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NOGAP B.6; VOLUME 7: HYDROCARBON DETERMINATIONS; MACKENZIE RIVER AND BEAUFORT SEA SHORELINE PEAT SAMPLES

by

M.B. Yunker, F.A. McLaughlin, B.R. Fowler, T.A. Smyth,
W.J. Cretney, R.W. Macdonald and D. McCullough

Institute of Ocean Sciences
Department of Fisheries and Oceans
Sidney, B.C.

1990

CANADIAN DATA REPORT OF HYDROGRAPHY AND OCEAN SCIENCES NO. 60

Fisheries and Oceans Pêches et Océans

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Canadian Data Report Of Hydrography and Ocean Sciences

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Cat. No. Fs 97 – 16/60 ISSN 0711-6721

Correct citation for this publication:

M.B. Yunker, F.A. McLaughlin, B.R. Fowler, T.A. Smyth, W.J. Cretney, R.W. Macdonald and D. McCullough 1990. NOGAP B.6; Volume 7: Hydrocarbon Determinations; Mackenzie River and Beaufort Sea Shoreline Peat Samples. *Can. Data Rep. Hydrogr. Ocean Sci.:* **60**, 81 pp

Contents

Abstract

M.B. Yunker, F.A. McLaughlin, B.R. Fowler, T.A. Smyth, W.J. Cretney, R.W. Macdonald and D. McCullough 1990. NOGAP B.6; Volume 7: Methods of Hydrocarbon Sample Collection and Analysis for Hydrocarbon Determinations; Mackenzie River and Beaufort Sea Shoreline Peat Samples. *Can. Data Rep. Hydrogr. Ocean Sci.:* **60**, 81 pp

As part of the NOGAP B.6 program, with major objectives to determine hydrocarbon pathways and primary productivity of the waters overlying the Mackenzie Shelf, we collected hydrocarbon samples in the Mackenzie Delta, from the Beaufort Sea coast and from repeat sampling of several transects extending from inshore waters to the shelf break. This report describes in detail the methods used for the collection and analysis of hydrocarbon samples from the water, shoreline, sediment and atmosphere. It also provides complete results for the analysis of samples from the Mackenzie River Delta and the Beaufort Sea shoreline.

Key words: Beaufort Sea, Hydrocarbon, Mackenzie River, methods, peat

Résumé

M.B. Yunker, F.A. McLaughlin, B.R. Fowler, T.A. Smyth, W.J. Cretney, R.W. Macdonald and D. McCullough 1990. NOGAP B.6; Volume 6: Methods of Hydrocarbon Sample Collection and Analysis for Hydrocarbon Determinations; Mackenzie River and Beaufort Sea Shoreline Peat Samples. *Can. Data Rep. Hydrogr. Ocean Sci.:* **60**, 81 pp

Le programme NOGAP B.6 a pour objectifs majeurs de déterminer le cheminement des hydrocarbures et la productivit/'e primaire dans les eaux du plateau côtier de la mer de Beaufort. Dans ces buts, des échantillons ont été prélevés dans le delta du Mackenzie, le long de la côte à la limite extérieure du plateau. Le présent rapport décrit en détail les méthodes de prélèvement des échantillons des eaux, du sédiment littoral et de l'atmosphère, ainsi que les méthodes de dosage des hydrocarbures. Tous les résultats analytiques obtenus pour les échantillons du delta de la riviére Mackenzie et du littoral de la mer de Beaufort sont également rapportés.

Mots-clés: Mer de Beaufort, hydrocarbure, rivière Mackenzie, méthodes, tourbe

Acknowledgements

This work was funded jointly by **Indian and Northern Affairs, Canada**, as part of the *Northern Oil and Gas Action Program* and Department of Fisheries and Oceans, Canada. We thank Polar Continental Shelf Project (PCSP) for support during the field work, Blair Humphrey for help in the Mackenzie River sampling, Scott Dallimore (GSC) for assistance during the peat sampling, and the officers and men of the CSS *John P. Tully* for assistance during the summer open-water field work. Help in carrying out analytical workups was provided by G. Brooks, G. Chiddell, D. Herbert and H. Adams. S. Thomson assisted with advice on style and final text-editing of this report.

