PEBBLE PROJECT
ENVIRONMENTAL BASELINE DOCUMENT
2004 through 2008

CHAPTER 33.
SURFACE WATER QUALITY AND SEDIMENT, FRESH WATER
Cook Inlet Drainages

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
ADEC	Alaska Department of Environmental Conservation
BEESC	Bristol Environmental & Engineering Services Corporation
CALC	chronic aquatic life criterion(ia)
cm	centimeter(s)
DWS	drinking water standard(s)
EBD	environmental baseline document
EPA	U.S. Environmental Protection Agency
L	liter(s)
MDL	method detection limit
mg	milligram(s)
MRL	method reporting limit
mV	millivolt(s)
NGS	National Geochemical Survey
NURE	National Uranium Resource Evaluation
PQL	practical quantitation limit
QA	quality assurance
QC	quality control
RASS	Rock Analysis Storage System
TDS	total dissolved solids
USGS	U.S. Geological Service
WAD cyanide	weak acid dissociable cyanide
µg	microgram(s)
µmhos	micromhos

33. SURFACE WATER QUALITY AND SEDIMENT—FRESH WATER

33.1 Introduction

This chapter presents the findings of the 2004 through 2007 surface water quality study in the Cook Inlet drainages for the Pebble Project. This study was conducted by Bristol Environmental & Engineering Services Corporation (BEESC).

33.2 Study Objectives

The objective of the surface-water quality study was to characterize the constituent characteristics of freshwater streams within the Cook Inlet study area.

33.3 Study Area

The study area encompasses that portion of the transportation corridor that is within the Cook Inlet drainages (Figure 33-1). The transportation-corridor, Cook Inlet drainages study area is generally bounded by the drainage divide between Bristol Bay and Cook Inlet drainages in the west and Iliamna and Iniskin bays to the east. The study area is more specifically defined by the location of the sampling stations as depicted in Figure 33-1.

33.4 Previous Studies

The U.S. Geological Survey (USGS) conducted several soil sampling programs in the Iliamna Lake region over the past several decades. These programs, including the National Uranium Resource Evaluation (NURE), the Rock Analysis Storage System (RASS), and the National Geochemical Survey (NGS) were intended primarily to help identify mineral resources. However, several of the analytes of interest in these programs (including arsenic, chromium, mercury, lead, zinc, and other metals) are also important for water quality characterization

Relatively high detection limits, low analytical precision, and the lack of details available on sampling techniques make the results from these USGS programs very limited as a comparative or historical database to incorporate into the surface water quality and sediment study for the transportation corridor.

33.5 Scope of Work

Field studies were conducted according to the approach described the consolidated study program for the Pebble Project (Appendix E of this environmental baseline document [EBD]). In 2004 and 2005, water quality sampling stations were established on streams in the Cook Inlet drainages study area (stations GS-21 and GS-22). Station GS-21 was established in August 2004 and was sampled monthly in August through October of that year. In 2005 samples were collected eight times at station GS-21—in February,

March, and monthly in May through October. In July 2005, stations GS-22, PSC and PSD was added to the study. Station GS-22 was sampled four times from July through October 2005; stations PSC and PSD were sampled once in July 2005. In August 2006 and October 2007, surface water quality stream sediment samples were collected from four additional locations in the Cook Inlet drainages: stations SWQ1, SWQ2, SWQ3, and SWQ4. Sample station locations are shown on Figure 33-1.

33.6 Methods

33.6.1 Site Selection

Freshwater streams listed in the *Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes — Southwestern Region* (Johnson and Weiss, 2006) were selected for sampling. Streams were also selected to coincide with the fish study conducted for the Pebble Project, and exact sample locations along the stream were chosen to coincide with baseline stations used for the hydrology study.

33.6.2 Groundwater Sampling Methods

The consultant conducted field sampling in accordance with the consolidated study program for Pebble Project (Appendix E) and the field sampling plan (Appendix F). Quality Assurance/Quality Control (QA/QC) protocols followed procedures outlined in the Quality Assurance Project Plan (Appendix G). The consultant coordinated closely with the water quality sampling consultants for the mine study area to ensure that the procedures followed in the two study areas were consistent. Photographs of field personnel conducting surface water sampling are included in the photographs sections of this chapter.

33.6.3 Data Analysis

Analytical and field parameter data for 2004 through 2007 sampling events are summarized in tables and in graphs included in the appendices to this chapter. Analytical data for the surface water samples are presented in Appendix 33A. Field parameter data (temperature, pH, dissolved oxygen and specific conductivity) and hydrographs are presented graphically in Appendix 33B for stations GS-21 and GS-22. Graphs of major ions for the surface water samples are presented in Appendix 33C for stations GS-21 and GS-22. A piper diagram of the major ions is presented in Appendix 33D. Stations PSC, PSD, and SWQ1-4 only had one or two analytical data points and therefore were not graphed for field parameter data, hydrographs, or major ions. Select trace elements are presented graphically in Appendix 33E for stations GS-21 and GS-22, and SWQ1-4. Stations PSC and PSD had only one sample collected from each station and therefore the trace element data was not graphed. Analytical results for all stations were combined in order to calculate the average concentration for each parameter.

Only primary sample data were used for analyses in this EBD. Duplicate and triplicate sample data were only used for evaluation of precision. Only sample locations from which analytical data were collected were included in the evaluation. Both field and laboratory data were available for pH and specific conductivity; but only field pH and specific conductivity data were incorporated into the quantitative evaluation because these measurements are more representative of field conditions than laboratory pH data.

General statistics were compiled for each dataset, including the following parameters:

- Minimum and maximum detected concentrations.
- Sample-specific minimum and maximum method detection limits (MDLs) and method reporting limits (MRLs).
- Number of results detected.
- Number of samples analyzed.
- Frequency of detection.
- Arithmetic average and median concentrations.
- Standard deviations and coefficients of variation.

Non-detect results were included for statistical summaries as one-half the MDL, and non-detect results were included as one-half the MRL. For all other statistical analyses, only detected concentrations were included to avoid skewing the datasets based on multiple non-detect values. Statistical summary tables for the Cook Inlet drainages are provided in Tables 33-1 through 33-5.

The summary statistics listed on the tables in Appendix 33A highlight values that are undetected, results that exceed water quality criteria, and results reported by the laboratory as being below the MRL, which is also referred to in the appendices as the practical quantitation limit (PQL). Only validated data were used in the summary tables and graphs. See Appendix A, Analytical Data QA/QC, for a data quality assessment.

At the time of sample collection, the following field parameters were measured and recorded in 2004 and 2005:

- Dissolved oxygen.
- pH.
- Specific conductivity.
- Water temperature.
- Stream discharge.

In 2006 and 2007, the same set of field parameters were measured, except for stream discharge.

Data reduction and outlier analysis are discussed in Section 9.0. The results of the outliers analysis are presented in Appendix 33A for this data set.

33.7 Results and Discussion

This section discusses and summarizes the field parameter data and qualified laboratory analytical results for surface water samples and sediments collected in 2004 through 2007 in the Cook Inlet drainages.

For most parameters, the relevant and most stringent water quality criteria are established by the Alaska Department of Environmental Conservation (ADEC) as chronic aquatic life criteria (CALC) for fresh water or as drinking water standards (DWS).

33.7.1 Field and Physical Parameters, Surface Water

33.7.1.1 Total Dissolved Solids

The results of the analyses of total dissolved solids (TDS) in samples from stations in the Cook Inlet drainages were generally low (Appendix 33A). The TDS mean concentration value was 33 milligrams per liter (mg/L) and ranged from undetected to 124 mg/L. All TDS results were well below the ADEC DWS of 500 mg/L. Low concentrations of dissolved solids such as these are representative of basins containing thin soils and rocks that are not easily dissolved or of water that has had only brief contact time with more easily dissolved rocks.

33.7.1.2 pH

The field pH values found in this study ranged from 2.8 to 8.36 with an average pH of 6.12 (Appendix 33A). Fourteen of the 24 surface water samples had a pH lower than the CALC value of 6.5.

The pH values measured in August 2006 at stations SWQ1, SWQ2, SWQ3, and SWQ4 were between 5.05 and 7.33; however, in October 2007, pH at these same four stations measured between 2.8 and 4.74. Measurements were only collected twice from these stations, and no other stations were sampled in 2006 and 2007 from the transportation corridor study area. Although the values are considerably different between these two sampling events, the pH meter was calibrated correctly and appeared to be working for both events. Several other parameters had noticeable differences between the two events as well.

33.7.1.3 Dissolved Oxygen

Dissolved oxygen concentrations in this study had a mean value of12.46 mg/L and ranged from 9.44 to 15.47 mg/L (Appendix 33B). Dissolved oxygen concentrations varied seasonally; the highest concentration was measured in winter (February, 2005), while the lowest concentrations were measured in late summer to fall (August).

33.7.1.4 Water Temperature

Ranges in water temperature in the study area appear to be highly seasonal as based on the data from the one station that was sampled throughout all four seasons. Station GS21 was sampled in February and April of 2005 and then monthly from May through October 2005. There were additional monthly samples for August through October of 2004. The coldest water temperatures recorded at Station GS21 were during the months of April and February, when stream temperatures were 1.05 and 1.80 degrees Celsius (°C), respectively (Appendix 33B), with a mean value of 1.43°C. The warmest water temperatures recorded at station GS21 were during July through September, when the mean stream temperature was 9.5°C and ranged from 7.6°C to 14.6°C. For all other stations, data was limited to July through October; the highest temperature value among all of the stations was 15.25°C.

33.7.1.5 Specific Conductance

Values for field specific conductance ranged from 10 to 1,094 microsiemens per centimeter (µS/cm; Appendix 33B). The highest specific conductance values were measured in fall (September and October), while the lowest values were typically measured in early summer (June and July).

33.7.1.6 Total Suspended Solids

Values for total suspended solids ranged from undetected to 3.2 mg/L, with a mean value of 1.1 mg/L (Appendix A).

33.7.1.7 Summary of Field and Physical Parameters

In summary, surface water within the Cook Inlet drainages was characterized by low TDS, average pH below the lower CALC value of 6.5, DO typically greater than 10 mg/L, seasonally variable temperatures, seasonally variable specific conductance, and low TDS.

33.7.2 Major Ions

Water samples were collected and analyzed for major ions, which are primarily derived from soil and rock weathering. Dissolved cations that constitute a majority of the dissolved solids content in natural waters are calcium, magnesium, sodium, and potassium; the major anions are usually represented by sulfate, chloride, fluoride, nitrate, and alkalinity (as calcium carbonate; Hem, 1985). Total and dissolved major ions concentrations are shown graphically for each station in Appendix 33C. Streams draining basins with rocks and soils containing insoluble minerals contain lower concentrations of dissolved solids.

33.7.2.1 Calcium

Calcium is usually the dominant positively charged ion in most natural waters (Hem, 1985). Total calcium concentrations in samples from this study had a mean value of 5.5 mg/L and ranged from 0.55 to 13.4 mg/L. Dissolved calcium concentrations had a mean value of 5.4 mg/L and ranged from 0.48 to 13.6 mg/L (Appendix 33A).

33.7.2.2 Magnesium

Total magnesium concentrations had a mean value of 0.40 mg/L and ranged from undetected to 1.62 mg/L. Dissolved magnesium had a mean value of 0.40 mg/L and ranged from undetected to 1.9 mg/L (Appendix 33A).

33.7.2.3 Sodium

Sodium is present in all natural waters but usually in low concentrations in rivers. The total sodium concentrations in this study had a mean value of 1.8 mg/L and ranged from undetected to 11.3 mg/L. Dissolved sodium had a mean value of 1.9 mg/L and ranged from 0.95 to 13.4 mg/L.

33.7.2.4 Potassium

Potassium, an essential element for both plants and animals, is abundant in nature but rarely occurs in high concentrations in natural waters (Hem, 1985). The total potassium concentrations in this study had a mean value of 0.27 mg/L and ranged from undetected to 0.71 mg/L (Appendix 33A). Dissolved potassium had a mean value of 0.26 mg/L and ranged from undetected to 0.78 mg/L (Appendix 33A).

33.7.2.5 Alkalinity

All but one surface water sample was found to have alkalinity concentrations less than 20 mg/L (Appendix 33A). The alkalinity concentrations had a mean value of 11 mg/L and generally ranged from undetected to 17.0 mg/L, with one additional high value of 28 mg/L. These alkalinity concentrations indicate that the water has a low buffering capacity and limited availability of inorganic carbon.

33.7.2.6 Sulfate

The mean value for the sulfate concentrations in this study was 3.9 mg/L, and the concentrations ranged from undetected or below the MRL to 12.5 mg/L (Appendix 33A).

33.7.2.7 Chloride

Chloride concentrations in this study had a mean value of 1.9 mg/L and generally ranged from undetected or below the MRL to 1.8 mg/L, except for one sample of 19.9 mg/L (Appendix 33A).

33.7.2.8 Fluoride

Fluoride concentrations were undetected or below the MRL for all samples in this study (Appendix 33A).

33.7.2.9 Hardness

Hardness concentrations in this study had a mean value of 16 mg/L and ranged from undetected to 35.4 mg/L (Appendix 33A).

33.7.2.10 Summary of Major Ions

No seasonal variations of the major ion concentrations were observed in the study area as based on the data from the one station (GS21) that was sampled throughout all four seasons. Station GS21 was sampled in February and April of 2005 and then monthly from May through October 2005. There were additional monthly samples for August through October of 2004.

Concentrations of the major ions were converted to milliequivalents per liter and plotted on a piper diagram (Appendix 33D). A piper diagram displays water chemistry data and indicates the overall composition of the water. The proportions of the major cations (calcium, magnesium, sodium, and potassium) were plotted on one triangle of the diagram, the major anions (alkalinity as bicarbonate, chloride, and sulfate) were plotted on another triangle of the diagram, and the information from these two triangles was plotted on a third triangle. The streams in the study area are classified as calcium bicarbonate water.

33.7.3 Nutrients

The nutrients measured in the surface water included total ammonia, nitrate plus nitrite (as N), phosphorus, and orthophosphate. Each of the constituents is discussed below.

33.7.3.1 Ammonia

The CALC for total ammonia (as N) depends on pH and temperature at each individual station and, based on data collected during this study, ranged from undetected to 6.82 mg/L. All but one ammonia result was either undetected or were reported by the laboratory as below the MRL (Appendix 33A).

33.7.3.2 Nitrate and Nitrite

Total nitrate plus nitrite (as N) concentrations in this study had a mean value of 0.73 mg/L and ranged from undetected to 4.56 mg/L (Appendix 33A). None of the results were found to be above the DWS of 10 mg/L.

33.7.3.3 Phosphorus

Total phosphorus concentrations found in this study had a mean value of 0.02 mg/L and ranged from undetected to 0.08 mg/L (Appendix 33A).

33.7.3.4 Total Orthophosphate

Total orthophosphate data were only collected in 2006 and 2007 from sample locations SWQ1 through SWQ4. Orthophosphate was not detected in any of the samples submitted.

33.7.3.5 Summary of Nutrients

In summary, nitrate plus nitrite (as N) was detected in every sample analyzed but one, while total ammonia was only detected in one sample. Low levels of phosphorus were detected in approximately one-third of the samples; and orthophosphate, which was only analyzed for four samples, was not detected.

33.7.4 Total and Dissolved Trace Elements

The trace elements that are discussed in this section include aluminum, barium, iron, copper, zinc, lead, cadmium, arsenic, nickel, molybdenum, manganese, and low-level mercury. Samples were analyzed for other trace elements (e.g., beryllium, bismuth, boron, selenium, silver, thallium, and tin), but the majority of the results for those constituents were undetected or were reported by the laboratory as below the reporting limit.

33.7.4.1 Aluminum

Total aluminum concentrations were naturally elevated above the ADEC maximum CALC of 87 µg/L for fresh waters at station GS-21 during fall sampling events in both 2004 and 2005. Total aluminum concentrations had a mean value of 42 µg/L and ranged from 5.9 to 144 µg/L (Appendix 33A). Total aluminum in samples from GS-21 was above the maximum CALC in 36 percent of the sampling events,

while concentrations at the other four locations never exceeded the maximum CALC for aluminum. Dissolved aluminum concentrations had a mean value of 9.2 µg/L and ranged from undetected to 29 µg/L (Appendix 33A).

33.7.4.2 Barium

Total barium concentrations in the samples had a mean value of 2.71 µg/L and ranged from 1.01 to 5.42 µg/L. Dissolved barium concentrations in the samples had a mean value of 2.61 µg/L and ranged from 0.79 to 5.50 µg/L (Appendix 33A).

33.7.4.3 Iron

Total and dissolved iron concentrations were below the ADEC maximum CALC of 1,000 µg/L. Total iron concentrations had a mean value of 63.2 µg/L and ranged from undetected to 171 µg/L. Dissolved iron concentrations in the samples had a mean value of 30.9 µg/L and ranged from undetected to 80.0 µg/L (Appendix 33A).

33.7.4.4 Copper

The ADEC maximum CALC for copper depends on the hardness concentration in each individual stream. Based on hardness data collected during this study, the preliminary estimate for the total copper CALC for streams in the study area ranged from 0.33 to 2.16 µg/L. Total copper concentrations in the samples had a mean value of 1.6 µg/L and ranged from undetected to 14.8 µg/L. Dissolved copper concentrations in the samples had a mean value of 0.70 µg/L and ranged from undetected to 2.77 µg/L (Appendix 33A).

33.7.4.5 Zinc

The ADEC maximum CALC for zinc also depends on the hardness concentration in each individual stream. Based on hardness data collected during this study, the preliminary estimate for the total zinc CALC for streams in the study area ranged from 4.37 to 29.9 µg/L. Total zinc concentrations in this study had a mean value of 4.0 µg/L and ranged from undetected to 15.9 µg/L. Dissolved zinc concentrations in this study had a mean value of 4.0 µg/L and ranged from undetected to 18.7 µg/L (Appendix 33A).

33.7.4.6 Lead

The ADEC maximum CALC for lead again depends on the hardness concentration in each individual stream. Based on hardness data collected during this study, the preliminary estimate for the total lead CALC for streams in the study area ranged from 0.022 to 0.36 µg/L. Total lead concentrations were undetected in the majority of samples. Samples from stations GS-21 and SWQ3 contained total lead concentrations above the ADEC maximum CALC in two sampling events at each station. Dissolved lead concentrations were detected above the ADEC maximum CALC in samples from stations GS-21 and SWQ3. The mean values for total lead and dissolved lead were 0.26 µg/L and 0.15 µg/L respectively (Appendix 33A).

33.7.4.7 Cadmium

Total and dissolved cadmium were undetected in all samples collected from the study area (Appendix 33A).

33.7.4.8 Arsenic

Total and dissolved arsenic concentrations were undetected in the majority of sampling events (Appendix 33A). The results had a mean value of 0.216 µg/L for total arsenic, and 0.193 µg/L for dissolved arsenic. None of the results exceeded the ADEC maximum DWS of 10 µg/L.

33.7.4.9 Nickel

The ADEC maximum CALC for nickel also depends on the hardness concentration in the individual stream. Based on hardness data collected during this study, the preliminary estimate for the total nickel CALC for streams in the study area ranged from 1.9 to 12.3 µg/L. Nickel concentrations were never found to exceed the maximum CALC. Total nickel concentrations ranged from undetected to 0.553 µg/L with one higher non-detect value of 1.0 at one-half the detection limit., and dissolved concentrations ranged from undetected to 0.461 µg/L (Appendix 33A).

33.7.4.10 Molybdenum

Total molybdenum concentrations had a mean value of 0.469 µg/L and ranged from undetected to 0.934 µg/L. Dissolved molybdenum concentrations had a mean value of 0.488 µg/L and ranged from undetected to 0.928 µg/L. (Appendix 33A). ADEC has not established a DWS or a CALC for molybdenum for fresh water.

33.7.4.11 Manganese

Manganese concentrations never exceeded the EPA DWS of 50 µg/L. Total manganese concentrations had a mean value of 3.53 µg/L and ranged from undetected to 11.6 µg/L. Dissolved manganese concentrations had a mean value of 2.96 µg/L and ranged from undetected to 10.8 µg/L (Appendix 33A).

33.7.4.12 Low-Level Mercury

Mercury was only detected on one sampling event at one sample station (GS-21 on August 18, 2004) and was never found at concentrations above the ADEC maximum CALC of 0.12 µg/L (Appendix 33A).

33.7.4.13 Summary of Trace Elements

In summary, the concentrations of individual trace elements were below the most stringent water quality criterion in most samples. Exceptions include aluminum, copper, lead, and zinc, which were above criteria in a small number of samples. Typically, samples with a low field pH had higher concentrations of metals.

33.7.5 Cyanides

Water quality samples collected at all the sites were analyzed for total cyanide, and weak acid dissociable (WAD) cyanide. The majority of results for total were undetected; however one total cyanide sample at station GS21 on August 18, 2004 did show a detectable value of 0.0077 mg/L. All results for WAD cyanide were undetected (Appendix 33A). The ADEC water quality regulations specify analysis of free

cyanide by the WAD cyanide method, and the result is then applied to the free cyanide CALC of 0.0052 mg/L. Cyanide did not exceed the CALC in any samples collected from the study area.

33.7.6 Stream Sediment

Sediment samples were collected from the sample locations in the study area. These sample sites coincide with water quality sample sites (Figure 33-1). Sediment samples were collected in May, July, and September in 2004 and 2005. Chapter 10 provides analytical results and further discussion of the stream sediment data.

33.8 Summary

In 2004 and 2005, water quality sampling stations were established on streams in the Cook Inlet drainages study area (stations GS-21 and GS-22). Station GS-21 was established in August 2004 and was sampled monthly in August through October of that year. In 2005 samples were collected eight times at station GS-21—in February, March, and monthly in May through October. In July 2005, stations GS-22, PSC and PSD were added to the study. Station GS-22 was sampled four times from July through October 2005, stations PSC and PSD were sampled once in July 2005. In August 2006 and October 2007, surface water quality stream sediment samples were collected from four additional locations in the Cook Inlet drainages: stations SWQ1, SWQ2, SWQ3, and SWQ4. Sample station locations are shown on Figure 33-1.

Surface water samples were analyzed for field parameters and then sent to an ADEC-approved laboratory for analyses for a suite of inorganic compounds and metals. Data on field parameters are presented in graphically in Appendix 33B, and all qualified laboratory results are presented in Appendix 33A.

