

PRINCE WILLIAM SOUND RCAC

LONG-TERM ENVIRONMENTAL MONITORING PROGRAM

2002-2003 LTEMP Monitoring Report

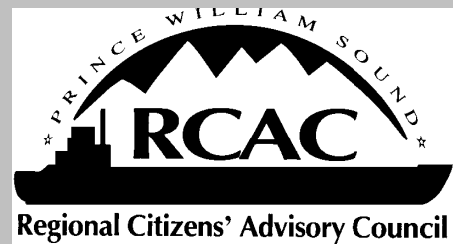
PWSRCAC Contract 951.03.1



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November 6, 2003

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List of Abbreviations

Stations:

AMT	Alyeska Marine Terminal, Port Valdez
AIB	Aialik Bay, west of Seward
DII	Disk Island, Knight Island Group, western PWS
GOC	Gold Creek, Port Valdez
KNH	Knowles Head, eastern PWS
SHB	Sheep Bay, eastern PWS
SHH	Shuyak Harbor, Kodiak
SLB	Sleepy Bay, LaTouche Island, western PWS
WIB	Windy Bay, Outer Kenai Peninsula
ZAB	Zaikof Bay, Montague Island, central PWS
ABL	NOAA/NMFS Auke Bay Laboratory, Juneau AK
AHC	aliphatic hydrocarbons
ANS	Alaskan North Slope
BWTF	Alyeska Terminal's Ballast Water Treatment Facility
CPI	carbon preference index
CRUDE	crude oil index
EVOS	<i>Exxon Valdez</i> oil spill
FFPI	fossil fuel pollution index
GC/FID	gas chromatography/flame ionization detector
GC/MS	gas chromatography/mass spectrometry
GERG	Geochemical and Environmental Research Group, Texas A&M
KLI	Kinnetic Laboratories, Inc., Anchorage AK
MDL	analytic method detection limit
MPI	Mytilus pollution index
MSD	mass selective detector
NIST	National Institute of Standards and Technology
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
PAH	polycyclic (or polynuclear) aromatic hydrocarbons
PDR	particulate/dissolved ratio
PECI	Payne Environmental Consultants, Inc., Encinitas, CA
PGS	particle grain size
PWS	Prince William Sound
SIM	selected ion monitoring
SRM	NIST standard reference material
TAHC	total AHC
TALK	total n-alkanes
TC	total carbon
TIC	total inorganic carbon
TOC	total organic carbon
TPAH	total PAH
UCM	unresolved complex mixture

1 Executive Summary

After reviewing the LTEMP 2002-2003 results, we have concluded that the intertidal sites monitored by the LTEMP program are currently extremely clean. With the exception of the Alyeska Marine Terminal (AMT) site and, to a lesser extent, the Gold Creek (GOC) site in Port Valdez, the regional sites do not show elevated concentrations of hydrocarbons from either Alyeska Marine Terminal operations and discharges, or oil transportation activities within Prince William Sound (PWS). Even at AMT and GOC, where PAH and AHC contaminants from the AMT Ballast Water Treatment Facility (BWTF) are detected, the measured concentrations are probably not environmentally significant.

A large part of this report covers two main topics: 1) reevaluating historic trends and analytic issues and 2) the inter-calibration of laboratory analyses (since the program has now changed from GERG to Auke Bay Lab (ABL) for chemical analyses).

In order to interpret the current year's results in a historic context, we meticulously reviewed the chemistry results for individual samples from the preceding years of the program. During the review, we immediately identified several data-quality issues, some of which were mentioned in our 1998 LTEMP data synthesis report (Payne et al. 1998), and others more recently discussed in our 2001 evaluation of whether or not there were potential toxicity concerns reflected in the LTEMP data specific to Port Valdez (Payne et al. 2001). Investigation of these data quality issues led to successively deeper examinations of the historic data. For some samples, the data integrity appears partially compromised, most likely from lipid interference with the laboratory instruments used for analyses of both aliphatic hydrocarbon (AHC) and (less frequently) polynuclear aromatic hydrocarbon (PAH) analytes. Based on the available data and known signatures and trends, we have attempted to discriminate between real data and obvious artifacts. Through these analyses, we have concluded that although there are some time periods when we have concerns, the overall data-quality picture is not quite so grim, and much of the data still tells a story even if some analytes were erratic.

In general, the LTEMP data suggest that when actual spills or other episodic hydrocarbon inputs occurred, the mussel tissue and sediment results detected the event, for example, after the 1994 *T/V Eastern Lion* spill, the 1997 BWTF sheening event, and the 1994 mussel-bed cleaning activities on Disk Island (and possibly Sleepy Bay). In the other routine surveys, the background levels were extremely low and generally near or below the laboratory method detection limits (MDL). When the signal levels are so low, it is easy to pick up spurious noise (real or artifacts) from the clean samples. In the 1997-1998 data set, however, there is an unusual trend of elevated hydrocarbon concentrations across all stations throughout the study region (Figure 35). Some sites peak in 1997 and then decline; in 1998, others do the same. The fact that the peaks occur across the entire study area suggests a region-wide event (Valdez to Kodiak) and yet, oddly, other parts of the same region peak in the next year. Because that would be an unlikely scenario for any contaminant behavior, we find a more likely explanation in a systematic change or

bias introduced by either collection or analytical chemistry procedures. In 1997, GERG changed instruments and data-integration procedures, upgrading to a newer more sensitive GC/MS and automating the integration of alkylated PAH homologues, an analytic task previously done manually by the GC/MS operator. We suspect the coincidence of trends may be related but lack conclusive evidence without additional laboratory data that were unavailable at this time.

Laboratory inter-calibration then becomes a pertinent issue when there are data-quality issues to resolve. In fact, it became even more important because there were significant differences in the lower levels of contaminants reported this year versus the previous years' results. By comparing split samples and National Institutes of Standards and Technology (NIST) standard reference materials analyzed by both GERG and ABL, it was determined that the labs are actually fairly close on most analytes, but GERG does get elevated results for some analytes, quite possibly due to lipid interference.

The inter-comparison anomalies thus corroborate the approach in this report of correcting the trend analyses for the known spurious peaks in selected analytes. This approach is acknowledged to be subjective but appears to be properly directed. To be less subjective the task would require more detailed data to be less subjective. Still, even with the corrections, the overall conclusions reached would be nearly the same except perhaps with a better resolution/understanding of the apparent 1997-98 peaks in hydrocarbon concentrations.

In summary, because the typical hydrocarbon contaminant concentrations measured in mussel tissues outside Port Valdez are so low (often at or below method detection limits), detailed trend analyses are confounded by background levels, spurious events, and historic data-quality issues. Nevertheless, portions of the historic dataset are internally consistent with known pollution events, observed seasonal changes, and plausible transitions to the current low oiling levels.

With the possible exception of the 1997-1998 timeframe, the LTEMP program appears to be on-track with high-quality, high-sensitivity data with a good record of detected events. These are the hallmarks of a good monitoring program. The LTEMP data have also proven invaluable as a corroborating data set in acquiring a much more in-depth perspective of the trends and behavior of oil contaminants in the region.