1 INTRODUCTION

We collected samples throughout 1987 as part of a major inter- disciplinary study (NOGAP-B.6) to measure the transport and fate of hydrocarbons over the Beaufort Shelf and the primary productivity of these coastal waters. We conducted the spring sampling program out of Tuktoyaktuk, Polar Continental Shelf Project, using fixed-wing and rotary-wing support vehicles. The Mackenzie River Delta sampling (Seakem Oceanography Ltd.) was performed during two 10-day trips from Inuvik in June and July using the "R-28", a 10 m aluminum workboat. To complete the field program, a cruise was carried out on the C.S.S. *John P. Tully* in the summer of 1987. The primary logistic goals (1987) for the work done by Institute of Ocean Sciences staff were as follows:

- Collect time series measurements from late winter through to late summer for physical, chemical and biological properties on a transect extending from Kugmallit Bay (Mackenzie River) to the Shelf edge. Deploy short-term sediment traps and current meter moorings, and *in situ* pumps.
- Deploy and recover moorings at the shelf edge (4 sites) to measure currents, % Transmission (light), and sedimentation throughout the entire season (March 1987 - March 1988).
- Perform measurements to delineate plume structure in the near-shore zone with and without ice-cover.

These measurements were augmented with satellite imagery, and Mackenzie River source functions for water flow, sediment discharge, and hydrocarbon content.

In this document we report the methods used to collect and analyze all hydrocarbon samples as well as the results of hydrocarbon analyses for Mackenzie River and Beaufort Sea shoreline peat samples. A brief overview of the samples collected from the ice and ship is given below: **bold** font is used for the data reported here, normal font is used for data which have been collected concurrently and are, or will be, available elsewhere. *Canadian Data Reports of Hydrography and Ocean Sciences* available in the NOGAP B.6 series are listed inside the back cover.

- Water samples (hydrocasts, pumping); salinity, dissolved oxygen, nutrients (reactive silicate, phosphate, nitrate plus nitrite), $\delta^{18}O$, total suspended solids, particulate organic carbon and nitrogen, chlorophyll *a*, pigments by HPLC, ^{14}C productivity, total carbon dioxide, total organic carbon, phytoplankton, particle identification by scanning electron microscopy, and particulate organic carbon and nitrogen, isotopic composition (^{13}C, ^{15}N).
- Radium isotopes.
- Hydrocarbon samples which include:
  1. **Water (Seastar Pump, large volume filtration and Sedisamp); particulate and dissolved hydrocarbon components.**
  2. **Sediment grab samples for hydrocarbons from the Mackenzie River** and Beaufort Sea.
  3. **Beaufort Sea shoreline peat samples for hydrocarbons.**
  4. Atmospheric samples for hydrocarbons from Mould Bay NWT.
- Zooplankton (vertical net hauls; 300 μm mesh, 0.45 m diameter, 1.5 m length, preserved in buffered formalin).

- Conductivity, Temperature, % Transmission and Pressure; Applied Microsystem and Guildline CTTD systems [*McCullough et al.*, 1988].
- Light intensity; Photosynthetically Active Radiation (PAR) was measured continuously at PCSP, Tuktoyaktuk (LI-COR quantum sensor LI-192SA), and with vertical under-ice profiles (LI-COR underwater spherical quantum sensor LI-193SB) and albedo of the ice.
- Ice algae
- Ice cores for particulate and dissolved hydrocarbons, salinity and $\delta^{18}O$ measurements.
- Satellite imagery; temperature, turbidity, and ice distribution.
- Short-term (5-day) sediment trap (bongo) moorings.
- AML (vector averaging) current meter, R.D. Instruments doppler current meter measurements.
- Wind and weather records (logged at Tuktoyaktuk and at a fixed station on the ice).