A comparison of the results of the field measurements and laboratory analyses to water quality criteria established by ADEC (ADEC, 2003) shows that all sample locations had naturally elevated concentrations above the water quality criteria for at least one parameter in at least one sampling event. The most common naturally elevated concentrations included aluminum and copper. Alkalinity results were always reported below the minimum criterion of 20 mg/L, with the exception of the sample collected from SWQ2 in August 2006, in which the measured alkalinity was 28.0 mg/L.

33.9 References

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TABLES

TABLE 33-1
Surface Water Data Summary for Naturally Occurring Constituents, Cook Inlet Drainages

Analyte	Frequency of Detection (FOD) [a]	Percent Detected	Range of Detects (Min - Max)	Range of Detection Limits (RDL) (Min - Max)	Range of Detection Limits (MDL) (Min - Max)	Average [b]	Median [b]	Standard Deviation [b]	Coefficient of Variation
Metals (mg/L)									
Aluminum (Dissolved)	23 / 25	92%	0.00269 - 0.02900	0.0000702 - 0.0078	0.0002 - 0.025	0.00917	0.00557	0.00754	0.82199
Aluminum (Total)	25 / 25	100%	0.0059 - 0.144	0.0000708 - 0.0078	0.0002 - 0.025	0.0421	0.036	0.0366	0.8701
Antimony (Dissolved)	10 / 24	40%	0.000005 - 0.0002	0.0000031 - 0.0004	0.00001 - 0.002	0.0000464	0.0000155	0.0000709	1.52796
Antimony (Total)	13 / 25	52%	0.0000041 - 0.0002	0.0000031 - 0.0004	0.00001 - 0.002	0.0000495	0.0000166	0.0000706	1.42606
Arsenic (Dissolved)	7 / 25	28%	0.00009 - 0.00044	0.0000121 - 0.0005	0.00004 - 0.001	0.000193	0.000125	0.000105	0.544717
Arsenic (Total)	7 / 25	28%	0.000062 - 0.000727	0.0000121 - 0.0005	0.00004 - 0.001	0.000216	0.000148	0.000158	0.728519
Barium (Dissolved)	25 / 25	100%	0.00079 - 0.0055	0.000025 - 0.0001	0.00005 - 0.0005	0.00261	0.00255	0.00104	0.39626
Barium (Total)	25 / 25	100%	0.00101 - 0.00542	0.000025 - 0.0001	0.00005 - 0.0005	0.00271	0.0027	0.00097	0.35755
Beryllium (Dissolved)	0 / 25	0%	0.000001 - 0.000500	0.00000299 - 0.0001	0.00001 - 0.0005	0.000015	0.000008	0.000016	1.09316
Beryllium (Total)	0 / 25	0%	0.000001 - NA	0.00000299 - 0.0001	0.00001 - 0.0005	0.000015	0.000008	0.000016	1.09316
Bismuth (Dissolved)	2 / 25	0%	0 - 0.02	0.0000031 - 0.04	0.00001 - 0.2	0.00329	0	0.00745	2.26163
Bismuth (Total)	0 / 25	8%	0 - 0.02	0.0000031 - 0.04	0.0001 - 0.2	0.00329	0.00001	0.00745	2.26079
Boron (Dissolved)	24 / 25	96%	0.00125 - 0.031	0.000198 - 0.0006	0.0006 - 0.01	0.0151	0.0161	0.0068	0.4514
Boron (Total)	22 / 25	88%	0.0009 - 0.05	0.000198 - 0.0031	0.0006 - 0.01	0.0146	0.0148	0.0098	0.6732
Cadmium (Dissolved)	4 / 25	16%	0.0000078 - 0.00005	0.00000619 - 0.0001	0.00002 - 0.0005	0.0000181	0.0000123	0.000015	0.8289911
Cadmium (Total)	4 / 25	16%	0.0000078 - 0.00005	0.00000619 - 0.0001	0.00002 - 0.0005	0.0000188	0.0000155	0.000015	0.7971107
Calcium (Dissolved)	24 / 24	100%	0.55 - 13.4	0.015 - 0.2	0.05 - 1	5.411	6.45	3.089	0.571
Calcium (Total)	25 / 25	100%	0.481 - 13.6	0.015 - 0.2	0.05 - 1	5.529	6.69	3.057	0.553
Chromium (Dissolved)	26 / 24	67%	0.000031 - 0.000951	0.000062 - 0.0001	0.0002 - 0.0005	0.000297	0.000287	0.000241	0.812046
Chromium (Total)	21 / 25	84%	0.000036 - 0.0021	0.000062 - 0.0001	0.0002 - 0.0005	0.000411	0.0003	0.000459	1.115218
Cobalt (Dissolved)	24 / 25	96%	0.0000118 - 0.00013	0.0000031 - 0.00005	0.00001 - 0.0003	0.000055	0.0000541	0.000029	0.5268008
Cobalt (Total)	24 / 25	96%	0.00002 - 0.000146	0.0000031 - 0.00005	0.00001 - 0.0003	0.0000632	0.0000456	0.0000386	0.6111042
Copper (Dissolved)	17 / 19	89%	0.00025 - 0.00277	0.000031 - 0.0005	0.0001 - 0.003	0.000702	0.000429	0.00065	0.92559
Copper (Total)	22 / 25	88%	0.000209 - 0.0148	0.0000209 - 0.0005	0.00006 - 0.003	0.001622	0.000461	0.00318	1.960359
Iron (Dissolved)	17 / 25	68%	0.0031 - 0.08	0.00265 - 0.02	0.008 - 0.05	0.03087	0.025	0.02356	0.76302
Iron (Total)	23 / 25	92%	0.0031 - 0.171	0.00265 - 0.02	0.008 - 0.05	0.06315	0.0629	0.04575	0.72441
Lead (Dissolved)	11 / 15	73%	0.00005 - 0.000432	0.000031 - 0.0001	0.0001 - 0.0005	0.000154	0.000132	0.000116	0.757866
Lead (Total)	7 / 25	28%	0.000016 - 0.00421	0.000022 - 0.0001	0.00007 - 0.0005	0.00026	0.00005	0.000837	3.223276
Magnesium (Dissolved)	25 / 25	100%	0.109 - 1.87	0.00155 - 0.2	0.005 - 1	0.401	0.384	0.324	0.808
Magnesium (Total)	25 / 25	100%	0.117 - 1.620	0.00155 - 0.2	0.005 - 1	0.397	0.4	0.276	0.696
Manganese (Dissolved)	22 / 25	88%	0.00008 - 0.0108	0.00013 - 0.0005	0.0004 - 0.003	0.00296	0.0022	0.00287	0.9698
Manganese (Total)	24 / 25	96%	0.0001 - 0.0116	0.000013 - 0.0005	0.00004 - 0.003	0.00353	0.00253	0.00322	0.91239
Mercury (Total)	3 / 21	14%	0.00000015 - 0.00000	0.0000006 - 8.99E-07	0.000001 - 0.000005	0.00000054	0.00000045	0.00000049	0.90055204
Molybdenum (Dissolved)	20 / 23	87%	0.000015 - 0.000928	0.0000062 - 0.0005	0.00002 0.003	0.000488	0.000527	0.000195	0.398731
Molybdenum (Total)	3 / 25	12%	0.000015 - 0.000934	0.0000062 - 0.0005	0.00002 - 0.003	0.000469	0.000534	0.0002	0.425275

TABLE 33-1
Surface Water Data Summary for Naturally Occurring Constituents, Cook Inlet Drainages

Analyte	Frequency of Detection (FOD) [a]	Percent Detected	Range of Detects (Min - Max)	Range of Detection Limits (RDL) (Min - Max)	Range of Detection Limits (MDL) (Min - Max)	Average [b]	Median [b]	Standard Deviation [b]	Coefficient of Variation
Nickel (Dissolved)	3 / 7	43%	0.000282 - 0.000461	0.000062 - 0.0006	0.0002 0.003	0.000326	0.0003	0.000062	0.19002
Nickel (Total)	20 / 25	80%	0.000045 - 0.001	0.0000298 - 0.0006	0.00009 - 0.003	0.000286	0.0003	0.000197	0.68936
Potassium (Dissolved)	21 / 25	84%	0.097 - 0.784	0.00142 - 0.3	0.004 - 2	0.264	0.253	0.137	0.52
Potassium (Total)	22 / 25	88%	0.088 - 0.71	0.00142 - 0.3	0.004 - 2	0.266	0.261	0.124	0.467
Selenium (Dissolved)	4 / 25	16%	0.00005 - 0.000436	0.0000286 - 0.00031	0.00009 0.001	0.000108	0.000078	0.000078	0.717838
Selenium (Total)	3 / 25	12%	0.000049 - 0.000458	0.0000286 - 0.00031	0.00009 - 0.001	0.00011	0.000078	0.000084	0.764315
Silicon (Dissolved)	25 / 25	100%	1.54 - 3.6	0.031 - 0.2	0.1 2.43	2.497	2.54	0.488	0.196
Silver (Dissolved)	1 / 25	4%	0.0000014 - 0.000025	0.00000287 - 0.00005	0.00001 0.0003	0.0000066	0.0000031	0.0000082	1.2408526
Silver (Total)	1 / 25	4%	0.0000014 - 0.000025	0.00000287 - 0.00005	0.00001 - 0.0003	0.0000065	0.0000031	0.0000083	1.277464
Thallium (Dissolved)	3 / 25	12%	0.0000021 - 0.0002	0.00000425 - 0.0001	0.00001 - 0.0005	0.0000202	0.0000031	0.0000436	2.1606874
Thallium (Total)	3 / 25	12%	0.0000021 - 0.0001	0.00000425 - 0.0001	0.00001 - 0.0005	0.0000148	0.0000031	0.0000234	1.5861053
Tin (Dissolved)	0 / 25	0%	0.00003 - 0.0001	0.0000604 - 0.002	0.0002 - 0.01	0.00009	0.000031	0.000194	2.155222
Tin (Total)	2 / 25	8%	0.000031 - 0.000461	0.0000604 - 0.00031	0.0002 - 0.001	0.000079	0.00005	0.000097	1.234713
Vanadium (Dissolved)	16 / 25	64%	0.0001 - 0.000728	0.0000094 - 0.0005	0.00003 - 0.001	0.000309	0.00025	0.000182	0.589983
Vanadium (Total)	17 / 25	68%	0.0001 - 0.000736	0.0000094 - 0.0005	0.00003 - 0.001	0.000342	0.000339	0.000183	0.53563
Zinc (Dissolved)	19 / 22	86%	0.00075 - 0.0187	0.00031 - 0.002	0.001 - 0.01	0.00404	0.0022	0.00483	1.19682
Zinc (Total)	15 / 25	60%	0.0005 - 0.0159	0.00031 - 0.002	0.002 - 0.001	0.00399	0.00152	0.00471	1.18043
Anions (mg/L, except where noted)									
Chloride	25 / 25	100%	0.53 - 19.9	0.031 - 0.5	0.1 - 3	1.9	1.11	3.76	1.98
Fluoride	1 / 25	4%	0.0155 - 0.05	0.031 - 0.1	0.1 - 0.5	0.022	0.016	0.013	0.609
Cyanide	1 / 25	4%	0.0008 - 0.0077	0.0015 - 0.005	0.005 - 0.03	0.0017	0.0013	0.0014	0.7879
Cyanide, Weak Acid Dissociable	2 / 25	8%	0.0008 - 0.0034	0.0015 - 0.005	0.005 - 0.03	0.0017	0.0013	0.001	0.466
Nitrogen, nitrate-nitrite	24 / 25	96%	0.127 - 4.6	0.02 - 0.031	0.1 - 1	0.734	0.469	0.894	1.218
Phosphorus, Total Orthophosphate (as P)	14 / 25	56%	0.00155 - 0.0800	0.031 - 0.031	0.1 - 0.1	0.022	0.008	0.0257	1.1554
Sulfate	24 / 24	100%	0.54 - 12.5	0.0022 - 0.031	0.007 - 0.1	3.90	3.80	2.68	0.69
Thiocyanate	1 / 25	4%	0.0008 - 0.0077	0.031 - 0.5	0.1 - 3	0.0017	0.0013	0.0014	0.7879
Cations (mg/L, except where noted)									
Total Ammonia (as N)	2 / 25	8%	0.016 - 0.25	0.031 - 0.5	0.1 - 5	0.059	0.016	0.082	1.40
Sodium (Dissolved)	24 / 24	100%	0.953 - 13.4	0.031 - 0.31	0.1 - 2	1.92	1.435	2.45	1.28
Sodium (Total)	25 / 25	100%	0.941 - 11.3	0.031 - 0.31	0.1 - 2	1.801	1.480	1.987	1.103

TABLE 33-1
Surface Water Data Summary for Naturally Occurring Constituents, Cook Inlet Drainages

Analyte	Frequency of Detection (FOD) [a]	Percent Detected	Range of Detects (Min - Max)	Range of Detection Limits (RDL) (Min - Max)	Range of Detection Limits (MDL) (Min - Max)	Average [b]	Median [b]	Standard Deviation [b]	Coefficient of Variation
Miscellaneous Parameters (mg/L, except where noted)									
Acidity, Total	11 / 25	44%	0.79 - 5.0	1.57 - 3.14	5 - 10	2.02	1.57	1.11	0.55
Alkalinity, Total	25 / 25	100.0%	1.55 - 28.0	2 - 3.1	10 - 20	11.4	13	6.2	0.5
Hardness as CaCO3 (Not Filtered)	25 / 25	100%	2 - 35.4	0.147 - 1	0.46 - 7	15.5	18.5	8.20	0.50
pH (Field, Standard Units)	25 / 25	100%	2.8 - 8.36	NA - NA	NA - NA	6.12	6.40	1.36	0.220
Specific Conductivity (Field, mS/cm)	25 / 25	100%	11 - 430	NA - NA	NA - NA	60	47	81	1
Total Dissolved Solids	23 / 25	92%	1.6 - 124	3.1 - 10	10 - 20	32.8	26.2	26.6	0.80
Total Suspended Solids	14 / 25	56%	0.075 - 3.22	0.15 - 5	0.5 - 20	1.10	0.70	1.10	1.00
Water Temperature (degC)	25 / 25	100%	1.05 - 15.3	NA - NA	NA - NA	7.73	7.6	3.45	0.45

Notes:

a. Frequency of detection (FOD) = Number of detected samples / total number of samples in data set.

b. When calculating the average, median, and standard deviation, non-detects with "U" or "UJ" qualifiers were included as one-half the RDL. Non-detect results of zero, without "U" or "UJ" qualifiers, were included as one-half the MDL.

RDL = reporting detection limit.

MDL = method detection limit.

mg/L = milligram per liter.

MEQ/L = milliequivalent per liter.

mV = millivolt.

mS/cm = microSiemens per centimeter.

NTU = nephelometric turbidity units.

degC = degrees Celsius.

-- = Not applicable.

TABLE 33-2
Comparison of Freshwater Aquatic Life Water Quality Criteria with Naturally Occurring Constituent Concentrations in Surface Water, Cook Inlet Drainages

Analyte	Criteria [a,b]		CRR [c]			CRR > 1 [d]	
	Acute	Chronic	Min	Max	Median	Number of Samples	Percent of Samples
Dissolved Metals [e]							
Aluminum	-	-	0.031	0.33	0.064	0	0%
Aluminum (Total)	**0.75**	**0.087**	**0.068**	**1.7**	**0.41**	**4**	**16%**
Antimony	-	-	-	-	-	-	-
Arsenic	0.34	0.15	0.00057	0.0029	0.00083	0	0%
Barium	-	-	-	-	-	-	-
Beryllium	-	-	-	-	-	-	-
Bismuth	-	-	-	-	-	-	-
Boron	-	-	-	-	-	-	-
Cadmium	**A**	**A (0.000016-0.000078)**	**0.10**	**3.12**	**0.24**	**3**	**12%**
Calcium	-	-	-	-	-	-	-
Chromium [f]	A	A (0.0030-0.011)	0.0029	0.17	0.028	0	0%
Cobalt	-	-	-	-	-	-	-
Copper	**A**	**A (0.0000057-0.0022)**	**0.12**	**2.2**	**0.36**	**3**	**16%**
Iron	-	1.0	0.0031	0.080	0.025	0	0%
Lead	**A**	**A (0.000030-0.00041)**	**0.12**	**5.0**	**0.44**	**4**	**27%**
Magnesium	-	-	-	-	-	-	-
Manganese	-	-	-	-	-	-	-
Mercury [g]	0.0014	0.00077	0.00019	0.0032	0.00058	0	0%
Molybdenum	-	-	-	-	-	-	-
Nickel	A	A (0.0034-0.013)	0.023	0.16	0.028	0	0%
Potassium	-	-	-	-	-	-	-
Selenium	-	-	-	-	-	-	0%
Selenium (Total)	- [h]	0.0050	0.0098	0.092	0.016	0	0%
Silicon	-	-	-	-	-	-	-
Silver	**A (0.0000040-0.00021)**	**-**	**0.0079**	**6.0**	**0.026**	**1**	**4%**
Thallium	-	-	-	-	-	-	-
Tin	-	-	-	-	-	-	-
Vanadium	-	-	-	-	-	-	-
Zinc	**A**	**A (0.0043-0.029)**	**0.036**	**1.3**	**0.10**	**1**	**5%**
Anions [e]							
Chloride	860	230	0.0023	0.087	0.0048	0	0%
Fluoride	-	-	-	-	-	-	-
Cyanide [i]	**0.022**	**0.0052**	**0.14**	**1.5**	**0.24**	**1**	**4%**
Cyanide, Weak Acid Dissociable [i]	-	-	0.14	0.65	0.24	0	0%
Nitrogen, Nitrate (as N)	-	-	-	-	-	-	-

TABLE 33-2
Comparison of Freshwater Aquatic Life Water Quality Criteria with Naturally Occurring Constituent Concentrations in Surface Water, Cook Inlet Drainages

Analyte	Criteria [a,b]		CRR [c]			CRR > 1 [d]	
	Acute	Chronic	Min	Max	Median	Number of Samples	Percent of Samples
Nitrogen, nitrate-nitrite	-	-	-	-	-	-	-
Nitrogen, Nitrite	-	-	-	-	-	-	-
Sulfate	-	-	-	-	-	-	-
Cations [e]							
TotalAmmonia (as N; total mg N/L)	C	D,E (1.38-7.09)	0.0022	0.04	0.022	0	0%
Sodium	-	-	-	-	-	-	-
Miscellaneous Parameters [e]							
Alkalinity [j]	-	20	-	-	-	-	-
pH (Field, Standard Units) [k]	**6.5-8.5**	**6.5-8.5**	**2.80**	**8.36**	**6.40**	**14**	**56%**
Total Dissolved Solids	1,000	1,000	0.0016	0.12	0.026	0	0%
Water Temperature (degC) [l]	-	-	-	-	-	-	-

Notes:

a. From ADEC (2008 and 2009). Criteria are in mg/L unless otherwise specified.

b. Criteria listed as "A" are hardness-dependent. Criteria listed as "C", "D", or "E" are pH-dependent. Calculated criteria are presented in parentheses. Equations are provided below.
Acute and Chronic hardness-dependent criteria can be calculated using the following equations:
Acute Criteria (mg/L) = $[\exp(m_A(\ln(\text{hardness}))+b_A)*(CF)]/1{,}000$
Chronic Criteria (mg/L) = $[\exp(m_C(\ln(\text{hardness}))+b_C)*(CF)]/1{,}000$
Input values are provided in Table 9.1-9. The 5th percentile of hardness throughout the Cook Inlet Drainage was used to calculate criteria.
Acute and Chronic pH-dependent criteria can be calculated using the following equations:
Acute (mg/L) = $(0.275/(1+10^{7.204-pH}))+(39.0/(1+10^{pH-7.204}))$
Chronic (mg/L) = $((0.0577/(1+10^{7.688-pH}))+(2.487/(1+10^{pH-7.688})))*(\text{MIN}(2.85, 1.45*10^{0.028(25-T)}))$, where T = water temperature
Acute criteria assume that salmonids are present, and chronic criteria assume that early life stages of fish are present. Field pH measurements were used to calculate criteria.
Hardness dependent criteria are preliminary estimates.

c. CRR = Concentration/Criteria. Lowest available criteria were used to calculate CRRs.

d. For analytes with CRRs >1, individual CRRs (greater than 1 only) and corresponding sample locations and dates are discussed in Section 9.1.
Percent of samples represents the number of samples with CRRs>1 divided by the total number of samples analyzed.

e. Aquatic life criteria are for dissolved constituents unless otherwise specified. Where criteria were available only for total constituents, both total and dissolved data were compared to the total criteria.

f. Aquatic life criteria were only available for Cr^3 and Cr^6, not for total chromium. Cr^3 values were used for this comparison.

g. Only total mercury data were available, so these were compared to the aquatic life criteria, which are for dissolved mercury.

h. The acute selenium criteria calculation requires data for fractions of total selenium as selenite and selenate. These data were not available; therefore, only the chronic criterion was used for comparison with surface water data.

i. Cyanide criteria are for free cyanide, as CN/L. It is ADEC protocol to apply Weak Acid Dissociable cyanide data to this criterion.

j. Chronic criterion is a minimum criterion for alkalinity (as $CaCO_3$), unless natural alkalinity is lower. Surface water data were therefore not compared to this criterion.

k. pH must be within the given range of 6.5-8.5 (ADEC, 2009). CRRs were not calculated for pH. Number of samples and Percent of Samples represent samples with pH values outside of the given range.

l. Water quality standards for temperature range from 13 to 20 degC depending on fish use (ADEC, 2009). The average water temperature in the Cook Inlet Drainage is well below the

TABLE 33-2
Comparison of Freshwater Aquatic Life Water Quality Criteria with Naturally Occurring Constituent Concentrations in Surface Water, Cook Inlet Drainages

Analyte	Criteria [a,b]		CRR [c]			CRR > 1 [d]	
	Acute	Chronic	Min	Max	Median	Number of Samples	Percent of Samples

minimum criterion of 13 degC, with only occasional values (limited to the summer months) near or above the various criteria. All values are below the absolute criterion of 20 degC.

References:

ADEC. 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. As amended through December 12, 2008.

ADEC. 2009. 18 AAC 70. Water Quality Standards. Amended as of September 19, 2009.

