all monitoring equipment in use to be in compliance with the requirements of this QAPP (see Sections 15, 16, & 17). The Program Director ensures that all monitors listed on the data sheet have completed required training for the parameters tested and have attended at least one QC session within the past year (see section 8). When review is complete and any questions have been resolved, each data sheet is signed and dated by the Project QC Coordinator and the Program Director. If data quality questions cannot be adequately resolved, data will not be entered into the CEMP data system and the Project QC Coordinator will arrange for corrective

measures (i.e. monitor re-training, equipment re-calibration, etc.). Any changes made to data are initialed, and any action taken as a result of the data review is specifically recorded on the data sheet below the reviewers' signatures.

Data is then entered into the CEMP data system which is designed to flag any values which fall outside of the expected range for each parameter. On a quarterly basis the Project QC Coordinator prints out the data and proof reads it against original data sheets. Errors in data entry are corrected and inconsistencies are flagged for further review. Data will be presented annually using graph and report formats to document baseline water quality, identify trends and detect deficiencies in data collection or program design.

Annual reports will include discussion of any data quality problems and will be distributed to all data users (see Section 20). Members of the Technical Advisory Committee will be asked to review these reports and offer suggestions for improving the Citizens' Environmental Monitoring Program.

D3. RECONCILIATION WITH USER REQUIREMENTS

Calculations and determinations for precision and completeness are made by the Project QC Coordinator and Program Director during the initial data sheet review process (see Sections 19, 22 & 23) and at biannual QC sessions. Calculations of data accuracy are made during random site visits and at annual QC sessions; as described in Sections 8, 14 & 20, replicate analysis is performed at these times and values recorded by volunteer monitors are compared with those obtained by the Project QC Coordinator or a Certified Monitor Trainer. Results of precision, accuracy and completeness calculations are recorded on monitor data sheets and will be included in annual reports.

Data collected with both baseline and discrete sampling protocols are generally intended to serve as screening data that may indicate areas that require more refined methods.

If data quality indicators do not meet program specifications (see Table T-2) data will not be entered in the CEMP data system and will not be used in annual report. The cause of failure will be evaluated. If the cause is found to be equipment failure, calibration and maintenance procedures will be reassessed and improved. If the problem is found to be monitor error, monitors will be retrained. If accuracy and precision goals are frequently not being met QC sessions will be scheduled more often.

If failure to meet program specifications is found to be unrelated to equipment, methods, or monitor error, specifications may be revised. Revisions to this QAPP will be submitted to the designated state ADEC Project Manager and Quality Assurance Officer for approval.

APPENDIX A

ANCHORAGE WATERWAYS COUNCIL

Technical Advisory Committee

MEMBER LIST

Anchorage Waterways Council

Technical Advisory Committee

MEMBER LIST

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APPENDIX B

ANCHORAGE WATERWAYS COUNCIL

Water Quality Monitor

Monitor Training Records

CEMP MONITOR TRAINING RECORD

NAME: _____

ADDRESS: _____

CITY: _____ ZIP: _____

TELEPHONE: HOME: _____ WORK: _____

EMAIL: _____

ORIENTATION DATE: _____ MEANS OF INITIAL CONTACT:_____

PHASE I: LAB (PARAMETER DEMONSTRATIONS): DATE: _____

	Parameters Covered		Initials	Comments
I-A	**temperature**	yes/no	_____	_____
	pH	yes/no	_____	_____
	dissolved oxygen	yes/no	_____	_____
	clarity (turbidity)	yes/no	_____	_____
	salinity	yes/no	_____	_____
I-B	**color**	yes/no	_____	_____
	conductivity	yes/no	_____	_____
	ORP	yes/no	_____	_____
	fecal/total coliform	yes/no	_____	_____
	nutrients (nitrate/phosphate)	yes/no	_____	_____
I-C *	*heavy metals ( )*	*yes/no*	_____	_____
	" " ( )	*yes/no*	_____	_____
I-D *	*hydrocarbons ( )*	*yes/no*	_____	_____
	" " ( )	*yes/no*	_____	_____
I-E +	*Macro invertebrates*	*yes/no*	_____	_____
I-F *	*Water Habitat Surveys( )*	*yes/no*	_____	_____

Comments: _____

_____

_____

_____

Trainer: _____ _____

Print Name Signature

+Macro invertebrates are currently part of the CEMP under Citizen Rapid Bioassessment.