1.1 Stations

1.1.1 Station Nomenclature

Each station has been given a two-part designation; xP-yQ, where x and y are numbers and P and Q are letters. The alpha-numeric *before* the hyphen refers to location; this is simply a number for planned stations on the main transect(s) across the shelf and a number followed by a letter for stations which were added on site (to trace interesting water features or substituted due to inability to land at the chosen site). For a few stations, the letter precedes the number; these are either the 4 'SS' stations at which we placed sequential trap/current meter moorings or near-shore transects which were added to the program in the field to delineate the plume structure (mostly CTTD work). The Mackenzie River Delta samples are named according to the channel where the sampling took place: MM, MR, and ME refer to sampling in the Middle, Reindeer and East Channels respectively. The alpha-numeric *after* the hyphen refers to time period (see itemized list below) and sequential visit to a station within time period (letter). An example of a typical station number would be 5A-2B; this refers to station 5A (close to station 5), the second sampling period (late April), and the third time within that period that we visited the station. Dates and locations for all stations are given in the Table headers. Data collection periods for the 1987 NOGAP B.6 arctic program are listed below, with **bold** font used for the results presented in this report.

1. March 29 - April 11 (ice work)
2. April 23 - May 7 (ice work)
3. May 21 - June 1 (ice work)
4. June 2 - July 30 (ice algae and core, ice work CTD, **Mackenzie River sampling**)
5. July 31 - August 30 (*C.S.S. John P. Tully*, **shore peat sampling**)
6. Aug 31 - Sept 9 (*C.S.S. John P. Tully*)