Bold indicates at least one CRR greater than one (1).
CRR = Concentration risk ratio.
mg/L = Milligrams per liter.
degC = degrees Celsius.
ADEC = Alaska Department of Environmental Conservation.
Min = Minimum.
Max = Maximum.
- = Not available or not applicable.
> = Greater than.

TABLE 33-3

Identification of Surface Water Samples Exceeding Human Health Water Quality Criteria for pH, Cook Inlet Drainages

Analyte	CRR [a]	Sample Location	Sample Date	Total Exceedences by Location and Analyte	
pH (Field)	6.4	GS21	08/18/04		
	5.48	GS21	09/26/04		
	6.4	GS21	10/15/04		
	6.02	GS21	02/15/05		
	5.73	GS21	09/09/05		
	5.5	GS21	10/06/05	GS21	7
	5.38	GS22	09/10/05		
	5.5	GS22	10/06/05	GS22	2
	5.05	SWQ1	08/30/06		
	2.80	SWQ1	10/04/07	SWQ1	2
	3.19	SWQ2	09/13/07	SWQ2	1
	4.62	SWQ3	10/04/07	SWQ3	1
	4.74	SWQ4	10/04/07	SWQ4	1
				Total (6 locations)	**14**
Water Temperature	1.02	GS22	08/09/05	GS22	1
				Total (1 location)	**1**

Notes:

a. Only CRRs greater than 1, and the corresponding analytes, are shown in this table. Values for pH represent pH measurements at each location, not CRRs.

CRR = Concentration risk ratio.

TABLE 33-4
Identification of Surface Water Samples Exceeding Freshwater Aquatic Life Water Quality Criteria, Cook Inlet Drainages

Analyte	CRR [a]	Sample Location	Sample Date	Total Exceedences by Location and Analyte	
Aluminum (Total)	1.03	GS21	09/26/04		
	1.04	GS21	10/15/04		
	1.66	GS21	08/09/05		
	1.29	GS21	09/09/05	GS21	
				Total (1 location)	**4**
Cadmium (Dissolved)	1.38	SWQ1	10/04/07	SWQ1	1
	1.15	SWQ3	08/30/06		
	3.12	SWQ3	10/04/07	SWQ3	2
				Total (2 locations)	**3**
Copper (Dissolved)	2.22	PSC	07/13/05	PSC	1
	1.17	SWQ1	10/04/07	SWQ1	1
	1.66	SWQ3	08/30/06	SWQ3	1
				Total (3 locations)	**3**
Silver (Dissolved)	6.030	SWQ3	10/04/07	SWQ3	1
				Total (1 location)	**1**
Zinc (Dissolved)	1.33	GS22	07/14/05	GS22	1
				Total (1 location)	**1**
Cyanide (Total)	1.48	GS21	08/18/04	GS21	1
				Total (1 location)	**1**
pH (Field)	6.4	GS21	08/18/04		
	5.48	GS21	09/26/04		
	6.4	GS21	10/15/04		
	6.02	GS21	02/15/05		
	6.00	GS21	05/03/05		
	5.73	GS21	09/09/05		
	5.5	GS21	10/06/05	GS21	7
	5.38	GS22	09/10/05		
	5.5	GS22	10/06/05	GS22	2
	5.05	SWQ1	08/30/06		
	2.80	SWQ1	10/04/07	SWQ1	2
	3.19	SWQ2	09/13/07	SWQ2	1
	4.62	SWQ3	10/04/07	SWQ3	1
	4.74	SWQ4	10/04/07	SWQ4	1
				Total (6 locations)	**14**

Notes:

a. Only CRRs greater than 1, and the corresponding analytes, are shown in this table. Values for pH represent pH measurements at each location, not CRRs. Hardness dependent criteria for cadmium, copper and zinc are preliminary estimates.

CRR = Concentration risk ratio.

TABLE 33-5

Comparison of Total and Dissolved Naturally Occurring Constituent Concentrations in Surface Water, Cook Inlet Drainage

Analyte	T/D Significantly Different? [a]	p-Value	Mean Ranks		Sample Counts	
			Dissolved	Total	Dissolved	Total
Aluminum	**Yes**	**<0.0001**	**14.8**	**33.4**	**23**	**25**
Antimony	No	0.48	10.3	12.4	9	13
Arsenic	No	0.61	6.9	8.1	7	7
Barium	No	0.52	24.1	26.9	25	25
Beryllium [b]	-	-	0.0	0.0	0	0
Bismuth [b]	-	-	0.0	1.5	0	2
Boron	No	0.78	24.1	22.9	24	22
Cadmium	No	1.00	4.6	4.4	4	4
Calcium	No	0.79	24.4	25.5	24	25
Chromium	No	0.50	20.4	17.9	16	21
Cobalt	No	0.58	23.4	25.6	24	24
Copper	No	0.99	19.9	20.1	17	22
Iron	**Yes**	**0.04**	**16.0**	**23.8**	**17**	**23**
Lead	No	0.44	8.7	10.8	11	7
Magnesium	No	0.74	24.8	26.2	25	25
Manganese	No	0.75	22.8	24.1	22	24
Molybdenum	No	0.82	22.0	21.1	20	22
Nickel	No	0.44	15.0	11.6	3	20
Potassium	No	0.90	22.3	21.8	21	22
Selenium	No	1.00	4.5	4.5	4	4
Silver [b]	-	-	1.5	1.5	1	1
Sodium	No	0.98	24.9	25.1	24	25
Thallium	No	0.83	3.8	3.2	3	3
Tin [b]	-	-	0.0	1.5	0	2
Vanadium	No	0.72	16.3	17.6	16	17
Zinc	No	0.39	16.2	19.2	19	15

Notes:

a. Differences are considered statistically significant if the p-value is less than 0.050. The nonparametric Mann-Whitney U-test was used for statistical comparisons. Only detected concentrations were included in the statistical comparisons.

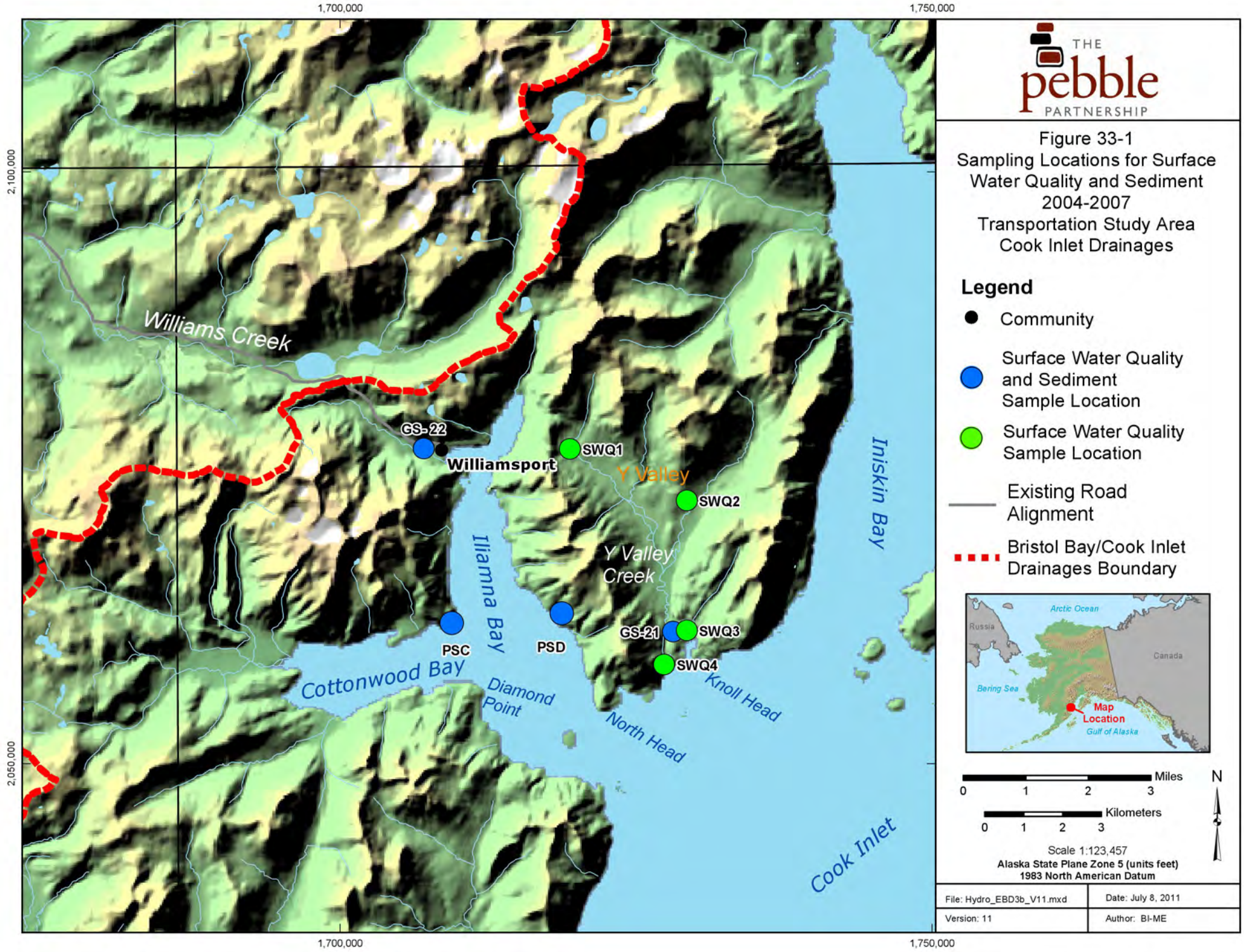
b. Each sample count must be greater than 1 to perform Mann-Whitney U-test.

T/D = total vs. dissolved.

< = less than.

- = not applicable.

FIGURES


1,700,000
1,750,000
2,100,000
2,050,000
Williams Creek
GS-22
Williamsport
SWQ1
Y Valley
SWQ2
Iliamna Bay
Y Valley Creek
Iniskin Bay
PSC
PSD
GS-21
SWQ3
SWQ4
Cottonwood Bay
Diamond Point
North Head
Knoll Head
Cook Inlet
THE pebble PARTNERSHIP
Figure 33-1
Sampling Locations for Surface Water Quality and Sediment
2004-2007
Transportation Study Area
Cook Inlet Drainages
Legend
Community
Surface Water Quality and Sediment Sample Location
Surface Water Quality Sample Location
Existing Road Alignment
Bristol Bay/Cook Inlet Drainages Boundary
Arctic Ocean
Russia
Canada
Bering Sea
Map Location
Gulf of Alaska
Miles
0 1 2 3
Kilometers
0 1 2 3
N
Scale 1:123,457
Alaska State Plane Zone 5 (units feet)
1983 North American Datum
File: Hydro_EBD3b_V11.mxd
Date: July 8, 2011
Version: 11
Author: BI-ME

PHOTOGRAPHS

PHOTO 33-1: Sample station GS-21 in the Y Valley in summer. August 2005.

PHOTO 33-2: Sample station GS-21 in the Y Valley. April 2005.

PHOTO 33-3: Sample station GS-22 in Williams Creek. July 2005.

PHOTO 33-4: Sampling in the pouring rain at station GS-22 in Williams Creek in July 2005.

PHOTO 33-5: Collecting a water quality and sediment sample from station PSC. July 2005.

PHOTO 33-6: Field crew preparing to collect a water quality sample at station PSD. July 2005.

PHOTO 33-7: Downstream of sample location PSD. July 2005.

APPENDICES

APPENDIX 33A

Laboratory Data Tables and Outlier Analysis, Surface Water Transportation Corridor Study Area, Cook Inlet Drainages 2004-2007

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

	Parameters	Hardness	pH Field Measurement	Temperature Field Measurement	Specific Conductance	Total Dissolved Solids	Total Suspended Solids	Acidity	Alkalinity	Nitrate+Nitrite (as N)	Nitrite (as N)	Nitrate (as N)	Total Ammonia (as N)[3]	Total Phosphorus	Ortho-phosphate	Chloride	Fluoride	Sulfate
	Total/Dissolved																	
	Units	mg/L	pH Units	°C	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sampling Station GS21																		
	Sample Date																	
	08/18/04	20.0	6.4	14.6	60	51.3	0.8	**1.57**	17	**0.155**			**0.0155**	**0.0326**		1.35	**0.016**	
	09/26/04	20.7	5.48	7.6	65	58.8	1.5	**3.5**	**5.25**	4.56			**0.050**	**0.0155**		1.51	**0.016**	9.09
	10/15/04	19.3	6.4	5.8	65	31.3	1.4	**1.57**	16	1.44			**0.054**	**0.080**		1.59	**0.016**	3.99
	02/15/05	22.7	6.02	1.8	60	43.7	**0.075**	**2.5**	16	1.54			**0.050**	0.0307		1.55	**0.016**	4.33
	04/02/05	18.5	7.96	1.05	60	35.0	**0.3**	**0.79**	16	0.82			**0.050**	0.0356		1.76	**0.016**	4.54
	05/03/05	20.4	6.00	2.99	49	124	1.3	**2.88**	14.5	0.91			**0.0155**	0.0070		1.44	**0.016**	3.21
	06/13/05	18.5	6.85	7.66	430	32.5	0.521	**2.0**	13	1.36			**0.0155**	0.0175		1.08	**0.016**	4.01
	07/13/05	17.6	7.10	8.63	42	23.8	0.7	**3.0**	13.5	0.482			**0.0155**	0.0775		0.977	**0.016**	3.35
	08/09/05	20.7	7.48	8.27	55	15.0	2.7	**3.75**	16	0.937			**0.0155**	**0.0017**		1.08	**0.016**	3.77
	09/09/05	20.2	5.73	8.47	60	31.3	3.2	**2.25**	16	0.427			**0.0155**	**0.0085**		1.01	**0.016**	4.14
	10/06/05	19.2	5.5	6.58	47	23.0	0.7	**3.25**	15.5	0.581			**0.0155**	**0.0071**		1.11	**0.016**	3.82
	Mean	19.8	6.45	6.68	90	43.0	1.2	2.5	14	1.2	NA	NA	0.028	0.029	NA	1.31	0.016	4.43
	Median	20.0	6.4	7.60	60	32.5	0.8	2.5	16	0.91	NA	NA	0.016	0.018	NA	1.35	0.016	4.00
	St. Deviation	1.4	0.82	3.79	110	30	1	0.92	3	1.2	NA	NA	0.018	0.0273	NA	0.27	0	1.69
	# of values	11	11	11	11	11	11	11	11	11	0	0	11	11	0	11	11	10
	Minimum	17.6	5.48	1.05	42	15.0	0.075	0.79	5.25	0.155	NA	NA	0.0155	0.0017	NA	0.977	0.016	3.21
	Maximum	22.7	7.96	14.6	430	124	3.2	3.75	17	4.56	NA	NA	0.054	0.08	NA	1.76	0.016	9.09
	% of values undetected						9%	27%		9%			91%	18%			100%	
	# of values between MDL and MRL						1	8	1				1	4				
	Chronic Aquatic Life Criteria (CALC)[1]	NA	>6.5 and <8.5	NA	NA	NA	NA	NA	>=20	NA	NA	NA	7.04	NA	NA	230	NA	NA
	Drinking Water Standards (DWS)[2]	NA	>6.0 and <8.5	NA	NA	500	NA	NA	NA	10	NA	NA	NA	NA	NA	250	4	250
	% of CALC exceedences	0%	64%	0%	0%	0%	0%	0%	100%	0%	NA	NA	0%	0%	NA	0%	0%	0%
	% of DWS exceedences	0%	27%	0%	0%	0%	0%	0%	0%	0%	NA	NA	0%	0%	NA	0%	0%	0%
Sampling Station GS22																		
	Sample Date																	
	07/14/05	8.32	6.57	11.87	24	16.3	**0.075**	**0.79**	**4.45**	0.202			**0.0155**	0.0640		0.840	**0.016**	3.46
	08/09/05	8.40	6.94	15.25	28	30.0	**0.075**	**1.57**	**5.5**	0.469			**0.0155**	**0.0017**		0.833	**0.016**	4.42
	09/10/05	3.20	5.38	9.76	13	**1.6**	**0.3**	**0.79**	**3.5**	0.127			**0.050**	**0.0017**		0.533	**0.016**	0.544
	10/06/05	9.61	5.5	6.84	30	12.0	**0.075**	**1.63**	**6.0**	0.430			**0.0155**	**0.0017**		0.860	**0.016**	4.51
	Mean	7.40	6.10	10.93	24	15.0	0.13	1.19	4.9	0.307	NA	NA	0.024	0.0172	NA	0.770	0.016	3.23
	Median	8.40	6.04	10.82	26	14.0	0.08	1.18	5.0	0.316	NA	NA	0.016	0.0017	NA	0.840	0.016	3.94
	St. Deviation	2.9	0.78	3.54	7	12	0.11	0.47	1.1	0.168	NA	NA	0.017	0.0312	NA	0.16	0	1.85
	# of values	4	4	4	4	4	4	4	4	4	0	0	4	4	0	4	4	4
	Minimum	3.20	5.38	6.84	13	1.6	0.075	0.79	3.5	0.127	NA	NA	0.0155	0.0017	NA	0.533	0.016	0.544
	Maximum	9.61	6.94	15.25	30	30.0	0.3	1.63	6.0	0.469	NA	NA	0.050	0.064	NA	0.860	0.016	4.51
	% of values undetected					25%	75%	75%					100%	75%			100%	
	# of values between MDL and MRL						1	1	4									
	Chronic Aquatic Life Criteria (CALC)[1]	NA	>6.5 and <8.5	NA	NA	NA	NA	NA	>=20	NA	NA	NA	7.05	NA	NA	230	NA	NA
	Drinking Water Standards (DWS)[2]	NA	>6.0 and <8.5	NA	NA	500	NA	NA	NA	10	NA	NA	NA	NA	NA	250	4	250
	% of CALC exceedences	0%	50%	0%	0%	0%	0%	0%	100%	0%	NA	NA	0%	0%	NA	0%	0%	0%
	% of DWS exceedences	0%	50%	0%	0%	0%	0%	0%	0%	0%	NA	NA	0%	0%	NA	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

	Parameters	Total Cyanide	Cyanide WAD[5]	Thiocyanate	Aluminum		Antimony		Arsenic		Barium		Beryllium		Bismuth		Boron		Cadmium[4]		Calcium	
	Total/Dissolved				Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Units	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station GS21																						
	Sample Date																					
	08/18/04	0.0077	**0.0013**	**0.065**	79.5	**12.5**	**0.0901**	**0.0385**	**0.125**	**0.125**	3.01	3.09	**0.0075**	**0.0075**	**0.750**	**0.750**	22.4	21.8	**0.0155**	**0.0155**	7310	7500
	09/26/04	**0.0013**	**0.0013**	**0.24**	89.6	**12.5**	**0.0385**	**0.0385**	**0.125**	**0.125**	3.29	3.10	**0.0075**	**0.0075**	**0.750**	**0.750**	21.8	19.7	**0.0155**	**0.0155**	7580	7750
	10/15/04	**0.0025**	**0.0025**	**0.065**	90.6	**16.6**	**0.0900**	**0.0385**	**0.125**	**0.125**	2.89	2.55	**0.0075**	**0.0075**	**0.750**	**0.750**	14.8	15.0	**0.0155**	**0.0155**	7060	6820
	02/15/05	**0.0013**	**0.0013**	**0.074**	7.12	2.80	0.0104	**0.0050**	**0.125**	**0.254**	2.83	2.61	**0.0075**	**0.0075**	**0.0016**	**0.0016**	15.6	22.0	**0.0250**	**0.0078**	8250	7580
	04/02/05	**0.0013**	**0.0013**	**0.18**	7.99	3.13	**0.0041**	**0.0100**	0.0620	0.0850	3.15	3.02	**0.0015**	**0.0015**	**0.0038**	**0.0038**	18.2	19.4	**0.0109**	**0.0123**	6690	
	05/03/05	**0.0013**	**0.0013**	**0.21**	49.6	2.98	**0.0100**	**0.0100**	0.148	0.101	3.02	2.46	**0.0015**	**0.0015**	**0.0038**	**0.0038**	13.2	16.1	**0.0100**	**0.0100**	7520	7310
	06/13/05	**0.0013**	**0.0013**	**0.091**	12.4	2.99	0.0160	0.0198	**0.125**	**0.125**	2.22	2.06	**0.0075**	**0.0075**	**0.0016**	**0.0016**	**7.30**	**8.30**	**0.0078**	**0.0078**	6820	6550
	07/13/05	**0.0013**	**0.0013**	**0.22**	22.5	5.12	0.0184	0.0156	**0.125**	**0.125**	2.52	2.47	**0.0075**	**0.0075**	**0.0016**	**0.0016**	12.2	15.1	**0.0250**	**0.0250**	6460	6510
	08/09/05	**0.0013**	**0.0013**	**0.17**	144	5.47	0.0170	**0.0090**	**0.486**	**0.125**	3.13	2.75	**0.0075**	**0.0075**	0.0148	**0.0050**	21.8	23.3	**0.0078**	**0.0078**	7510	7410
	09/09/05	**0.0013**	**0.0013**	**0.22**	112	13.4	0.0220	0.0246	**0.125**	**0.125**	3.40	3.27	**0.0075**	**0.0075**	**0.0016**	**0.0016**	23.7	17.00	**0.0078**	**0.0078**	7350	7450
	10/06/05	**0.0013**	**0.0031**	**0.62**	38.5	5.57	0.0110	**0.0050**	**0.125**	**0.125**	2.65	2.44	**0.0075**	**0.0075**	**0.0050**	**0.0016**	13.1	18.8	**0.0078**	**0.0078**	6990	6390
	Mean	0.0020	0.0015	0.20	59.0	7.60	0.030	0.020	0.154	0.131	2.92	2.71	0.0064	0.0064	0.21	0.21	16.7	17.9	0.014	0.012	7230	7130
	Median	0.0013	0.0013	0.18	49.6	5.47	0.017	0.016	0.125	0.125	3.01	2.61	0.0075	0.0075	0.0038	0.0038	15.6	18.8	0.011	0.010	7310	7360
	St. Deviation	0.0019	0.0006	0.16	47	5.1	0.031	0.0135	0.112	0.043	0.35	0.37	0.0024	0.0024	0.348	0.349	5.2	4.2	0.0065	0.0055	500	510
	# of values	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	10
	Minimum	0.0013	0.0013	0.065	7.12	2.80	0.00405	0.005	0.0620	0.0850	2.22	2.06	0.0015	0.0015	0.0016	0.0016	7.30	8.30	0.0078	0.0078	6460	6390
	Maximum	0.0077	0.0031	0.62	144	16.6	0.0901	0.0385	0.486	0.254	3.40	3.27	0.0075	0.0075	0.750	0.750	23.7	23.3	0.025	0.025	8250	7750
	% of values undetected	91%	91%	18%		18%	27%	64%	73%	73%			100%	100%	91%	100%			91%	91%		
	# of values between MDL and MRL		1	9		1	2	1	1	1							1	1	1	1		
	Chronic Aquatic Life Criteria (CALC)[1]	NA	0.0052	NA	87	87	NA	NA	150	150	NA	NA	NA	NA	NA	NA	NA	NA	0.076	0.075	NA	NA
	Drinking Water Standards (DWS)[2]	NA	0.2	NA	NA	NA	6	NA	10	NA	2,000	NA	4	NA	NA	NA	NA	NA	5	NA	NA	NA
	% of CALC exceedences	0%	0%	0%	36%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sampling Station GS22																						
	Sample Date																					
	07/14/05	**0.0013**	**0.0013**	**0.26**	17.0	3.05	0.0178	0.0154	**0.125**	**0.125**	1.76	1.65	**0.0075**	**0.0075**	**0.0016**	**0.0016**	**7.80**	**7.30**	**0.0078**	**0.0078**	2920	2830
	08/09/05	**0.0013**	**0.0013**	**0.26**	7.35	3.04	0.0166	0.0112	**0.125**	**0.125**	1.96	1.91	**0.0075**	**0.0075**	0.0102	**0.0016**	16.5	14.8	**0.0078**	**0.0078**	2960	2950
	09/10/05	**0.0013**	**0.0013**	**0.39**	33.7	7.76	0.0130		**0.125**	**0.125**	1.01	0.792	**0.0075**	**0.0075**	**0.0016**	**0.0016**	**5.00**	12.6	**0.0078**	**0.0078**	1090	1020
	10/06/05	**0.0013**	**0.0034**	**0.19**	6.11	2.69	**0.0050**	0.0108	**0.281**	**0.125**	2.05	2.04	**0.0075**	**0.0075**	**0.0050**	**0.0016**	**5.00**	12.2	**0.0078**	**0.0078**	3370	3080
	Mean	0.0013	0.0018	0.28	16.0	4.14	0.013	0.0125	0.164	0.125	1.70	1.60	0.0075	0.0075	0.0046	0.0016	9.00	11.7	0.0078	0.0078	2590	2470
	Median	0.0013	0.0013	0.26	12.2	3.05	0.015	0.0112	0.125	0.125	1.86	1.78	0.0075	0.0075	0.0033	0.0016	6.00	12.4	0.0078	0.0078	2940	2890
	St. Deviation	0	0.0011	0.08	12.7	2.42	0.006	0.0025	0.078	0	0.47	0.56	0	0	0.0041	0	5	3.2	0	0	1020	970
	# of values	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Minimum	0.0013	0.0013	0.19	6.11	2.69	0.0050	0.0108	0.125	0.125	1.01	0.792	0.0075	0.0075	0.0016	0.0016	5.00	7.30	0.0078	0.0078	1090	1020
	Maximum	0.0013	0.0034	0.39	33.7	7.76	0.0178	0.0154	0.281	0.125	2.05	2.04	0.0075	0.0075	0.0102	0.0016	16.5	14.8	0.0078	0.0078	3370	3080
	% of values undetected	100%	75%				25%		75%	100%			100%	100%	75%	100%	50%		100%	100%		
	# of values between MDL and MRL		1	4					1								1	1				
	Chronic Aquatic Life Criteria (CALC)[1]	NA	0.0052	NA	87	87	NA	NA	150	150	NA	NA	NA	NA	NA	NA	NA	NA	0.025	0.026	NA	NA
	Drinking Water Standards (DWS)[2]	NA	0.2	NA	NA	NA	6	NA	10	NA	2,000	NA	4	NA	NA	NA	NA	NA	5	NA	NA	NA
	% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