- ***These parameters are not currently part of the CEMP, but may be added at a later date.***

CEMP MONITOR TRAINING RECORD

NAME: _____

ADDRESS: _____

CITY: _____ ZIP: _____

TELEPHONE: HOME: _____ WORK: _____

EMAIL: _____

ORIENTATION DATE: _____ MEANS OF INITIAL CONTACT:_____

PHASE II: FIELD (HANDS-ON TRAINING): **DATE:** _____

	Testing Procedures Covered		Initials	Comments
II-A	**temperature**	yes/no	_____	_____
	pH	yes/no	_____	_____
	dissolved oxygen	yes/no	_____	_____
	clarity (turbidity)	yes/no	_____	_____
	salinity	yes/no	_____	_____
II-B	**color**	yes/no	_____	_____
	conductivity	yes/no	_____	_____
	ORP	yes/no	_____	_____
	fecal/total coliform	yes/no	_____	_____
	nutrients (nitrate/phosphate)	yes/no	_____	_____
II-C *	*heavy metals ( )*	*yes/no*	_____	_____
	" " ( )	*yes/no*	_____	_____
II-D *	*hydrocarbons ( )*	*yes/no*	_____	_____
	" " ( )	*yes/no*	_____	_____
II-E	*Macro invertebrates*	*yes/no*	_____	_____
II-F *	*Water Habitat Surveys( )*	*yes/no*	_____	_____

Data Recording & Entry: _____

Comments: _____

_____

_____

_____

Trainer: _____ _____
Print Name Signature

**** These parameters are not currently part of the CEMP, but may be added at a later date.***

CEMP MONITOR TRAINING RECORD

NAME: _____

ADDRESS: _____

CITY: _____ ZIP: _____

TELEPHONE: HOME: _____ WORK: _____

EMAIL: _____

ORIENTATION DATE: _____ MEANS OF INITIAL CONTACT:_____

PHASE III: ON-SITE (TRAINING & CHECK-OUT) **DATE:** _____

Site name: _____
(Attach Site Photographs if Available)
Site Location: _____GPS Reading: _____

Narrative: _____

_____

GPS Reading: _____

Team Members: _____

_____

Tests Performed: _____

_____

ACTIVITY	RATING (circle one) (1=Great 5=Retest Needed)
Knowledge of Test Kit Contents	1 2 3 4 5
Execution of Sampling & Testing Protocols	1 2 3 4 5
Knowledge & Execution of Safety Issues	1 2 3 4 5
Data Recording & Entry	1 2 3 4 5

Comments: _____

_____

Areas Needing Attention: _____

_____

THE AWC Volunteer Water Quality Monitor _____ is hereby certified to conduct surface water sampling and testing in accordance with the protocols and procedures approved by Anchorage Waterways Council. This certification remains in effect for two years from this date.

Trainer: _____ _____
Print Name Signature

_____
Date of Certification

CEMP MONITOR TRAINING RECORD

NAME: _____

ADDRESS: _____

CITY: _____ ZIP: _____

TELEPHONE: HOME: _____ WORK: _____

EMAIL: _____

ORIENTATION DATE: _____ MEANS OF INITIAL CONTACT:_____

PHASE IV: YEARLY (Training and Re-certification) WORKSHOP:

LOCATION or SITE NAME: _____ DATE:_____

Testing Procedures Covered			Initials	Comments
IV-A	**temperature**	yes/no	_____	_____
	pH	yes/no	_____	_____
	dissolved oxygen	yes/no	_____	_____
	clarity (turbidity)	yes/no	_____	_____
	salinity	yes/no	_____	_____
IV-B	**color**	yes/no	_____	_____
	conductivity	yes/no	_____	_____
	ORP	yes/no	_____	_____
	fecal/total coliform	yes/no	_____	_____
	nutrients (nitrate/phosphate)	yes/no	_____	_____
IV-C *	*heavy metals ( )*	*yes/no*	_____	_____
	" " ( )	*yes/no*	_____	_____
IV-D *	*hydrocarbons ( )*	*yes/no*	_____	_____
	" " ( )	*yes/no*	_____	_____
IV-E	*Macro invertebrates*	*yes/no*	_____	_____
IV-F *	*Water Habitat Surveys( )*	*yes/no*	_____	_____

*THE AWC Volunteer Water Quality Monitor _____ is hereby re-certified to conduct **Water-quality monitoring** for the CEMP in accordance with the protocols and procedures approved by the Anchorage Waterways Council. This certification remains in effect until one year from the date below.*

Trainer: _____ _____
Print Name Signature

**** These parameters are not currently part of the CEMP, but may be added at a later date.***

CEMP MONITOR TRAINING RECORD

NAME: _____

ADDRESS: _____

CITY: _____ ZIP: _____

TELEPHONE: HOME: _____ WORK: _____

EMAIL: _____

ORIENTATION DATE: _____ MEANS OF INITIAL CONTACT:_____

PHASE V TRAINER OF VOLUNTEERS WORKSHOP Date: _____

ACTIVITY	RATING (circle one) (1=Great 5=Retest Needed)
Knowledge of WQ Test Kit Contents	1 2 3 4 5
Execution of Sampling & Testing Protocols	1 2 3 4 5
Knowledge & Execution of Safety Procedures	1 2 3 4 5
Knowledge of WQ Data Recording & Entry	1 2 3 4 5
Presentation & Teaching Skills	1 2 3 4 5
Watershed Concept Knowledge	1 2 3 4 5
Water Quality Advocacy	1 2 3 4 5

Comments: _____

_____

_____

_____

Areas Needing Attention: _____

_____

*THE AWC Volunteer Water Quality Monitor _____has attended and completed the **Trainer of Water Quality Volunteer's Workshop** and is hereby certified to conduct "Water Quality Training for Volunteers" for CEMP in accordance with the protocols and procedures approved by the Anchorage Waterways Council. This certification remains in effect for two years from this date.*

Trainer: _____ _____

Print Name Signature

_____

Date of Certification

Discrete Monitoring
Volunteer Training Record

NAME: _____
ADDRESS _____
CITY: _____ ZIP: _____
TELEPHONE: HOME: _____ WORK: _____
EMAIL: _____ TRAINING DATE: _____

Type of Monitoring: _____

ACTIVITY	RATING (circle one) (1=Great 5=Retest Needed)
Knowledge of WQ Sampling Equipment	1 2 3 4 5
Execution of Sampling Protocols	1 2 3 4 5
Knowledge & Execution of Safety Procedures	1 2 3 4 5
Knowledge of WQ Data Recording & Entry	1 2 3 4 5
Cross-contamination prevention skills	1 2 3 4 5

Comments:
_____
_____
_____
_____
Areas Needing Attention: _____
_____

AWC Volunteer _____ has completed 4 hours of training for discrete monitoring and is hereby certified to conduct _____ sampling in accordance with the protocols and procedures approved by the Anchorage Waterways Council. This certification remains in effect for two years from this date.

Trainer:
_____ _____
Print Name Signature

_____
Date of Certification

APPENDIX C

ANCHORAGE WATERWAYS COUNCIL

Citizens Environmental Monitoring Program

VOLUNTEER TRAINING MANUAL

(see enclosed manual)

APPENDIX D

ANCHORAGE WATERWAYS COUNCIL

Water Quality Test Kit

INSPECTION FORM