Parameters	Chromium[4,6]		Cobalt		Copper[4]		Iron		Lead[4]		Magnesium		Manganese		Mercury[7]	Molybdenum		Nickel[4]		Potassium	
Total/Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Total	Dissolved	Total	Dissolved	Total	Dissolved
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station GS21																					
Sample Date																					
08/18/04	0.211	0.260	0.114	**0.0975**	0.774	0.716	111	54.5	**0.050**	**0.100**	427	440	9.26	8.79	0.001	**0.636**	**0.536**	0.271	0.461	320	350
09/26/04	0.215	**0.100**	0.121	**0.0947**	2.03	1.70	132	65.9	0.562	0.400	436	430	11.6	10.8	**0.0005**	**0.544**	**0.547**	0.338	0.336	305	320
10/15/04	**0.050**	**0.050**	**0.0943**	**0.0634**	4.45	1.56	68.4	**16.1**	0.610	0.432	407	379	4.49	3.30	**0.0005**	**0.585**	**0.569**	0.312	0.282	278	271
02/15/05	0.343	0.458	0.102	0.0736	0.268	0.314	79.7	66.8	**0.050**	0.115	503	464	5.58	5.27	**0.0005**	0.506	0.452	0.349		259	253
04/02/05	**0.036**	**0.036**	0.0399	0.0541	0.296		63.1	53.5	**0.035**		445	452	3.97	3.93	**0.00015**	0.243		0.103		224	245
05/03/05	**0.036**	**0.036**	0.0444	0.0371	0.475		50.0	10.1	**0.035**		406	384	2.53	1.66	**0.00015**	0.550	0.432	**0.045**		233	233
06/13/05	**0.100**	0.292	0.0326	0.0266	0.344	0.356	25.3	**8.3**	**0.016**		345	344	2.41	2.20	**0.00045**	0.556	0.527	0.353		247	251
07/13/05	0.402	0.297	0.0456	0.0414	14.8	0.344	68.2	37.1	**0.050**	0.135	360	354	3.94	3.63	**0.00045**	0.671	0.684	0.279		261	268
08/09/05	0.392	0.282	0.146	0.0874	0.991	0.616	171	31.9	**0.050**	0.136	469	412	10.1	7.00	**0.00045**	0.583	0.555	0.392		301	302
09/09/05	1.46	0.951	0.109	0.0852	1.33	0.573	136	48.4	**0.050**	0.174	451	431	6.44	4.96	**0.00045**	0.534	0.601	0.435		307	311
10/06/05	0.380	**0.031**	0.0696	0.0762	0.513	0.429	59.8	**18.9**	**0.050**	0.131	419	401	4.99	4.13	**0.00045**	0.552	0.603	0.337		287	261
Mean	0.33	0.25	0.0830	0.0670	2.40	0.734	88.0	37.4	0.14	0.203	424	408	5.90	5.10	0.00046	0.542	0.551	0.292	0.36	275	279
Median	0.22	0.26	0.0943	0.0736	0.774	0.573	68.4	37.1	0.050	0.136	427	412	4.99	4.13	0.0004495	0.552	0.551	0.337	0.336	278	268
St. Deviation	0.4	0.272	0.039	0.0244	4.3	0.527	44	21.8	0.22	0.133	45	39	3.1	2.8	0.00022	0.11	0.073	0.118	0.092	32	37
# of values	11	11	11	11	11	9	11	11	11	8	11	11	11	11	11	11	10	11	3	11	11
Minimum	0.036	0.031	0.0326	0.0266	0.268	0.314	25.3	8.28	0.016	0.100	345	344	2.41	1.66	0.00015	0.243	0.432	0.0450	0.282	224	233
Maximum	1.46	0.951	0.146	0.0975	14.8	1.70	171	66.8	0.610	0.432	503	464	11.6	10.8	0.001	0.671	0.684	0.435	0.461	320	350
% of values undetected	36%	45%							82%	13%					91%			9%			
# of values between MDL and MRL			1	3				3								3	3				
Chronic Aquatic Life Criteria (CALC)[1]	10.98	10.56	NA	NA	2.160	2.074	1000	1000	0.360	0.374	NA	NA	NA	NA	0.012	NA	NA	12.26	12.22	NA	NA
Drinking Water Standards (DWS)[2]	100	NA	NA	NA	NA	NA	NA	NA	15	NA	NA	NA	50	NA	2	NA	NA	100	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	18%	0%	0%	0%	18%	25%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sampling Station GS22																					
Sample Date																					
07/14/05	0.364	0.411	0.0214	0.0118	0.332		23.4	**10.0**	**0.0155**		250	236	0.277	**0.100**	**0.00045**	0.418	0.415	0.130		361	360
08/09/05	**0.152**	0.227	0.0220	0.0310	0.274	0.358	**3.1**	**3.1**	**0.0155**		243	244	**0.100**	**0.100**	**0.00045**	0.354	0.339	0.149		370	374
09/10/05	0.899	0.757	0.0410	0.0322	0.487	0.378	47.9	22.5	**0.0155**		117	109	1.46	0.998	**0.0025**	0.155		**0.0500**		190	192
10/06/05	0.395	**0.031**	0.0226	0.0324	0.243	0.285	**7.3**	**3.1**	**0.0155**		289	284	**0.135**	**0.083**	**0.00045**	0.365	0.401	0.166		401	376
Mean	0.453	0.36	0.0270	0.0269	0.334	0.340	20.4	10	0.0155		225	218	0.490	0.32	0.00096	0.323	0.385	0.120		331	326
Median	0.380	0.32	0.0220	0.0316	0.303	0.358	15.3	7.0	0.0155		247	240	0.210	0.10	0.00045	0.360	0.401	0.140		366	367
St. Deviation	0.317	0.309	0.01	0.0101	0.108	0.049	20.3	9	0	NA	75	76	0.65	0.45	0.00103	0.115	0.04	0.05	NA	95	89
# of values	4	4	4	4	4	3	4	4	4	0	4	4	4	4	4	4	3	4	0	4	4
Minimum	0.152	0.031	0.0214	0.0118	0.243	0.285	3.1	3.1	0.0155		117	109	0.100	0.083	0.0004495	0.155	0.339	0.0500		190	192
Maximum	0.899	0.757	0.0410	0.0324	0.487	0.378	47.9	22.5	0.0155		289	284	1.46	0.998	0.0025	0.418	0.415	0.166		401	376
% of values undetected		25%					25%	75%	100%				25%	50%	100%			25%			
# of values between MDL and MRL	1						1						1	1							
Chronic Aquatic Life Criteria (CALC)[1]	6.132	5.274	NA	NA	0.592	0.568	1000	1000	0.052	0.066	NA	NA	NA	NA	0.012	NA	NA	3.40	3.39	NA	NA
Drinking Water Standards (DWS)[2]	100	NA	NA	NA	NA	NA	NA	NA	15	NA	NA	NA	50	NA	2	NA	NA	100	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%		0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%		0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

	Parameters	Selenium		Silicon	Silver[8]		Sodium		Thallium		Tin		Vanadium		Zinc[4]	
	Total/Dissolved	Total	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station GS21																
	Sample Date															
	08/18/04	**0.155**	**0.155**	2920	**0.0031**	**0.0031**	1560	1710	**0.0125**	**0.0125**	**0.155**	**0.155**	0.683	0.431	**0.75**	
	09/26/04	**0.155**	**0.155**	2730	**0.0031**	**0.0031**	1590	1770	**0.0125**	**0.0125**	**0.155**	**0.155**	0.513	0.46	15.9	18.7
	10/15/04	**0.155**	**0.155**	2690	**0.0031**	**0.0031**	1780	1710	**0.0125**	**0.0125**	**0.155**	**0.155**	0.439	**0.266**	8.28	6.56
	02/15/05	**0.0775**	**0.0775**	2610	**0.0031**	**0.0031**	1600	1560	**0.0031**	**0.0031**	**0.031**	**0.031**	**0.10**	**0.10**	**0.75**	2.02
	04/02/05	**0.0492**	**0.0817**	2530	**0.0014**	**0.005**	1090		**0.0021**	**0.0021**	0.461	**0.0302**	0.206	0.191	**0.50**	1.62
	05/03/05	**0.0752**	**0.0716**	2600	**0.0014**	**0.0014**	1250	1270	**0.0021**	**0.0021**	**0.0675**	**0.0302**	0.349	0.221	1.34	2.00
	06/13/05	**0.0775**	**0.0775**	2190	**0.0031**	**0.0031**	1360	1370	**0.0031**	**0.0031**	**0.031**	**0.031**	**0.388**	**0.361**	1.51	2.38
	07/13/05	**0.0775**	**0.0775**	2340	**0.0031**	**0.0031**	1520	1540	**0.0031**	**0.0031**	**0.031**	**0.031**	**0.339**	**0.329**	11.0	
	08/09/05	**0.0775**	**0.0775**	2730	**0.0031**	**0.0031**	1500	1500	**0.0031**	**0.0031**	**0.031**	**0.031**	0.736	**0.10**	2.06	2.08
	09/09/05	**0.0775**	**0.0775**	2720	**0.0031**	**0.0031**	1480	1570	**0.0031**	**0.0031**	**0.031**	**0.031**	**0.10**	**0.10**	2.07	2.78
	10/06/05	**0.0775**	**0.0775**	3030	**0.0031**	**0.0031**	1520	1460	**0.0031**	**0.0031**	**0.031**	**0.031**	**0.333**	0.551	**0.75**	1.71
	Mean	0.0960	0.0980	2640	0.0028	0.0031	1480	1550	0.0050	0.0050	0.11	0.060	0.381	0.283	4.1	4.43
	Median	0.0775	0.0775	2690	0.0031	0.0031	1520	1550	0.0031	0.0031	0.031	0.031	0.349	0.266	1.5	2.08
	St. Deviation	0.039	0.036	240	0.0007	0.0008	190	160	0.005	0.005	0.13	0.06	0.208	0.157	5.2	5.56
	# of values	11	11	11	11	11	11	10	11	11	11	11	11	11	11	9
	Minimum	0.0492	0.0716	2190	0.0014	0.0014	1090	1270	0.0021	0.0021	0.031	0.0302	0.10	0.10	0.50	1.62
	Maximum	0.155	0.155	3030	0.0031	0.005	1780	1770	0.0125	0.0125	0.461	0.155	0.736	0.551	15.9	18.7
	% of values undetected	82%	82%		100%	100%			100%	100%	82%	100%	18%	27%	36%	0%
	# of values between MDL and MRL	2	2								1		3	3		
	Chronic Aquatic Life Criteria (CALC)[1]	5	4.6	NA	0.214	0.182	NA	NA	NA	NA	NA	NA	NA	NA	28.09	27.70
	Drinking Water Standards (DWS)[2]	50	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA
	% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sampling Station GS22																
	Sample Date															
	07/14/05	**0.0775**	**0.0775**	1960	**0.0031**	**0.0031**	1480	1460	**0.0031**	**0.0031**	**0.031**	**0.031**	0.438	0.403	13.2	10.2
	08/09/05	**0.0775**	**0.0775**	2130	**0.0031**	**0.0031**	1320	1370	**0.0031**	**0.0031**	**0.031**	**0.031**	**0.347**	**0.25**	**0.75**	**0.75**
	09/10/05	**0.0775**	**0.0775**	1760	**0.0031**	**0.0031**	941	953	**0.0031**	**0.0031**	**0.031**	**0.031**	**0.10**	**0.368**	1.52	2.31
	10/06/05	**0.175**	**0.0775**	2530	**0.0031**	**0.0031**	1490	1460	**0.0031**	**0.0031**	**0.031**	**0.031**	**0.38**	0.705	**0.75**	**0.75**
	Mean	0.102	0.0775	2100	0.0031	0.0031	1310	1310	0.0031	0.0031	0.031	0.031	0.32	0.432	4.0	4.0
	Median	0.0780	0.0775	2050	0.0031	0.0031	1400	1420	0.0031	0.0031	0.031	0.031	0.36	0.386	1.0	2.0
	St. Deviation	0.049	0	330	0	0	260	240	0	0	0	0	0.15	0.194	6	5
	# of values	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Minimum	0.0775	0.0775	1760	0.0031	0.0031	941	953	0.0031	0.0031	0.031	0.031	0.10	0.25	0.75	0.75
	Maximum	0.175	0.0775	2530	0.0031	0.0031	1490	1460	0.0031	0.0031	0.031	0.031	0.438	0.705	13.2	10.2
	% of values undetected	75%	100%		100%	100%			100%	100%	100%	100%	25%		50%	50%
	# of values between MDL and MRL	1											2	2		
	Chronic Aquatic Life Criteria (CALC)[1]	5	4.6	NA	0.016	0.013	NA	NA	NA	NA	NA	NA	NA	NA	7.78	7.67
	Drinking Water Standards (DWS)[2]	50	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA
	% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	25%
	% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

	Parameters	Hardness	pH Field Measurement	Temperature Field Measurement	Specific Conductance	Total Dissolved Solids	Total Suspended Solids	Acidity	Alkalinity	Nitrate+Nitrite (as N)	Nitrite (as N)	Nitrate (as N)	Total Ammonia (as N)[3]	Total Phosphorus	Ortho-phosphate	Chloride	Fluoride	Sulfate
	Total/Dissolved																	
	Units	mg/L	pH Units	°C	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sampling Station PSC																		
	Sample Date																	
	07/13/05	9.97	8.36	10.81	25	16.3	0.6	**2.0**	**5.5**	0.178			**0.0155**	0.063		0.800	**0.016**	2.95
	Mean	9.97	8.36	10.81	25	16.3	0.6	2.0	5.5	0.178	NA	NA	0.0155	0.063	NA	0.800	0.016	2.95
	Median	9.97	8.36	10.81	25	16.3	0.6	2.0	5.5	0.178	NA	NA	0.0155	0.063	NA	0.800	0.016	2.95
	St. Deviation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	# of values	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1
	Minimum	9.97	8.36	10.81	25	16.3	0.6	2.0	5.5	0.178	NA	NA	0.0155	0.063	NA	0.800	0.016	2.95
	Maximum	9.97	8.36	10.81	25	16.3	0.6	2.0	5.5	0.178	NA	NA	0.0155	0.063	NA	0.800	0.016	2.95
	% of values undetected												100%				100%	
	# of values between MDL and MRL							1	1									
	Chronic Aquatic Life Criteria (CALC)[1]	NA	>6.5 and <8.5	NA	NA	NA	NA	NA	>=20	NA	NA	NA	1.38	NA	NA	230	NA	NA
	Drinking Water Standards (DWS)[2]	NA	>6.0 and <8.5	NA	NA	500	NA	NA	NA	10	NA	NA	NA	NA	NA	250	4	250
	% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	100%	0%	NA	NA	0%	0%	NA	0%	0%	0%
	% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	NA	NA	0%	0%	NA	0%	0%	0%
Sampling Station PSD																		
	Sample Date																	
	07/13/05	14.2	6.92	9.03	35	23.8	**0.2**	**0.79**	**9.75**	0.139			**0.0155**	0.054		0.852	**0.016**	4.19
															NA			
	Mean	14.2	6.92	9.03	35	23.8	0.2	0.79	9.75	0.139	NA	NA	0.0155	0.054	NA	0.852	0.016	4.19
	Median	14.2	6.92	9.03	35	23.8	0.2	0.79	9.75	0.139	NA	NA	0.0155	0.054	NA	0.852	0.016	4.19
	St. Deviation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	# of values	1	1	1	1	1	1	1	1	1	0	0	1	1	0	1	1	1
	Minimum	14.2	6.92	9.03	35	23.8	0.2	0.79	9.75	0.139	NA	NA	0.0155	0.054	NA	0.852	0.016	4.19
	Maximum	14.2	6.92	9.03	35	23.8	0.2	0.79	9.75	0.139	NA	NA	0.0155	0.054	NA	0.852	0.016	4.19
	% of values undetected							100%					100%				100%	
	# of values between MDL and MRL						1		1									
	Chronic Aquatic Life Criteria (CALC)[1]	NA	>6.5 and <8.5	NA	NA	NA	NA	NA	>=20	NA	NA	NA	6.08	NA	NA	230	NA	NA
	Drinking Water Standards (DWS)[2]	NA	>6.0 and <8.5	NA	NA	500	NA	NA	NA	10	NA	NA	NA	NA	NA	250	4	250
	% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	100%	0%	NA	NA	0%	0%	NA	0%	0%	0%
	% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	NA	NA	0%	0%	NA	0%	0%	0%
Sampling Station SWQ1																		
	Sample Date																	
	08/30/06	6.39	5.05	7.19	20	26.2	**0.25**	**1.57**	**1.55**	0.165	**0.016**	0.152	**0.0155**	**0.0016**	**0.0500**	0.633	**0.016**	2.32
	10/04/07	7.0	2.80	5.33	20	**10.0**	**2.5**	**5.0**	**10**	0.67			**0.25**	**0.0050**		**1.2**	**0.050**	**1.5**
	Mean	6.7	3.93	6.26	20	18.0	1.4	3.3	6.0	0.42	0.016	0.152	0.13	0.0033	0.0500	0.90	0.033	1.90
	Median	6.7	3.93	6.26	20	18.0	1.4	3.3	6.0	0.42	0.016	0.152	0.13	0.0033	0.0500	0.90	0.033	1.90
	St. Deviation	0.4	1.59	1.32	0	11	1.6	2.4	6	0.36	NA	NA	0.17	0.0024	NA	0.4	0.024	0.6
	# of values	2	2	2	2	2	2	2	2	2	1	1	2	2	1	2	2	2
	Minimum	6.39	2.8	5.33	20	10.0	0.25	1.57	1.55	0.165	0.016	0.152	0.0155	0.0016	0.0500	0.633	0.016	1.5
	Maximum	7.0	5.05	7.19	20	26.2	2.5	5.0	10	0.67	0.016	0.152	0.25	0.0050	0.0500	1.2	0.05	2.32
	% of values undetected						100%	100%	100%		100%		100%	100%			100%	
	# of values between MDL and MRL					1									1	1		1
	Chronic Aquatic Life Criteria (CALC)[1]	NA	>6.5 and <8.5	NA	NA	NA	NA	NA	>=20	NA	NA	NA	7.09	NA	NA	230	NA	NA
	Drinking Water Standards (DWS)[2]	NA	>6.0 and <8.5	NA	NA	500	NA	NA	NA	10	NA	NA	NA	NA	NA	250	4	250
	% of CALC exceedences	0%	100%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	% of DWS exceedences	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

Parameters	Total Cyanide	Cyanide WAD[5]	Thiocyanate	Aluminum		Antimony		Arsenic		Barium		Beryllium		Bismuth		Boron		Cadmium[4]		Calcium	
Total/Dissolved				Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Units	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station PSC																					
Sample Date																					
07/13/05	**0.0013**	**0.0013**	**0.28**	47.1	8.69	0.0174	0.0184	0.727	**0.439**	1.92	1.64	**0.0075**	**0.0075**	**0.0016**	**0.0016**	16.9	17.6	**0.0078**	**0.0078**	3490	3330
Mean	0.0013	0.0013	0.28	47.1	8.69	0.0174	0.0184	0.727	0.439	1.92	1.64	0.0075	0.0075	0.0016	0.0016	16.9	17.6	0.0078	0.0078	3490	3330
Median	0.0013	0.0013	0.28	47.1	8.69	0.0174	0.0184	0.727	0.439	1.92	1.64	0.0075	0.0075	0.0016	0.0016	16.9	17.6	0.0078	0.0078	3490	3330
St. Deviation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
# of values	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Minimum	0.0013	0.0013	0.28	47.1	8.69	0.0174	0.0184	0.727	0.439	1.92	1.64	0.0075	0.0075	0.0016	0.0016	16.9	17.6	0.0078	0.0078	3490	3330
Maximum	0.0013	0.0013	0.28	47.1	8.69	0.0174	0.0184	0.727	0.439	1.92	1.64	0.0075	0.0075	0.0016	0.0016	16.9	17.6	0.0078	0.0078	3490	3330
% of values undetected	100%	100%										100%	100%	100%	100%			100%	100%		
# of values between MDL and MRL			1						1												
Chronic Aquatic Life Criteria (CALC)[1]	NA	0.0052	NA	87	87	NA	NA	150	150	NA	NA	NA	NA	NA	NA	NA	NA	0.049	0.049	NA	NA
Drinking Water Standards (DWS)[2]	NA	0.2	NA	NA	NA	6	NA	10	NA	2,000	NA	4	NA	NA	NA	NA	NA	5	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sampling Station PSD																					
Sample Date																					
07/13/05	**0.0013**	**0.0013**	**0.23**	10.6	5.38	0.0102	**0.0050**	0.553	**0.407**	1.90	1.97	**0.0075**	**0.0075**	**0.0016**	**0.0016**	14.1	11.9	**0.0078**	**0.0078**	5190	5330
Mean	0.0013	0.0013	0.23	10.6	5.38	0.0102	0.0050	0.553	0.407	1.90	1.97	0.0075	0.0075	0.0016	0.0016	14.1	11.9	0.0078	0.0078	5190	5330
Median	0.0013	0.0013	0.23	10.6	5.38	0.0102	0.0050	0.553	0.407	1.90	1.97	0.0075	0.0075	0.0016	0.0016	14.1	11.9	0.0078	0.0078	5190	5330
St. Deviation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
# of values	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Minimum	0.0013	0.0013	0.23	10.6	5.38	0.0102	0.0050	0.553	0.407	1.90	1.97	0.0075	0.0075	0.0016	0.0016	14.1	11.9	0.0078	0.0078	5190	5330
Maximum	0.0013	0.0013	0.23	10.6	5.38	0.0102	0.0050	0.553	0.407	1.90	1.97	0.0075	0.0075	0.0016	0.0016	14.1	11.9	0.0078	0.0078	5190	5330
% of values undetected	100%	100%					100%					100%	100%	100%	100%			100%	100%		
# of values between MDL and MRL			1						1												
Chronic Aquatic Life Criteria (CALC)[1]	NA	0.0052	NA	87	87	NA	NA	150	150	NA	NA	NA	NA	NA	NA	NA	NA	0.064	0.063	NA	NA
Drinking Water Standards (DWS)[2]	NA	0.2	NA	NA	NA	6	NA	10	NA	2,000	NA	4	NA	NA	NA	NA	NA	5	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sampling Station SWQ1																					
Sample Date																					
08/30/06	**0.0025**	**0.0025**	**0.16**	9.69	5.18	**0.0075**	0.0158	**0.155**	0.411	1.06	1.12	**0.0125**	**0.0125**	**0.0075**	**0.0075**	5.27	7.13	**0.0185**	**0.0185**	2280	2160
10/04/07	**0.0025**	**0.0025**	**0.050**	61.0	29.0	**0.200**	**0.200**	**0.250**	**0.250**	4.80	5.20	**0.0500**	**0.0500**	**20**	**20**	9.10	10.1	**0.0500**	**0.0500**	1400	2100
Mean	0.0025	0.0025	0.10	35.0	17.0	0.10	0.110	0.200	0.330	2.90	3.20	0.0310	0.0310	10	10	7.20	8.60	0.034	0.034	1840	2130
Median	0.0025	0.0025	0.10	35.0	17.0	0.10	0.110	0.200	0.330	2.90	3.20	0.0310	0.0310	10	10	7.20	8.60	0.034	0.034	1840	2130
St. Deviation	0	0	0.07	36	17	0.1	0.13	0.07	0.11	2.6	2.9	0.027	0.027	14	14	2.7	2.1	0.022	0.022	620	40
# of values	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Minimum	0.0025	0.0025	0.05	9.69	5.18	0.0075	0.0158	0.155	0.250	1.06	1.12	0.0125	0.0125	0.0075	0.0075	5.27	7.13	0.0185	0.0185	1400	2100
Maximum	0.0025	0.0025	0.155	61.0	29.0	0.200	0.200	0.250	0.411	4.80	5.20	0.0500	0.0500	20	20	9.10	10.1	0.0500	0.0500	2280	2160
% of values undetected	100%	100%	100%			100%	50%	100%	50%			100%	100%	100%	100%			100%	100%		
# of values between MDL and MRL							1		1												
Chronic Aquatic Life Criteria (CALC)[1]	NA	0.0052	NA	87	87	NA	NA	150	150	NA	NA	NA	NA	NA	NA	NA	NA	0.035	0.036	NA	NA
Drinking Water Standards (DWS)[2]	NA	0.2	NA	NA	NA	6	NA	10	NA	2,000	NA	4	NA	NA	NA	NA	NA	5	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	50%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

Parameters	Chromium[4,6]		Cobalt		Copper[4]		Iron		Lead[4]		Magnesium		Manganese		Mercury[7]	Molybdenum		Nickel[4]		Potassium	
Total/Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Total	Dissolved	Total	Dissolved	Total	Dissolved
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station PSC																					
Sample Date																					
07/13/05	0.352	0.248	0.0934	0.0636	7.13	2.77	47.1	**10.0**	**0.050**	0.132	304	277	1.14	0.251	**0.00045**	0.238	0.245	0.187		163	149
Mean	0.352	0.248	0.0934	0.0636	7.13	2.77	47.1	10.0	0.050	0.132	304	277	1.14	0.251	0.0004495	0.238	0.245	0.187		163	149
Median	0.352	0.248	0.0934	0.0636	7.13	2.77	47.1	10.0	0.050	0.132	304	277	1.14	0.251	0.0004495	0.238	0.245	0.187		163	149
St. Deviation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
# of values	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
Minimum	0.352	0.248	0.0934	0.0636	7.13	2.77	47.1	10.0	0.050	0.132	304	277	1.14	0.251	0.0004495	0.238	0.245	0.187		163	149
Maximum	0.352	0.248	0.0934	0.0636	7.13	2.77	47.1	10.0	0.050	0.132	304	277	1.14	0.251	0.0004495	0.238	0.245	0.187		163	149
% of values undetected								100%	100%						100%						
# of values between MDL and MRL																					
Chronic Aquatic Life Criteria (CALC)[1]	10.98	10.56	NA	NA	1.301	1.249	1000	1000	0.169	0.190	NA	NA	NA	NA	0.012	NA	NA	7.42	7.40	NA	NA
Drinking Water Standards (DWS)[2]	100	NA	NA	NA	NA	NA	NA	NA	15	NA	NA	NA	50	NA	2	NA	NA	100	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%		0%	0%
Sampling Station PSD																					
Sample Date																					
07/13/05	0.249	0.303	0.0200	0.0178	2.99		20.8	**10.0**	**0.016**		305	305	0.207	**0.10**	**0.00045**	0.471	0.482	0.19		104	109
Mean	0.249	0.303	0.0200	0.0178	2.99		20.8	10.0	0.016		305	305	0.207	0.10	0.0004495	0.471	0.482	0.19		104	109
Median	0.249	0.303	0.0200	0.0178	2.99		20.8	10.0	0.016		305	305	0.207	0.10	0.0004495	0.471	0.482	0.19		104	109
St. Deviation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
# of values	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	1	1	1	0	1	1
Minimum	0.249	0.303	0.0200	0.0178	2.99		20.8	10.0	0.016		305	305	0.207	0.10	0.0004495	0.471	0.482	0.19		104	109
Maximum	0.249	0.303	0.0200	0.0178	2.99		20.8	10.0	0.016		305	305	0.207	0.10	0.0004495	0.471	0.482	0.19		104	109
% of values undetected								100%	100%					100%	100%						
# of values between MDL and MRL																					
Chronic Aquatic Life Criteria (CALC)[1]	10.98	10.56	NA	NA	1.760	1.689	1000	1000	0.265	0.285	NA	NA	NA	NA	0.012	NA	NA	10.00	9.97	NA	NA
Drinking Water Standards (DWS)[2]	100	NA	NA	NA	NA	NA	NA	NA	15	NA	NA	NA	50	NA	2	NA	NA	100	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	100%		0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%		0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%		0%	0%	0%		0%	0%	0%	0%	0%	0%	0%	0%		0%	0%
Sampling Station SWQ1																					
Sample Date																					
08/30/06	**0.128**	**0.050**	0.0248	0.0356	0.209	0.309	**12.1**	**3.1**	**0.016**		170	152	0.263	0.312		0.934	0.928	**0.0904**		186	177
10/04/07	**0.30**	**0.40**	**0.12**	**0.13**	**0.6**	1	130	80	**0.050**	**0.050**	**300**	**400**	3.0	3.0	**0.00017**	**0.70**	**0.80**	**0.30**	**0.30**	**300**	**150**
Mean	0.21	0.23	0.070	0.080	0.400	0.700	71.0	42	0.033	0.05	240	280	1.6	1.7	0.00017	0.82	0.86	0.20	0.30	240	164
Median	0.21	0.23	0.070	0.080	0.400	0.700	71.0	42	0.033	0.05	240	280	1.6	1.7	0.00017	0.82	0.86	0.20	0.30	240	164
St. Deviation	0.12	0.25	0.07	0.07	0.28	0.5	83	54	0.024	NA	90	180	1.9	1.9	NA	0.17	0.09	0.15	NA	80	19
# of values	2	2	2	2	2	2	2	2	2	1	2	2	2	2	1	2	2	2	1	2	2
Minimum	0.128	0.05	0.0248	0.0356	0.209	0.309	12.1	3.1	0.0155	0.050	170	152	0.263	0.312	0.00017	0.70	0.80	0.0904	0.30	186	150
Maximum	0.30	0.40	0.12	0.13	0.600	1.00	130	80	0.05	0.05	300	400	3.0	3.0	0.00017	0.934	0.928	0.30	0.300	300	177
% of values undetected		50%						50%	100%	100%					100%			50%	100%		50%
# of values between MDL and MRL	2	1	1	1	1	1	1				1	1				1	1	1		1	
Chronic Aquatic Life Criteria (CALC)[1]	9.095	7.822	NA	NA	0.893	0.857	1000	1000	0.097	0.115	NA	NA	NA	NA	0.012	NA	NA	5.11	5.10	NA	NA
Drinking Water Standards (DWS)[2]	100	NA	NA	NA	NA	NA	NA	NA	15	NA	NA	NA	50	NA	2	NA	NA	100	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

Parameters	Selenium		Silicon	Silver[8]		Sodium		Thallium		Tin		Vanadium		Zinc[4]	
Total/Dissolved	Total	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station PSC															
Sample Date															
07/13/05	**0.0775**	**0.0775**	1540	**0.0031**	**0.0031**	1270	1220	**0.0031**	**0.0031**	**0.031**	**0.031**	**0.329**	0.452	5.25	
Mean	0.0775	0.0775	1540	0.0031	0.0031	1270	1220	0.0031	0.0031	0.031	0.031	0.329	0.452	5.25	
Median	0.0775	0.0775	1540	0.0031	0.0031	1270	1220	0.0031	0.0031	0.031	0.031	0.329	0.452	5.25	
St. Deviation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
# of values	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Minimum	0.0775	0.0775	1540	0.0031	0.0031	1270	1220	0.0031	0.0031	0.031	0.031	0.329	0.452	5.25	
Maximum	0.0775	0.0775	1540	0.0031	0.0031	1270	1220	0.0031	0.0031	0.031	0.031	0.329	0.452	5.25	
% of values undetected	100%	100%		100%	100%			100%	100%	100%	100%				
# of values between MDL and MRL												1			
Chronic Aquatic Life Criteria (CALC)[1]	5	4.6	NA	0.077	0.065	NA	NA	NA	NA	NA	NA	NA	NA	16.99	16.75
Drinking Water Standards (DWS)[2]	50	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Sampling Station PSD															
Sample Date															
07/13/05	**0.0775**	**0.0775**	1700	**0.0031**	**0.0031**	1300	1330	**0.0031**	**0.0031**	**0.031**	**0.031**	**0.31**	0.45	13.8	16.3
Mean	0.0775	0.0775	1700	0.0031	0.0031	1300	1330	0.0031	0.0031	0.031	0.031	0.31	0.45	13.8	16.3
Median	0.0775	0.0775	1700	0.0031	0.0031	1300	1330	0.0031	0.0031	0.031	0.031	0.31	0.45	13.8	16.3
St. Deviation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
# of values	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Minimum	0.0775	0.0775	1700	0.0031	0.0031	1300	1330	0.0031	0.0031	0.031	0.031	0.31	0.45	13.8	16.3
Maximum	0.0775	0.0775	1700	0.0031	0.0031	1300	1330	0.0031	0.0031	0.031	0.031	0.31	0.45	13.8	16.3
% of values undetected	100%	100%		100%	100%			100%	100%	100%	100%				
# of values between MDL and MRL												1			
Chronic Aquatic Life Criteria (CALC)[1]	5	4.6	NA	0.141	0.120	NA	NA	NA	NA	NA	NA	NA	NA	22.92	22.60
Drinking Water Standards (DWS)[2]	50	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sampling Station SWQ1															
Sample Date															
08/30/06	**0.155**	**0.155**	2080	**0.0031**	**0.0031**	1130	1010	**0.0050**	**0.0104**	**0.050**	**0.050**	**0.250**	**0.250**	2.82	1.35
10/04/07	**0.05**	**0.05**	3600	**0.025**	**0.025**	**1400**	**1400**	**0.050**	**0.10**	**0.050**	**0.050**	**0.10**	**0.10**	**1.0**	**3.0**
Mean	0.1	0.1	2840	0.014	0.014	1270	1210	0.028	0.060	0.050	0.050	0.20	0.20	1.9	2.2
Median	0.1	0.1	2840	0.014	0.014	1270	1210	0.028	0.060	0.050	0.050	0.20	0.20	1.9	2.2
St. Deviation	0.07	0.07	1070	0.015	0.015	190	280	0.032	0.06	0	0	0.1	0.1	1.3	1.2
# of values	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Minimum	0.05	0.05	2080	0.0031	0.0031	1130	1010	0.0050	0.0104	0.050	0.050	0.10	0.10	1.0	1.35
Maximum	0.155	0.155	3600	0.025	0.025	1400	1400	0.050	0.10	0.050	0.050	0.25	0.25	2.82	3.0
% of values undetected	100%	100%		100%	100%			100%		100%	100%	100%	100%	50%	
# of values between MDL and MRL						1	1		2						1
Chronic Aquatic Life Criteria (CALC)[1]	5	4.6	NA	0.036	0.031	NA	NA	NA	NA	NA	NA	NA	NA	11.70	11.54
Drinking Water Standards (DWS)[2]	50	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

	Parameters	Hardness	pH Field Measurement	Temperature Field Measurement	Specific Conductance	Total Dissolved Solids	Total Suspended Solids	Acidity	Alkalinity	Nitrate+Nitrite (as N)	Nitrite (as N)	Nitrate (as N)	Total Ammonia (as N)[3]	Total Phosphorus	Ortho-phosphate	Chloride	Fluoride	Sulfate
	Total/Dissolved																	
	Units	mg/L	pH Units	°C	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sampling Station SWQ2																		
	Sample Date																	
	08/30/06	35.4	7.17	7.09	70	53.8	**0.075**	**1.57**	28.0	0.374	**0.016**	0.356	0.213	**0.0050**	**0.0500**	0.960	**0.016**	7.25
	09/13/07	17.0	3.19	6.7	42	20.0	**2.5**	**1.0**	**14**	0.69			**0.025**	**0.0050**		**1.3**	**0.050**	**1.0**
	Mean	26.0	5.18	6.90	56	37.0	1.3	1.3	21	0.53	0.016	0.356	0.12	0.0050	0.0500	1.1	0.033	4.1
	Median	26.0	5.18	6.90	56	37.0	1.3	1.3	21	0.53	0.016	0.356	0.12	0.0050	0.0500	1.1	0.033	4.1
	St. Deviation	13	2.81	0.28	20	24	1.7	0.4	10	0.22	NA	NA	0.13	0	NA	0.2	0.024	4.4
	# of values	2	2	2	2	2	2	2	2	2	1	1	2	2	1	2	2	2
	Minimum	17.0	3.19	6.7	42	20.0	0.075	1.0	14	0.374	0.016	0.356	0.025	0.0050	0.0500	0.960	0.016	1
	Maximum	35.4	7.17	7.09	70	53.8	2.5	1.57	28	0.69	0.016	0.356	0.213	0.0050	0.0500	1.3	0.05	7.25
	% of values undetected						100%	100%			100%		50%	50%			100%	
	# of values between MDL and MRL								1					1	1	1		1
	Chronic Aquatic Life Criteria (CALC)[1]	NA	>6.5 and <8.5	NA	NA	NA	NA	NA	>=20	NA	NA	NA	7.09	NA	NA	230	NA	NA
	Drinking Water Standards (DWS)[2]	NA	>6.0 and <8.5	NA	NA	500	NA	NA	NA	10	NA	NA	NA	NA	NA	250	4	250
	% of CALC exceedences	0%	50%	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	% of DWS exceedences	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sampling Station SWQ3																		
	Sample Date																	
	08/30/06	2.11	7.33	12.02	11	20.0	**0.25**	**3.25**	**1.55**	0.292	**0.016**	0.273	**0.0155**	**0.0016**	**0.0700**	1.32	**0.016**	0.585
	10/04/07	**2.00**	4.62	4.61	17	**5.0**	**2.5**	**1.0**	**10**	0.32			**0.25**	**0.0250**		**1.8**	**0.05**	**0.60**
	Mean	2.10	5.98	8.32	14	13	1.4	2.1	6.0	0.31	0.016	0.273	0.13	0.0130	0.0700	1.6	0.033	0.59
	Median	2.10	5.98	8.32	14	13	1.4	2.1	6.0	0.31	0.016	0.273	0.13	0.0130	0.0700	1.6	0.033	0.59
	St. Deviation	0.1	1.92	5.24	4	11	1.6	1.6	6	0.02	NA	NA	0.17	0.017	NA	0.3	0.024	0.01
	# of values	2	2	2	2	2	2	2	2	2	1	1	2	2	1	2	2	2
	Minimum	2.00	4.62	4.61	11	5.0	0.25	1.0	1.55	0.292	0.016	0.273	0.0155	0.0016	0.0700	1.32	0.016	0.585
	Maximum	2.11	7.33	12.02	17	20	2.5	3.25	10	0.32	0.016	0.273	0.25	0.0250	0.0700	1.8	0.05	0.6
	% of values undetected					50%	100%	50%	100%		100%		100%	100%			100%	
	# of values between MDL and MRL	1						1								1	1	1
	Chronic Aquatic Life Criteria (CALC)[1]	NA	>6.5 and <8.5	NA	NA	NA	NA	NA	>=20	NA	NA	NA	7.08	NA	NA	230	NA	NA
	Drinking Water Standards (DWS)[2]	NA	>6.0 and <8.5	NA	NA	500	NA	NA	NA	10	NA	NA	NA	NA	NA	250	4	250
	% of CALC exceedences	0%	50%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	% of DWS exceedences	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

Parameters	Total Cyanide	Cyanide WAD[5]	Thiocyanate	Aluminum		Antimony		Arsenic		Barium		Beryllium		Bismuth		Boron		Cadmium[4]		Calcium	
Total/Dissolved				Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Units	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station SWQ2																					
Sample Date																					
08/30/06	**0.0008**	**0.0008**	**0.16**	5.93	5.67	**0.0075**	**0.0075**	**0.311**	**0.322**	5.42	5.50	**0.0125**	**0.0125**	**0.0075**	**0.0075**	15.3	16.6	**0.0185**	**0.0185**	13400	13600
09/13/07	**0.0025**	**0.0025**	**0.050**	36.0	18.0	**0.200**	**0.200**	**0.250**	**0.250**	2.40	2.60	**0.0500**	**0.0500**	**20**	**20**	50.0	31.0	**0.0500**	**0.0500**	5900	6000
Mean	0.0016	0.0016	0.1	21.0	12.0	0.10	0.10	0.280	0.290	3.90	4.10	0.0310	0.0310	10	10	33.0	24.0	0.0340	0.0340	9700	10000
Median	0.0016	0.0016	0.1	21.0	12.0	0.10	0.10	0.280	0.290	3.90	4.10	0.0310	0.0310	10	10	33.0	24.0	0.0340	0.0340	9700	10000
St. Deviation	0.0012	0.0012	0.07	21	9	0.1	0.1	0.04	0.05	2.1	2.1	0.027	0.027	14	14	25	10	0.022	0.022	5300	5000
# of values	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Minimum	0.0008	0.0008	0.050	5.93	5.67	0.0075	0.0075	0.250	0.250	2.40	2.60	0.0125	0.0125	0.0075	0.0075	15.3	16.6	0.0185	0.0185	5900	6000
Maximum	0.0025	0.0025	0.16	36.0	18.0	0.200	0.200	0.311	0.322	5.42	5.50	0.0500	0.0500	20	20	50.0	31.0	0.0500	0.0500	13400	13600
% of values undetected	100%	100%	100%			100%	100%	50%	50%			100%	100%	100%	100%			100%	100%		
# of values between MDL and MRL								1	1												
Chronic Aquatic Life Criteria (CALC)[1]	NA	0.0052	NA	87	87	NA	NA	150	150	NA	NA	NA	NA	NA	NA	NA	NA	0.076	0.074	NA	NA
Drinking Water Standards (DWS)[2]	NA	0.2	NA	NA	NA	6	NA	10	NA	2,000	NA	4	NA	NA	NA	NA	NA	5	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sampling Station SWQ3																					
Sample Date																					
08/30/06	**0.0008**	**0.0008**	**0.16**	42.7	21.7	**0.0075**	**0.0075**	**0.155**	**0.155**	2.65	2.32	**0.0125**	**0.0125**	**0.0075**	**0.0075**	**1.25**	**1.25**	**0.0185**	**0.0185**	550	481
10/04/07	**0.0025**	**0.0025**	**0.050**	53.0	25.0	**0.200**	**0.200**	**0.250**	**0.250**	3.10	3.30	**0.0500**	**0.0500**	**20**	**20**	**0.90**	1.4	**0.0500**	**0.0500**	**700**	**600**
Mean	0.0016	0.0016	0.1	48.0	23.0	0.10	0.10	0.200	0.200	2.90	2.80	0.0310	0.0310	10	10	1.1	1.3	0.0340	0.0340	630	540
Median	0.0016	0.0016	0.1	48.0	23.0	0.10	0.10	0.200	0.200	2.90	2.80	0.0310	0.0310	10	10	1.1	1.3	0.0340	0.0340	630	540
St. Deviation	0.0012	0.0012	0.07	7	2	0.1	0.1	0.07	0.07	0.3	0.7	0.027	0.027	14	14	0.2	0.1	0.022	0.022	110	80
# of values	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Minimum	0.0008	0.0008	0.050	42.7	21.7	0.0075	0.0075	0.155	0.155	2.65	2.32	0.0125	0.0125	0.0075	0.0075	0.90	1.25	0.0185	0.0185	550	481
Maximum	0.0025	0.0025	0.16	53.0	25.0	0.200	0.200	0.250	0.250	3.10	3.30	0.0500	0.0500	20	20	1.25	1.4	0.0500	0.0500	700	600
% of values undetected	100%	100%	100%			100%	100%	100%	100%			100%	100%	100%	100%	50%	50%	100%	100%		
# of values between MDL and MRL																1				1	1
Chronic Aquatic Life Criteria (CALC)[1]	NA	0.0052	NA	87	87	NA	NA	150	150	NA	NA	NA	NA	NA	NA	NA	NA	0.015	0.016	NA	NA
Drinking Water Standards (DWS)[2]	NA	0.2	NA	NA	NA	6	NA	10	NA	2,000	NA	4	NA	NA	NA	NA	NA	5	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	100%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

Parameters	Chromium[4,6]		Cobalt		Copper[4]		Iron		Lead[4]		Magnesium		Manganese		Mercury[7]	Molybdenum		Nickel[4]		Potassium	
Total/Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Total	Dissolved	Total	Dissolved	Total	Dissolved
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station SWQ2																					
Sample Date																					
08/30/06	0.502	0.529	0.0312	0.0328	0.365		**12.5**	**15.4**	0.133	0.198	471	486	0.184	0.225		0.457	0.425	0.553		307	321
09/13/07	2.1	**0.05**	**0.025**	**0.025**	**0.25**	**0.25**	**10**	60	**0.050**	**0.050**	**400**	**400**	**2.4**	**0.90**	**0.00017**	**0.25**	**0.25**	**1.0**	**0.30**	**150**	**150**
Mean	1.3	0.29	0.028	0.029	0.31	0.25	11	38	0.090	0.12	440	440	1.3	0.56	0.00017	0.35	0.34	0.80	0.30	229	236
Median	1.3	0.29	0.028	0.029	0.31	0.25	11	38	0.090	0.12	440	440	1.3	0.56	0.00017	0.35	0.34	0.80	0.30	229	236
St. Deviation	1.1	0.34	0.004	0.006	0.08	NA	2	32	0.06	0.1	50	60	1.6	0.48	NA	0.15	0.12	0.3	NA	111	121
# of values	2	2	2	2	2	1	2	2	2	2	2	2	2	2	1	2	2	2	1	2	2
Minimum	0.502	0.05	0.025	0.025	0.25	0.25	10	15.4	0.050	0.050	400	400	0.184	0.225	0.00017	0.25	0.25	0.553	0.30	150	150
Maximum	2.1	0.529	0.0312	0.0328	0.365	0.25	12.5	60	0.133	0.198	471	486	2.4	0.90	0.00017	0.457	0.425	1.0	0.3	307	321
% of values undetected		50%	50%	50%	50%	50%	50%		50%	50%					100%	50%	50%		50%	50%	50%
# of values between MDL and MRL							1	1			1	1	1	1				1			
Chronic Aquatic Life Criteria (CALC)[1]	10.98	10.56	NA	NA	2.147	2.061	1000	1000	0.357	0.371	NA	NA	NA	NA	0.012	NA	NA	12.18	12.14	NA	NA
Drinking Water Standards (DWS)[2]	100	NA	NA	NA	NA	NA	NA	NA	15	NA	NA	NA	50	NA	2	NA	NA	100	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sampling Station SWQ3																					
Sample Date																					
08/30/06	0.217	0.321	0.0446	0.0416	0.441	0.527	97.3	59.3	4.21	0.150	178	161	1.67	1.36		**0.01**	**0.01**	**0.120**		88.0	96.6
10/04/07	**0.40**	0.50	**0.05**	**0.06**	**0.25**	**0.25**	70	**25**	**0.050**	**0.050**	**200**	**200**	**2.2**	**2.1**	**0.00084**	**0.25**	**0.25**	**0.30**	**0.30**	**150**	**150**
Mean	0.31	0.41	0.047	0.051	0.35	0.39	84	42	2.1	0.10	190	180	1.9	1.7	0.00084	0.13	0.13	0.20	0.30	120	123
Median	0.31	0.41	0.047	0.051	0.35	0.39	84	42	2.1	0.10	190	180	1.9	1.7	0.00084	0.13	0.13	0.20	0.30	120	123
St. Deviation	0.13	0.13	0.004	0.013	0.14	0.2	19	24	2.9	0.1	20	30	0.4	0.5	NA	0.17	0.17	0.1	NA	40	38
# of values	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	2	2	1	2	2
Minimum	0.217	0.321	0.0446	0.0416	0.25	0.25	70	25	0.050	0.050	178	161	1.67	1.36	0.00084	0.0145	0.01	0.120	0.30	88	96.6
Maximum	0.40	0.50	0.05	0.06	0.441	0.527	97.3	59.3	4.21	0.15	200	200	2.2	2.1	0.00084	0.25	0.25	0.30	0.3	150	150
% of values undetected					50%	50%		50%	50%	50%						100%	100%	50%	50%	50%	50%
# of values between MDL and MRL	1		1	1							1	1	1	1	1			1			
Chronic Aquatic Life Criteria (CALC)[1]	3.507	3.016	NA	NA	0.330	0.317	1000	1000	0.022	0.030	NA	NA	NA	NA	0.012	NA	NA	1.91	1.90	NA	NA
Drinking Water Standards (DWS)[2]	100	NA	NA	NA	NA	NA	NA	NA	15	NA	NA	NA	50	NA	2	NA	NA	100	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	50%	50%	0%	0%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

Parameters	Selenium		Silicon	Silver[8]		Sodium		Thallium		Tin		Vanadium		Zinc[4]	
Total/Dissolved	Total	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station SWQ2															
Sample Date															
08/30/06	**0.155**	**0.155**	2190	**0.0031**	**0.0031**	1320	1410	**0.0160**	**0.0050**	**0.050**	**0.050**	**0.714**	**0.728**	2.70	2.65
09/13/07	**0.05**	**0.05**	3400	**0.025**	**0.025**	**1400**	**1300**	**0.050**	**0.050**	**0.050**	**1**	**0.40**	**0.20**	**1.0**	**1.0**
Mean	0.1	0.1	2800	0.014	0.014	1360	1360	0.03	0.028	0.050	0.500	0.56	0.46	2.0	1.8
Median	0.1	0.1	2800	0.014	0.014	1360	1360	0.03	0.028	0.050	0.500	0.56	0.46	2.0	1.8
St. Deviation	0.07	0.07	860	0.015	0.015	60	80	0.02	0.032	0	0.7	0.22	0.37	1	1.2
# of values	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Minimum	0.05	0.05	2190	0.0031	0.0031	1320	1300	0.016	0.0050	0.05	0.05	0.40	0.20	1.0	1.0
Maximum	0.155	0.155	3400	0.025	0.025	1400	1410	0.050	0.050	0.05	1	0.714	0.728	2.7	2.65
% of values undetected	100%	100%		100%	100%			50%	100%	100%	100%			50%	50%
# of values between MDL and MRL						1	1	1				2	2		
Chronic Aquatic Life Criteria (CALC)[1]	5	4.6	NA	0.211	0.179	NA	NA	NA	NA	NA	NA	NA	NA	27.92	27.53
Drinking Water Standards (DWS)[2]	50	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Sampling Station SWQ3															
Sample Date															
08/30/06	**0.155**	**0.155**	2510	**0.0031**	**0.0031**	1420	1480	**0.0140**	**0.0050**	**0.050**	**0.050**	**0.250**	**0.250**	6.97	3.70
10/04/07	**0.05**	**0.05**	2800	**0.025**	**0.025**	**1500**	**1400**	**0.050**	**0.050**	**0.25**	**0.050**	**0.10**	**0.10**	**1.0**	**2.0**
Mean	0.1	0.1	2660	0.014	0.014	1460	1440	0.030	0.028	0.20	0.050	0.20	0.20	4.0	3.0
Median	0.1	0.1	2660	0.014	0.014	1460	1440	0.030	0.028	0.20	0.050	0.20	0.20	4.0	3.0
St. Deviation	0.07	0.07	210	0.015	0.015	60	60	0.03	0.032	0.1	0	0.1	0.1	4.2	1
# of values	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Minimum	0.05	0.05	2510	0.0031	0.0031	1420	1400	0.0140	0.0050	0.05	0.05	0.10	0.10	1.0	2.0
Maximum	0.155	0.155	2800	0.025	0.025	1500	1480	0.050	0.050	0.25	0.05	0.25	0.25	6.97	3.7
% of values undetected	100%	100%		100%	100%			50%	100%	100%	100%	100%	100%	50%	
# of values between MDL and MRL						1	1	1							1
Chronic Aquatic Life Criteria (CALC)[1]	5	4.6	NA	0.005	0.004	NA	NA	NA	NA	NA	NA	NA	NA	4.37	4.30
Drinking Water Standards (DWS)[2]	50	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA
% of CALC exceedences	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

	Parameters	Hardness	pH Field Measurement	Temperature Field Measurement	Specific Conductance	Total Dissolved Solids	Total Suspended Solids	Acidity	Alkalinity	Nitrate+Nitrite (as N)	Nitrite (as N)	Nitrate (as N)	Total Ammonia (as N)[3]	Total Phosphorus	Ortho-phosphate	Chloride	Fluoride	Sulfate
	Total/Dissolved																	
	Units	mg/L	pH Units	°C	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Sampling Station SWQ4																		
	Sample Date																	
	08/30/06	27.2	7.39	7.63	125	86.2	2.5	**1.57**	16.0	0.614	**0.016**	0.594	**0.0155**	**0.0080**	**0.0155**	19.9	**0.0400**	12.5
	10/04/07	19.0	4.74	5.58	51	30.0	**2.5**	**1.0**	**10**	0.46			**0.25**	**0.0050**		**1.3**	**0.05**	3.50
	Mean	23.0	6.07	6.61	88	58.0	2.5	1.3	13	0.54	0.016	0.594	0.13	0.0065	0.0155	11	0.045	8.00
	Median	23.0	6.07	6.61	88	58.0	2.5	1.3	13	0.54	0.016	0.594	0.13	0.0065	0.0155	11	0.045	8.00
	St. Deviation	6	1.87	1.45	52	40	0	0.4	4	0.11	NA	NA	0.17	0.0021	NA	13	0.007	6
	# of values	2	2	2	2	2	2	2	2	2	1	1	2	2	1	2	2	2
	Minimum	19.0	4.74	5.58	51	30.0	2.5	1.0	10	0.46	0.016	0.594	0.0155	0.005	0.0155	1.3	0.04	3.50
	Maximum	27.2	7.39	7.63	125	86.2	2.5	1.57	16	0.614	0.016	0.594	0.25	0.0080	0.0155	19.9	0.05	12.5
	% of values undetected						50%	100%	50%		100%		100%	50%	100%		50%	
	# of values between MDL and MRL													1		1	1	
	Chronic Aquatic Life Criteria (CALC)[1]	NA	>6.5 and <8.5	NA	NA	NA	NA	NA	>=20	NA	NA	NA	7.08	NA	NA	230	NA	NA
	Drinking Water Standards (DWS)[2]	NA	>6.0 and <8.5	NA	NA	500	NA	NA	NA	10	NA	NA	NA	NA	NA	250	4	250
	% of CALC exceedences	0%	50%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	% of DWS exceedences	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Key:
Bold Results = Parameter undetected by test, value shown is 1/2 MDL or 1/2 MRL.
If result was not detected at the lab MDL, the value shown is 1/2 MDL.
If result was flagged U or UJ by validation, the value shown is 1/2 MRL.
Green Results = Estimate result reported by laboratory below reporting limit (MRL).
Red Results = Result exceed applicable Chronic Aquatic Life Criteria and/or Drinking Water Standards.
MDL = Method Detection Limit.
MRL = Method Reporting Limit.
NA = Not Applicable , no limit established.
CALC = ADEC Chronic Aquatic Life Criteria
DWS = Drinking Water Standards -18 AAC 70, Water Quality Standards, under fresh water uses, (6)(A)(i) and (6)(C).
ADEC = Alaska Department of Environmental Conservation
EPA = Environmental Protection Agency
WAD Cyanide = Weak Acid Dissociable Cyanide
mg/L = milligrams per liter
°C = degrees Celcius

Footnotes:
(1) CALC come from the ADEC Alaska Water Quality Criteria Manual – Table III and from the ADEC Water Quality Standards for Fresh Water Uses under use (C).
(2) DWS come from the ADEC Alaska Water Quality Criteria Manual – Table I, the ADEC Water Quality Standards under use (A)(i), and EPA Primary Drinking Water Standards.
(3) Total Ammonia CALC limit dependant on calculated lowest 5th percentile of temperature and pH.
(4) Cadmium, Chromium III, Copper, Lead, Nickel and Zinc CALC limits are dependent on Hardness lowest 5th percentile. CALC cirteria based on hardness are preliminary estimates.
(5) Criterion given is for free cyanide. ADEC has determined that the WAD cyanide method is to be used for analysis and the result is to be applied to the free cyanide criterion.
(6) Criterion given is the more stringent of those avalable for chromium III and chromium VI. Analysis is of total chromium.
(7) The Criterion given for total mercury concentration is based on the Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances, 2002.
(8) Criterion given is an acute criterion, rather than a chronic criterion. No chronic aquatic life criterion has been established for silver.
(9) Precision displayed in values may be less than actual where unit conversions were necessary, esp. Hg, Si, B.

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

	Parameters	Total Cyanide	Cyanide WAD[5]	Thiocyanate	Aluminum		Antimony		Arsenic		Barium		Beryllium		Bismuth		Boron		Cadmium[4]		Calcium	
	Total/Dissolved				Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Units	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station SWQ4																						
	Sample Date																					
	08/30/06	**0.0008**	**0.0008**	**0.16**	32.7	7.04	**0.0075**	**0.0075**	**0.155**	**0.155**	2.80	2.68	**0.0125**	**0.0125**	**0.0075**	**0.0075**	18.9	21.2	**0.0185**	**0.0185**	8240	8010
	10/04/07	**0.0025**	**0.0025**	**0.050**	36.0	**4.00**	**0.200**	**0.200**	**0.250**	**0.250**	2.70	2.80	**0.0500**	**0.0500**	**20**	**20**	15.0	16.5	**0.0500**	**0.0500**	7200	7100
	Mean	0.0016	0.0016	0.1	34.0	5.50	0.10	0.10	0.200	0.200	2.80	2.70	0.0310	0.0310	10	10	17.0	18.9	0.0340	0.0340	7720	7560
	Median	0.0016	0.0016	0.1	34.0	5.50	0.10	0.10	0.200	0.200	2.80	2.70	0.0310	0.0310	10	10	17.0	18.9	0.0340	0.0340	7720	7560
	St. Deviation	0.0012	0.0012	0.07	2	2.1	0.1	0.1	0.07	0.07	0.1	0.1	0.027	0.027	14	14	3	3.3	0.022	0.022	740	640
	# of values	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Minimum	0.0008	0.0008	0.050	32.7	4.00	0.0075	0.0075	0.155	0.155	2.70	2.68	0.0125	0.0125	0.0075	0.0075	15.0	16.5	0.0185	0.0185	7200	7100
	Maximum	0.0025	0.0025	0.16	36.0	7.04	0.200	0.200	0.250	0.250	2.80	2.80	0.0500	0.0500	20	20	18.9	21.2	0.0500	0.0500	8240	8010
	% of values undetected	100%	100%	100%			100%	100%	100%	100%			100%	100%	100%	100%			100%	100%		
	# of values between MDL and MRL					1																
	Chronic Aquatic Life Criteria (CALC)[1]	NA	0.0052	NA	87	87	NA	NA	150	150	NA	NA	NA	NA	NA	NA	NA	NA	0.080	0.078	NA	NA
	Drinking Water Standards (DWS)[2]	NA	0.2	NA	NA	NA	6	NA	10	NA	2,000	NA	4	NA	NA	NA	NA	NA	5	NA	NA	NA
	% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

	Parameters	Chromium[4,6]		Cobalt		Copper[4]		Iron		Lead[4]		Magnesium		Manganese		Mercury[7]	Molybdenum		Nickel[4]		Potassium	
	Total/Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station SWQ4																						
	Sample Date																					
	08/30/06	0.298		0.0756	0.0650	0.461		62.9	33.8	0.100		1620	1870	5.83	5.15		0.570	0.576	0.392		711	784
	10/04/07	**0.30**	0.50	**0.070**	**0.060**	**0.25**	**0.60**	70	**25**	**0.20**	**0.050**	**400**	**400**	4.0	3.6	**0.00048**	**0.60**	**0.60**	**0.30**	**0.30**	**150**	**150**
	Mean	0.30	0.5	0.073	0.060	0.36	0.60	66	29	0.15	0.05	1000	1100	4.9	4.4	0.00048	0.60	0.59	0.35	0.30	431	467
	Median	0.30	0.5	0.073	0.060	0.36	0.60	66	29	0.15	0.05	1000	1100	4.9	4.4	0.00048	0.60	0.59	0.35	0.30	431	467
	St. Deviation	0	NA	0.004	0	0.15	NA	5	6	0.07	NA	900	1000	1.3	1.1	NA	0	0.02	0.07	NA	397	448
	# of values	2	1	2	2	2	1	2	2	2	1	2	2	2	2	1	2	2	2	1	2	2
	Minimum	0.298	0.5	0.070	0.060	0.25	0.60	62.9	25	0.10	0.050	400	400	4.0	3.6	0.00048	0.57	0.58	0.30	0.30	150	150
	Maximum	0.30	0.5	0.0756	0.065	0.461	0.6	70	33.8	0.20	0.05	1620	1870	5.83	5.15	0.00048	0.60	0.60	0.392	0.3	711	784
	% of values undetected					50%			50%		100%								50%	50%	50%	50%
	# of values between MDL and MRL	1		1	1		1			1		1	1			1	1	1				
	Chronic Aquatic Life Criteria (CALC)[1]	10.98	10.56	NA	NA	2.299	2.207	1000	1000	0.395	0.407	NA	NA	NA	NA	0.012	NA	NA	13.03	12.99	NA	NA
	Drinking Water Standards (DWS)[2]	100	NA	NA	NA	NA	NA	NA	NA	15	NA	NA	NA	50	NA	2	NA	NA	100	NA	NA	NA
	% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

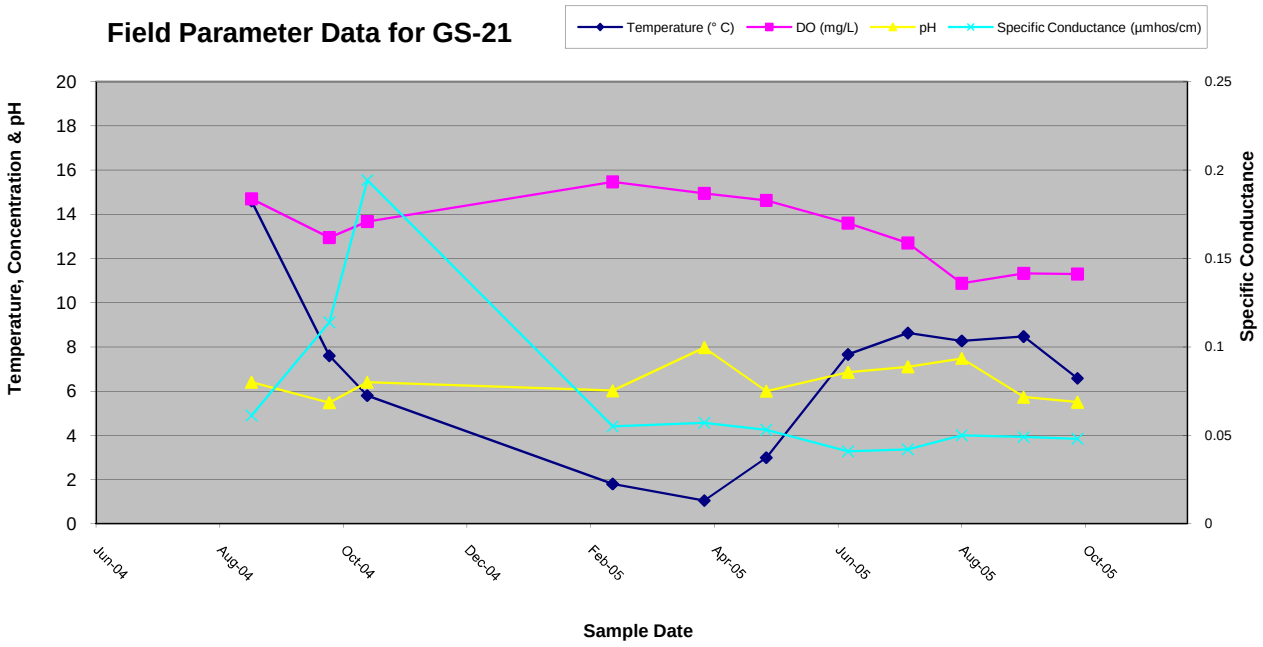
Laboratory Data Tables, Surface Water, Transportation Corridor Study Area, Cook Inlet Drainages, 2004-2007

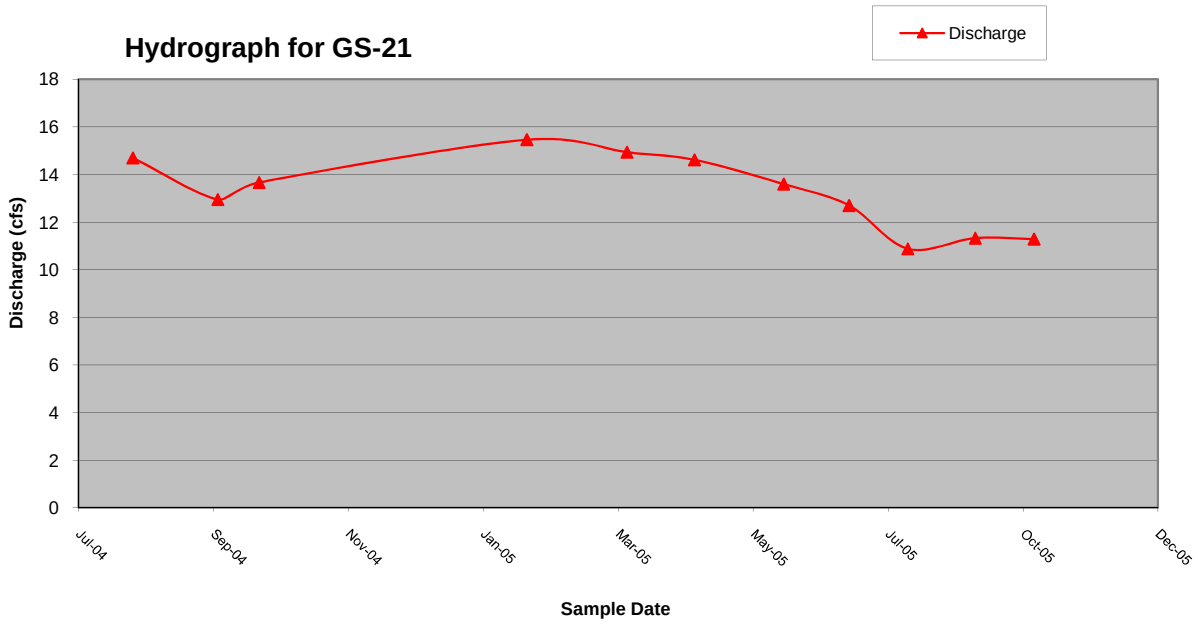
	Parameters	Selenium		Silicon	Silver[8]		Sodium		Thallium		Tin		Vanadium		Zinc[4]	
	Total/Dissolved	Total	Dissolved	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
	Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Sampling Station SWQ4																
	Sample Date															
	08/30/06	**0.458**	**0.436**	2540	**0.0031**	**0.0031**	11300	13400	**0.0050**	**0.0050**	**0.050**	**0.050**	**0.250**	**0.250**	3.04	2.01
	10/04/07	**0.05**	**0.1**	2600	**0.025**	**0.025**	**1500**	**1300**	**0.10**	**0.20**	**0.050**	**0.050**	**0.40**	**0.10**	**1.0**	**3.0**
	Mean	0.3	0.3	2570	0.014	0.014	6400	7400	0.05	0.10	0.050	0.050	0.30	0.20	2.0	2.5
	Median	0.3	0.3	2570	0.014	0.014	6400	7400	0.05	0.10	0.050	0.050	0.30	0.20	2.0	2.5
	St. Deviation	0.29	0.24	40	0.015	0.015	6900	8600	0.07	0.14	0	0	0.1	0.1	1.4	0.7
	# of values	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Minimum	0.05	0.1	2540	0.0031	0.0031	1500	1300	0.0050	0.0050	0.050	0.050	0.25	0.10	1.0	2.01
	Maximum	0.458	0.436	2600	0.025	0.025	11300	13400	0.10	0.20	0.050	0.050	0.40	0.25	3.04	3.0
	% of values undetected	50%			100%	100%			50%	50%	100%	100%	50%	100%	50%	
	# of values between MDL and MRL	1	2				1	1	1	1			1			1
	Chronic Aquatic Life Criteria (CALC)[1]	5	4.6	NA	0.242	0.206	NA	NA	NA	NA	NA	NA	NA	NA	29.87	29.45
	Drinking Water Standards (DWS)[2]	50	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA
	% of CALC exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

APPENDIX 33B

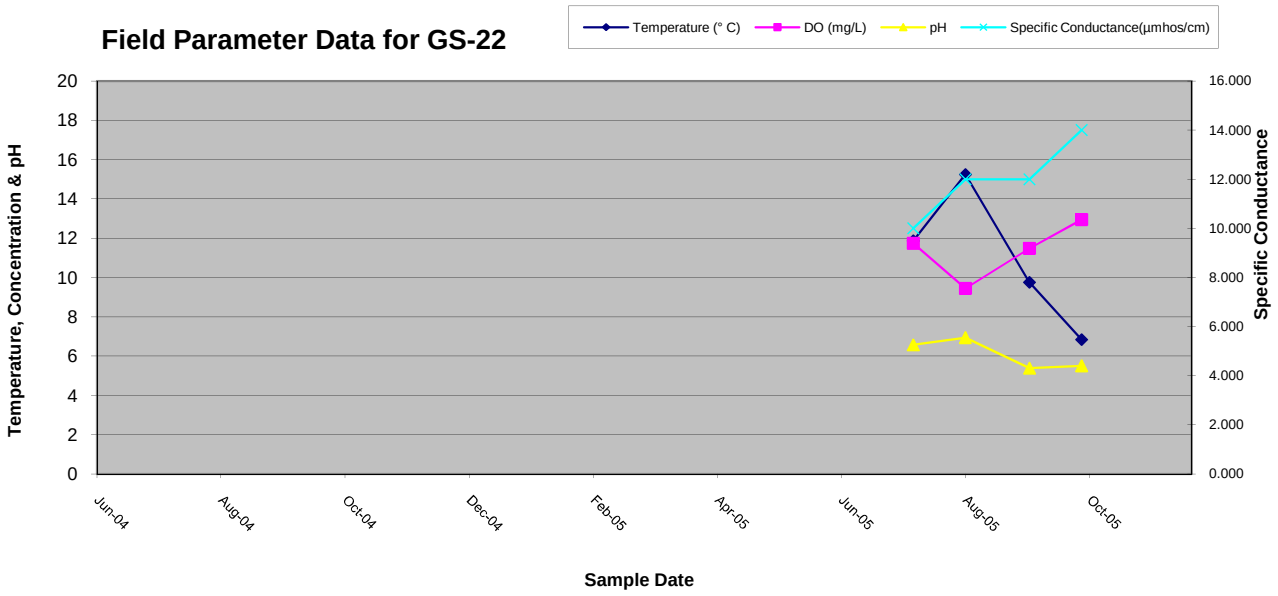
2004-2007 Field Parameter Graphs and Hydrographs Surface Water Transportation Corridor Study Area, Cook Inlet Drainages

Appendix 33B - Graph of field parameter data and hydrograph for surface water at station GS-21, Transportation-corridor, Cook Inlet Drainages 2004-2005





Appendix 33B - Graph of field parameter data and hydrograph for surface water at station GS-21, Transportation-corridor, Cook Inlet Drainages 2004-2005



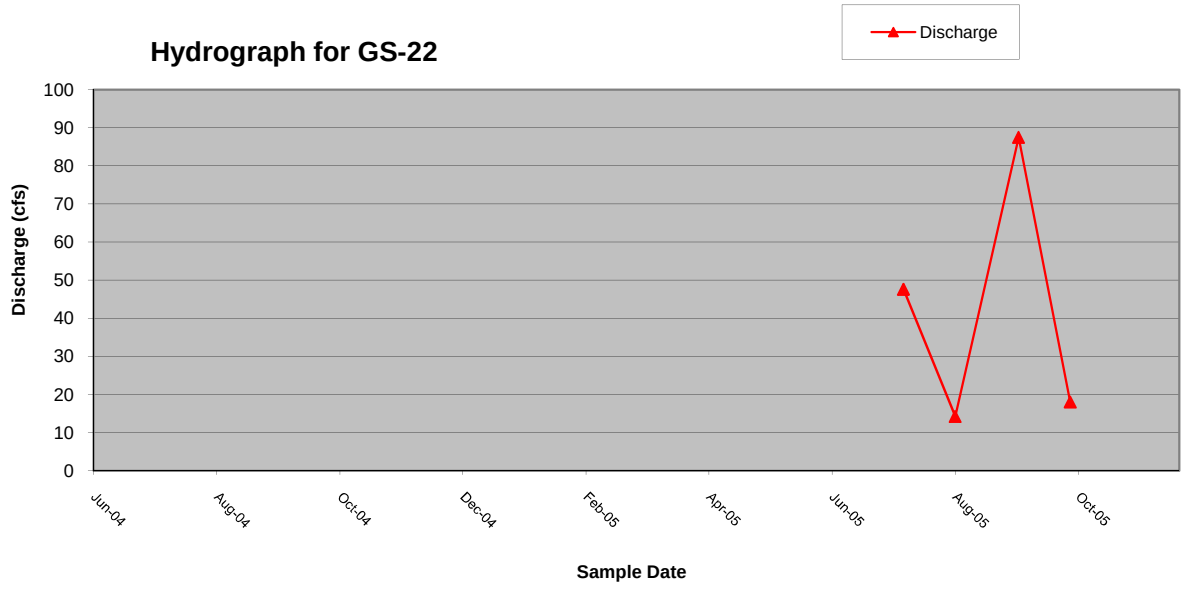


Table and graphs of field parameter data for SWQ1 from 2006-2007.

Date	Temp (°C)	Specific Conductance (µmhos/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Discharge (cfs)
08/30/06	7.19	20	10.72	5.05	271.5	1.14	NA
10/04/07	5.33	18	13.50	2.80	285	0.00	NA
Mean	6.26	19	12.11	3.93	278.25	0.57	
Standard Deviation	1.32	1	1.97	1.59	9.55	0.81	
Number of Values	2	2	2	2	2	2	0
Minimum	5.33	18	10.72	2.80	271.50	0.00	0.00
Maximum	7.19	20	13.50	5.05	285.00	1.14	0.00

Table and graphs of field parameter data for SWQ2 from 2006-2007.

Date	Temp (°C)	Specific Conductance (µmhos/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Discharge (cfs)
08/30/06	7.09	26	10.57	7.17	216	0.18	NA
09/13/07	6.70	36	12.39	3.19	33.7	NA	NA
Mean	6.90	31	11.48	5.18	124.85	0.18	
Standard Deviation	0.28	7	1.29	2.81	128.91	NA	
Number of Values	2	2	2	2	2	1	0
Minimum	6.70	26	10.57	3.19	33.70	0.18	0.00
Maximum	7.09	36	12.39	7.17	216.00	0.18	0.00

Table and graphs of field parameter data for SWQ3 from 2006-2007.

Date	Temp (°C)	Specific Conductance (µmhos/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Discharge (cfs)
08/30/06	12.02	10	8.40	7.33	203.3	0.37	NA
10/04/07	4.61	10	13.60	4.62	207	0.00	NA
Mean	8.31	10	11.00	5.98	205.15	0.19	
Standard Deviation	5.24	0	3.68	1.92	2.62	0.26	
Number of Values	2	2	2	2	2	2	0
Minimum	4.61	10	8.40	4.62	203.30	0.00	0.00
Maximum	12.02	10	13.60	7.33	207.00	0.37	0.00

Table and graphs of field parameter data for SWQ4 from 2006-2007.

Date	Temp (°C)	Specific Conductance (µmhos/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Discharge (cfs)
08/30/06	7.63	1094	10.55	7.39	162.4	1.06	NA
10/04/07	5.58	48	13.50	4.74	204	0.00	NA
Mean	6.61	571	12.03	6.07	183.20	0.53	
Standard Deviation	1.45	740	2.09	1.87	29.42	0.75	
Number of Values	2	2	2	2	2	2	0
Minimum	5.58	48	10.55	4.74	162.40	0.00	0.00
Maximum	7.63	1094	13.50	7.39	204.00	1.06	0.00

Table and graphs of field parameter data for PSD from 2005.

Date	Temp (°C)	Specific Conductance (µmhos/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Discharge (cfs)
07/13/05	9.03	40	12.76	6.92	198.30	0.15	NA
Mean	9.03	40	12.76	6.92	198.30	0.15	
Standard Deviation	NA	NA	NA	NA	NA	NA	
Number of Values	1	1	1	1	1	1	0
Minimum	9.03	40	12.76	6.92	198.30	0.15	0.00
Maximum	9.03	40	12.76	6.92	198.30	0.15	0.00

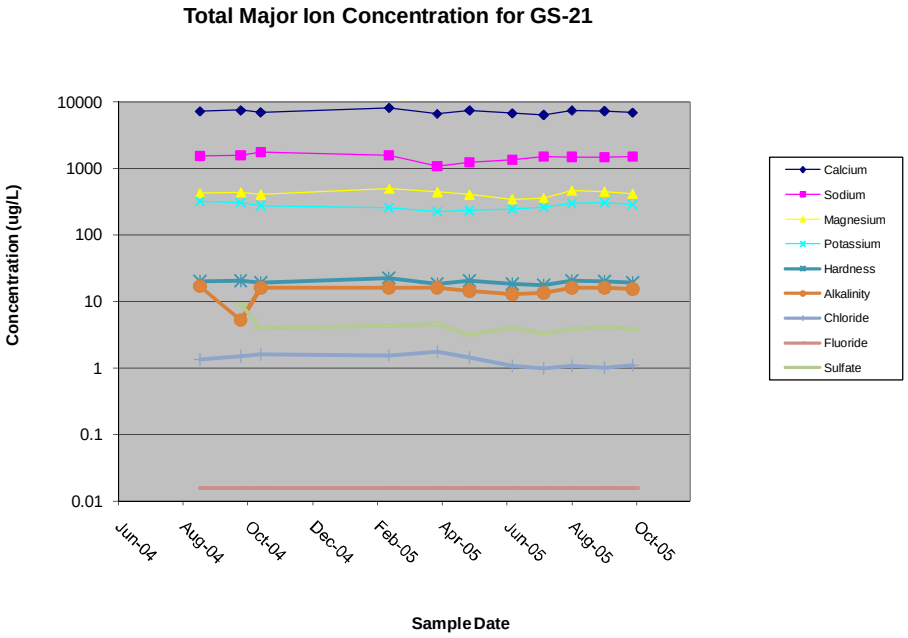
Table and graphs of field parameter data for PSC from 2005.

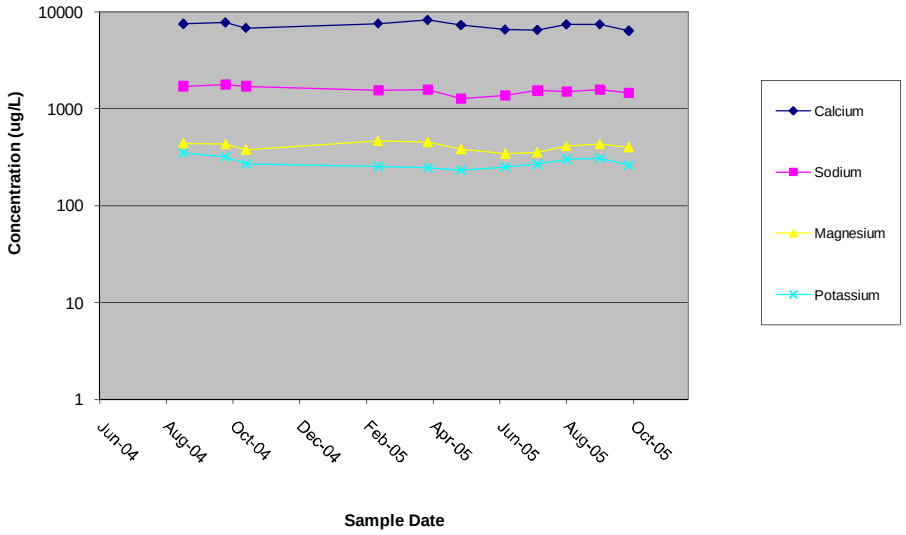
Date	Temp (°C)	Specific Conductance (µmhos/cm)	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Discharge (cfs)
07/13/05	10.81	30	13.71	8.36	190.50	1.19	NA
Mean	10.81	30	13.71	8.36	190.50	1.19	
Standard Deviation	NA	NA	NA	NA	NA	NA	
Number of Values	1	1	1	1	1	1	0
Minimum	10.81	30	13.71	8.36	190.50	1.19	0.00
Maximum	10.81	30	13.71	8.36	190.50	1.19	0.00

APPENDIX 33C

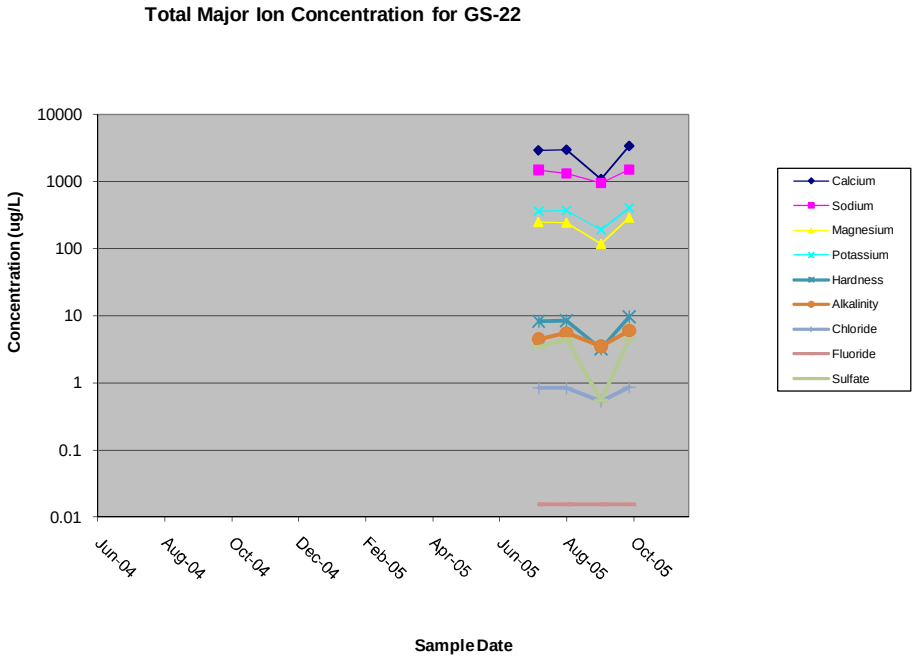
Graphs of Total and Dissolved Major Ions Surface Water Transportation Corridor Study Area, Cook Inlet Drainages 2004-2007

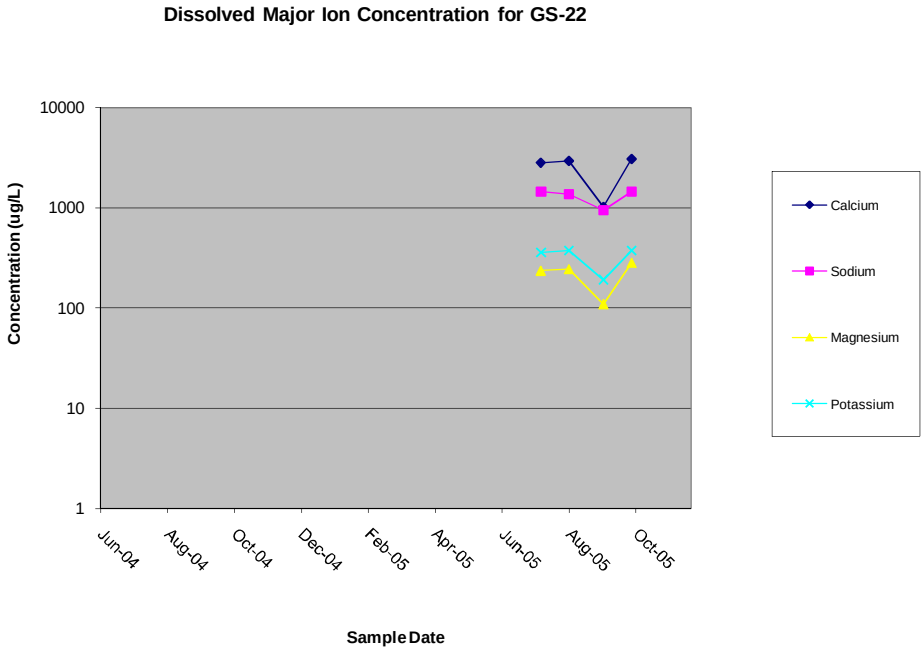
Appendix 33C - Graphs of total and dissolved major ions, surface water, Tranportation-corridor, Cook Inlet Drainages GS-21, 2004-2005.





Appendix 33C - Graphs of total and dissolved major ions, surface water, Tranportation-corridor, Cook Inlet Drainages GS-22, 2004-2005.



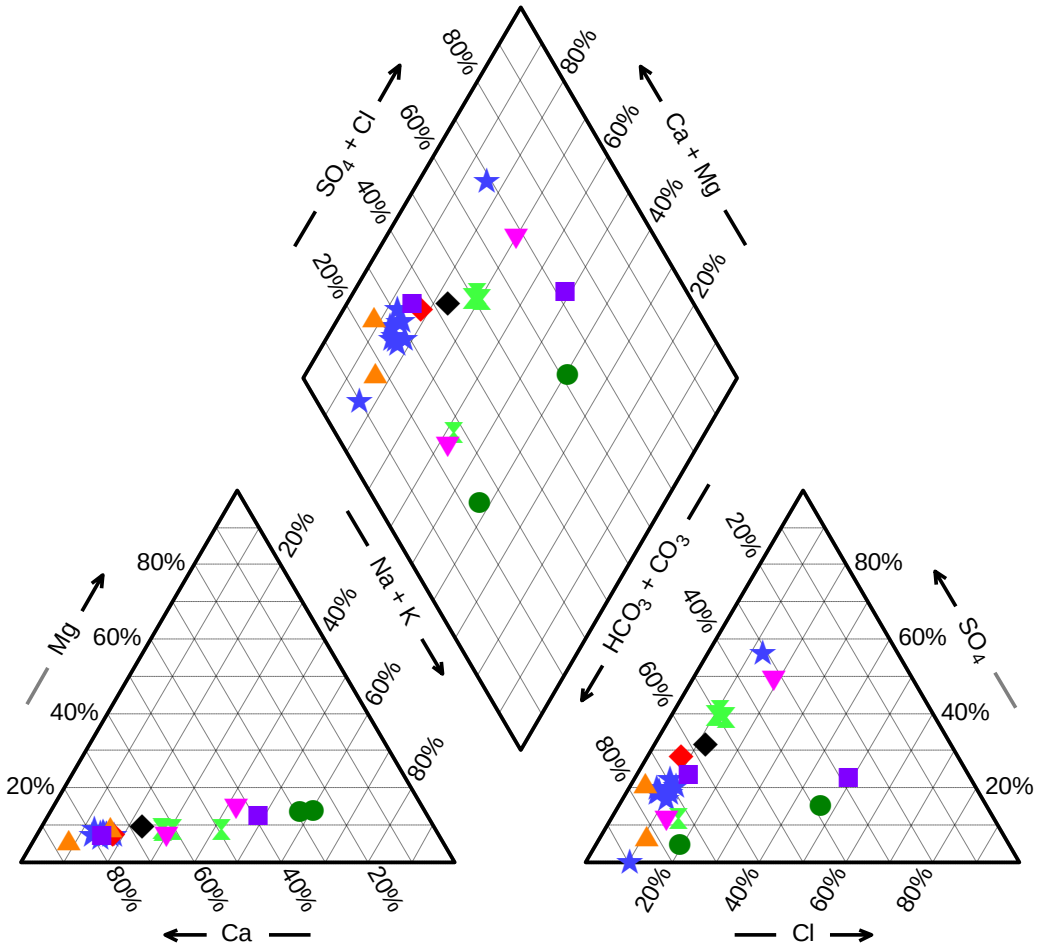


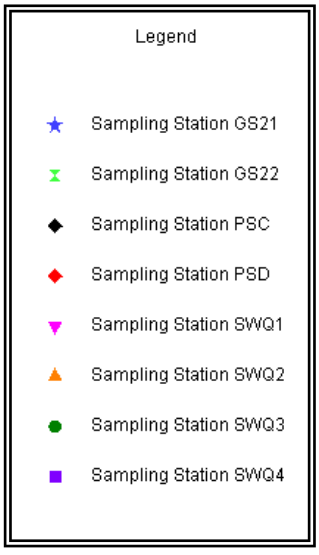
APPENDIX 33D

Piper Diagrams
Surface Water Transportation Corridor Study Area, Cook Inlet Drainages Combined Stations, 2004-2007

Piper Diagram Surface Water Transportation-Corridor, Cook Inlet Drainages
Combined Stations, 2004 - 2007

Cook Inlet Transportation Corridor





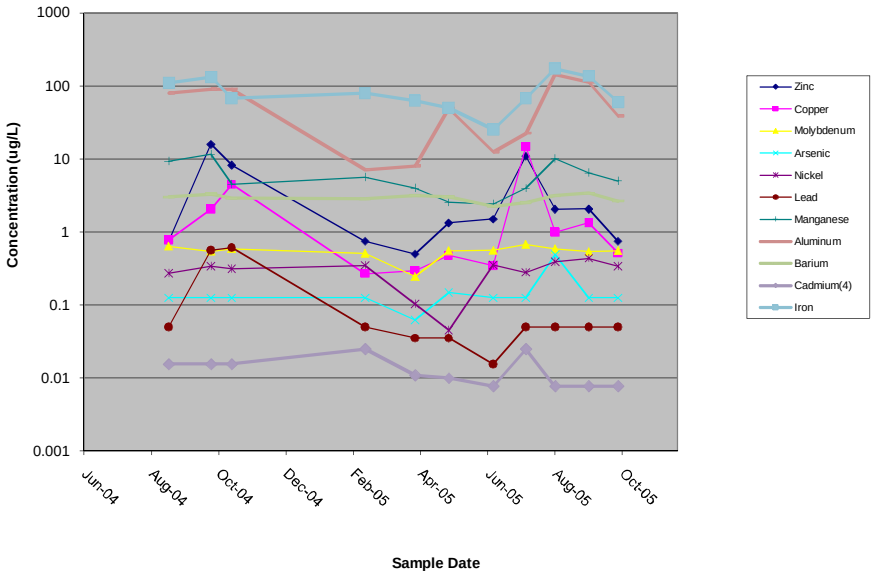
THE pebble PARTNERSHIP

APPENDIX 33E

Graphs of Total and Dissolved Trace Elements Surface Water Transportation Corridor Study Area, Cook Inlet Drainages 2004-2007

Appendix 33 E - Graphs of total and dissolved trace elements, surface water, Transportation-corridor, Cook Inlet Drainages, stations GS-21, 2004-2007.

Total Trace Element Concentration for GS-21



Dissolved Trace Element Concentration for GS-21

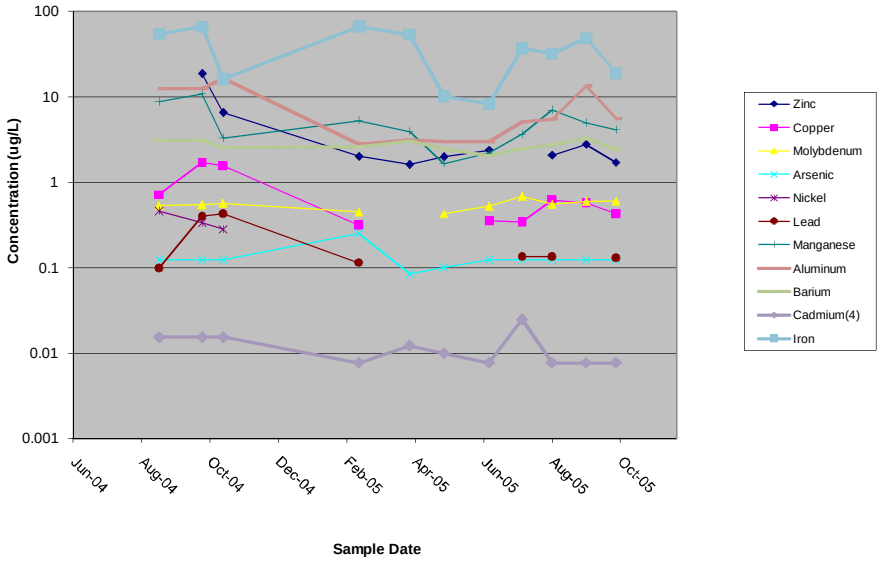
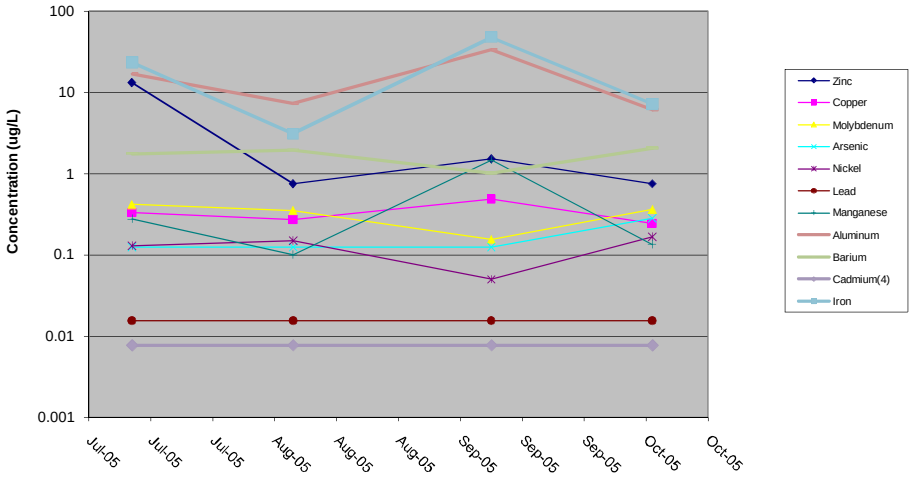


Table and graph of total and dissolved trace elements for GS-22. Red highlighted values are exceedances, green highlighted values are betw are undetected. Validation flags are defined in Appendix 33.1B.

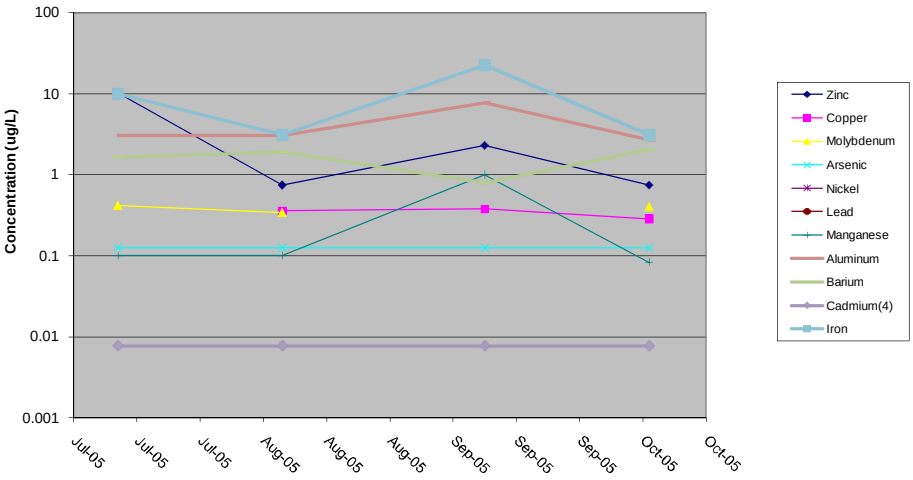
Sample Site	GS-22									
	Zinc		Copper		Molybdenum		Arsenic		Nickel	
Sample Date	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolved (µg/L)	Total (µg/L)	Dissolv (µg/L
07/14/05	13.2 J+	10.2 J+	0.332 J		0.418	0.415	**0.125**	**0.125**	0.13 J	
08/09/05	**0.75** U	**0.75** U	0.274 J+	0.358 J+	0.354	0.339	**0.125**	**0.125**	0.149 J	
09/10/05	1.52 J+	2.31 J+	0.487 J+	0.378 J+	0.155 J		**0.125**	**0.125**	**0.05** U	
10/06/05	**0.75** U	**0.75** U	0.243 J+	0.285 J+	0.365	0.401	**0.281** J	**0.125**	0.166 J	
Mean	4.1	3.5	0.334	0.340	0.323	0.385	0.164	0.125	0.12	
Median	1.135	1.53	0.303	0.358	0.3595	0.401	0.125	0.125	0.1395	
St. Deviation	6.1	4.5	0.108	0.049	0.115	0.04	0.078	0	0.05	NA
# of values	4	4	4	3	4	3	4	4	4	0
Minimum	0.75	0.75	0.243	0.285	0.155	0.339	0.125	0.125	0.05	
Maximum	13.2	10.2	0.487	0.378	0.418	0.415	0.281	0.125	0.166	
Lowest fifth percentile	0.8	0.8	0.248	0.29	0.185	0.345	0.125	0.125	0.06	NA
% of values undetected	50%	50%	0%	0%	0%	0%	75%	100%	25%	
# of values between MDL and PQL	0	0	0	0	0	0	1	0	0	
Chronic Aquatic Life Criteria (CALC)	7.84 (5)	7.73 (5)	0.596 (5)	0.568 (5)	NA	NA	150	150	3.43 (5)	3.39
Drinking Water Standards (DWS)	NA	NA	NA	NA	NA	NA	10	NA	100	NA
% of CALC exceedences	25%	25%	0%	0%	0%	0%	0%	0%	0%	
% of DWS exceedences	0%	0%	0%	0%	0%	0%	0%	0%	0%	

Appendix 33 E - Graphs of total and dissolved trace elements, surface water, Transportation-corridor, Cook Inlet Drainages, stations GS-21, 2004-2007.

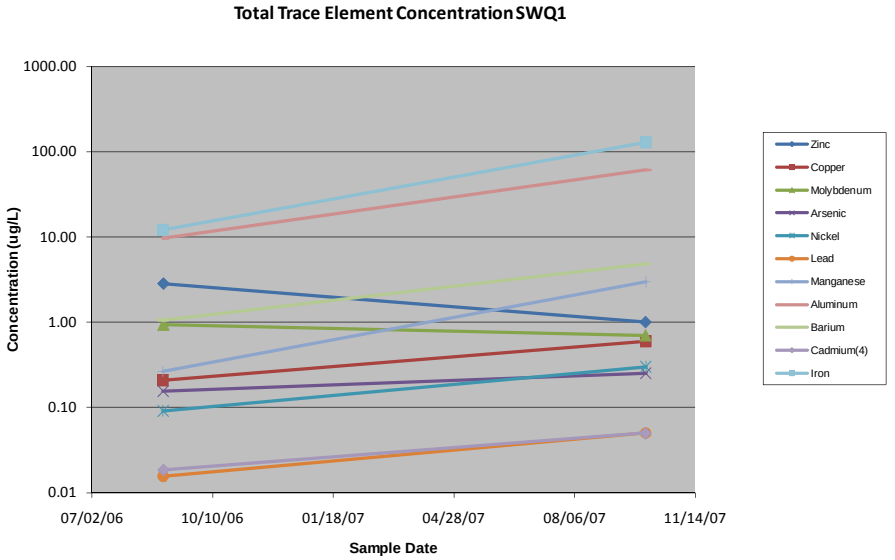
Total Trace Element Concentration for GS-22

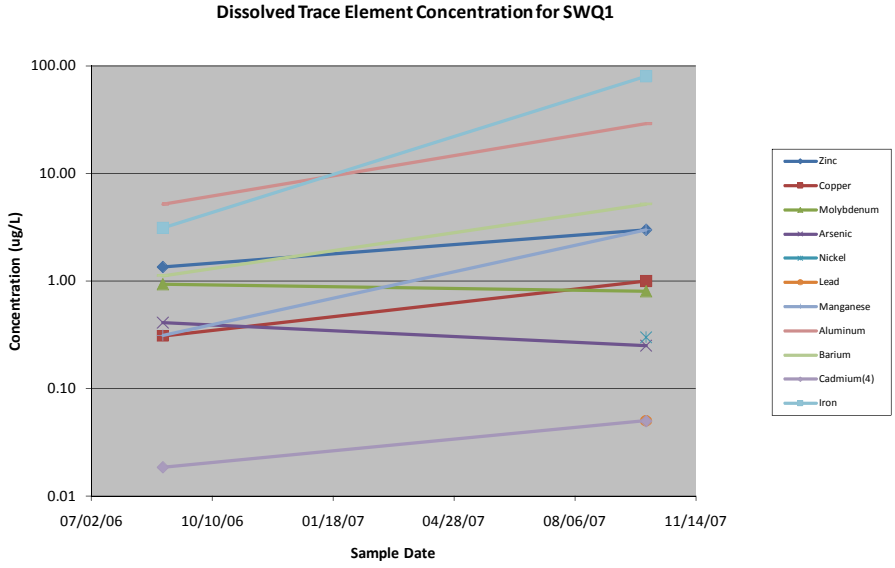


Dissolved Trace Element Concentration for GS-22

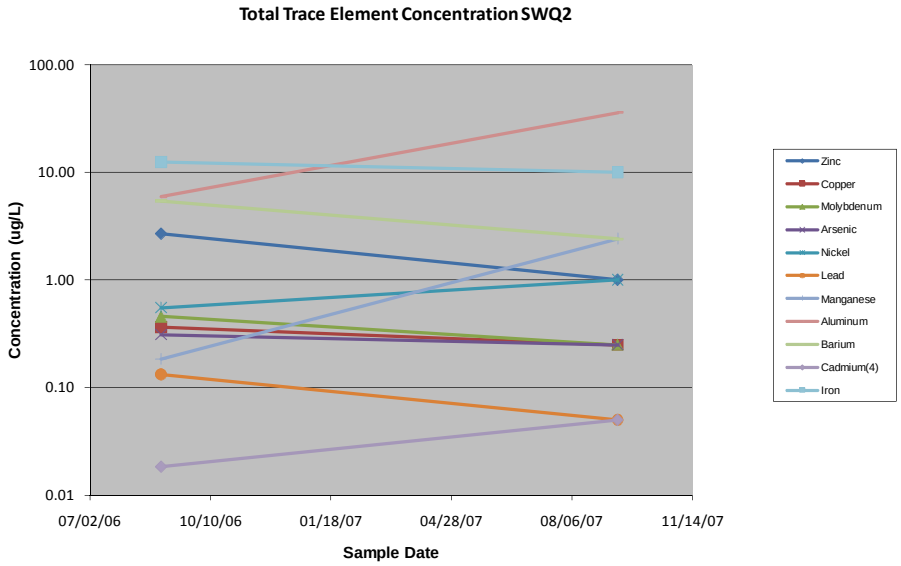


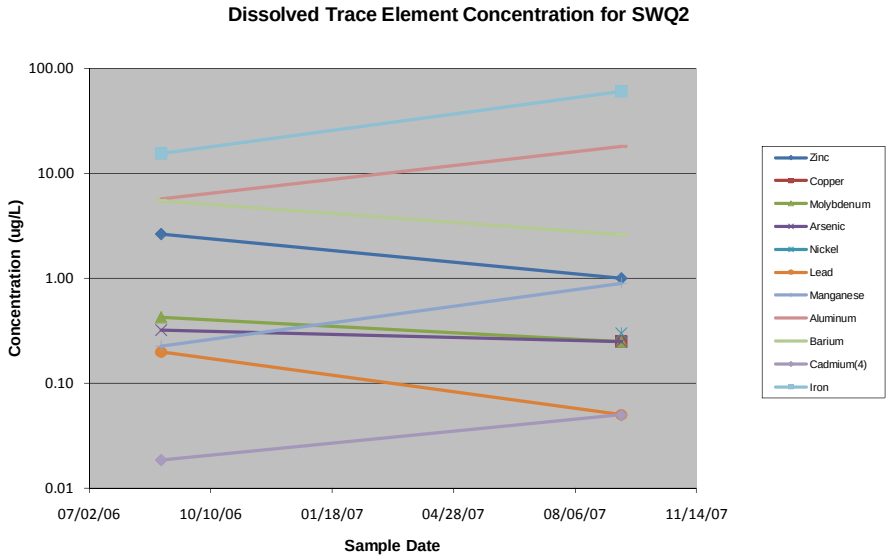
Appendix 33 E - Graph of total and dissolved trace elements for SWQ1.



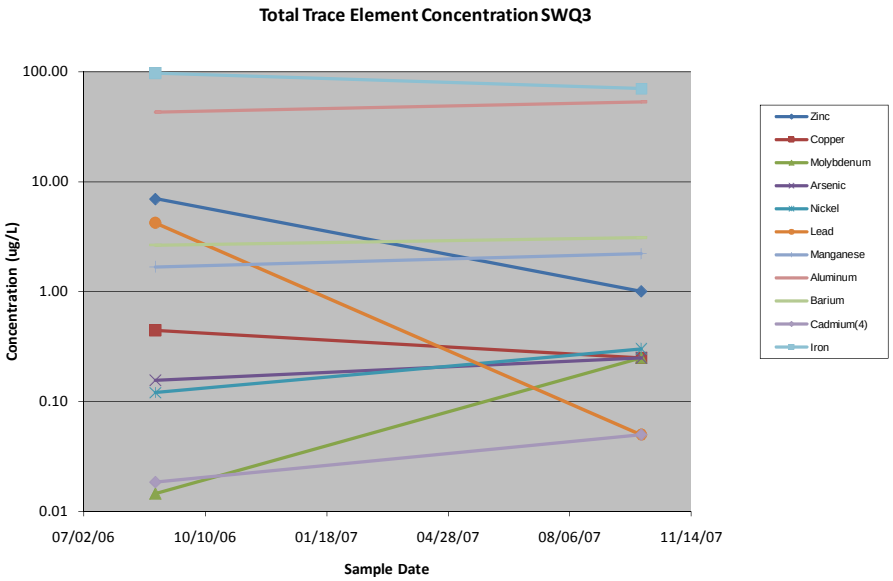


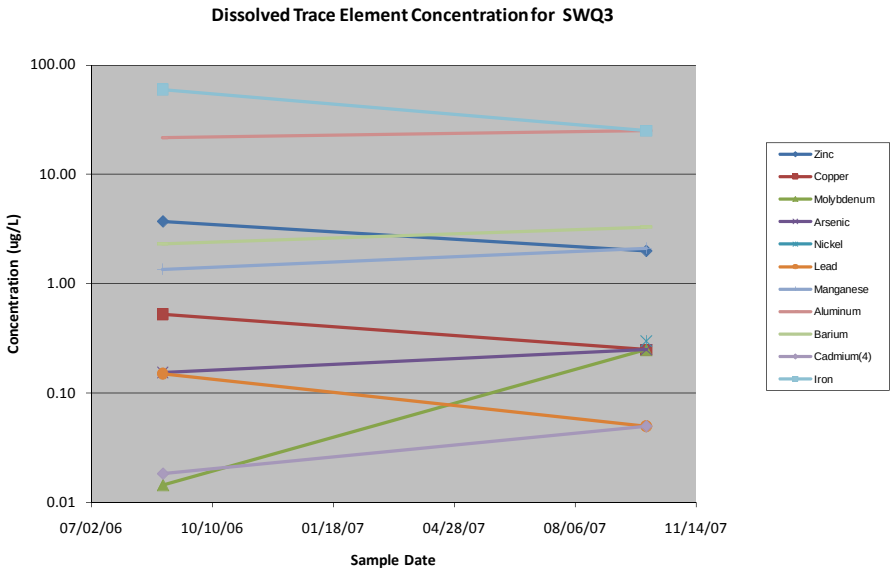
Appendix 33 E - Graph of total and dissolved trace elements for SWQ2.





Appendix 33 E - Graph of total and dissolved trace elements for SWQ3.





Appendix 33 E - Graph of total and dissolved trace elements for SWQ4.