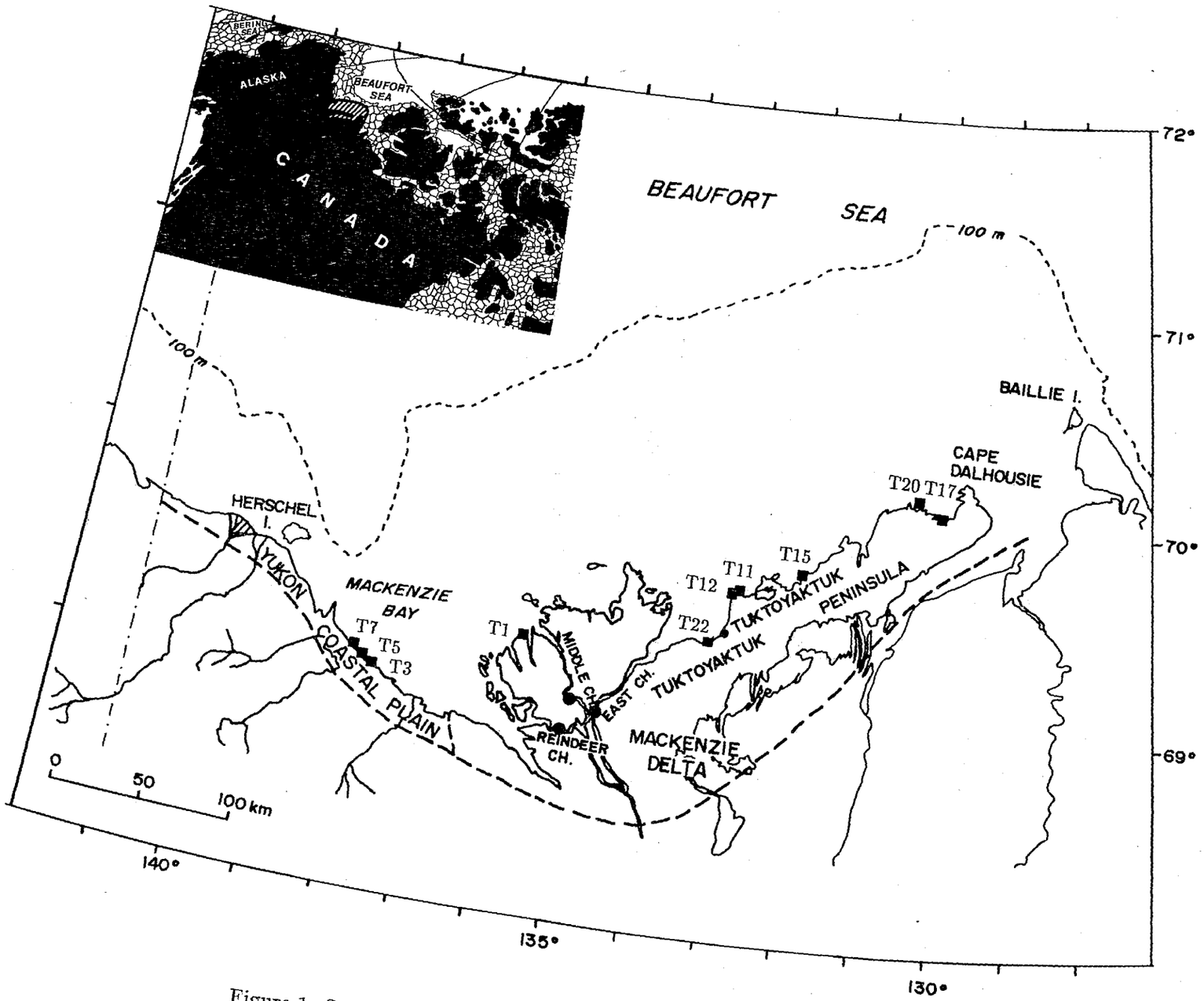


Figure 1: Station locations for the Mackenzie River and Peat Sampling

1.1.2 Station Locations

Figure 1 shows the station locations for the analyses included in this report. The main station locations were predetermined using hydrographic charts and modified in the field where required. For each site, the pilot would navigate to the chosen area using a Global Navigation GNS 500 VLF/Omega positioning system. Past experience shows that these avionics can place the aircraft inside a radius of 1000m from the true position. The avionics were shut down with the aircraft and re-initialized after start- up when sampling was complete.

On the *John P. Tully*, stations were located with a transit Satellite Navigator by the ship's officers. The majority of positions are expected to be within 1 km of the true position [*Huggett and Mortimer*, 1971]. (This appears to be a reasonable estimate of the error ellipse since we were able to relocate all of our bottom mooring by navigating to within 2 km, the range of the acoustic transponders. A further test was available in position fixes from the ARGOS drifters when they were stored on the after-deck.)

2 METHODS

2.1 Hydrocarbon Sampling Equipment

2.1.1 Submersible Pumps, Teflon Hoses and Large Filter

Water for large volume particulate filtration was pumped by submersible pump from the water depth being sampled up to the surface through a Teflon hose and then through a stainless steel filter housing containing glass fiber filters.

A 316 stainless steel magnetically coupled pump with Ryton gears (Cole-Parmer J-7703-30) coupled to a submersible well pump motor (Franklin Electric Co., 3450 RPM) was used for all water sampling. Pump O-rings were replaced with Teflon TFE O-rings; a small amount of machining had to be done to each pump to reverse the operating direction, since the motor and pump gears were designed to turn in different directions. The pump delivered a flow of 6 L/min that changed only marginally up to the maximum operating pressure of approximately 8 Atm. Water was pumped through a 1.4 cm o.d. hose (Aeroquip 2807-8) constructed of smooth bore extruded Teflon TFE (1.0 cm i.d.) with a reinforcement and cover of one braid of high tensile stainless steel wire. End fittings were 0.5 in (1.25 cm) pipe thread stainless steel and the maximum operating pressure was 136 atm. This pump/hose combination provided a mechanically strong system where the water sample only came in contact with non- contaminating materials that could be cleaned with organic solvents.

The pumps and hoses were cleaned (inside and out) with dilute RBS solution (Pierce Chemical), flushed with distilled water and then with recirculating methanol, dichloromethane and methanol (BDH Omnisolv).

The large stainless steel filter (Millipore YY30-293-16) was fitted with Teflon O-rings and a Teflon coated stainless steel filter support screen. The maximum operating pressure was specified at 8.5 Atm with a 5 Atm. differential. A stainless steel GPI flowmeter (Great Plains Industries 3S11LM; Halar rotor) was connected to the outlet. The flowmeter had a linear range of 1-10 L/min and a specified accuracy of 0.5% of volume displayed.

All stainless steel fittings and valves (Whitey SS45XF8) used were pre-cleaned in an acetone/hexane mixture in an ultrasonic bath and then soxhlet extracted with dichloromethane. Teflon tape used for assembling pipe fittings was rinsed in acetone, wrapped onto the pipe thread and then rinsed with dichloromethane. The large stainless steel filter and flowmeter were soaked overnight in 2% RBS and rinsed with distilled water, acetone and dichloromethane.

The hose was attached to the outlet of the submersible pump using a 90° stainless steel elbow; this allowed the pump to be lowered down a 20 cm ice auger hole. The hose and electrical cord to the pump were strain relieved by securing them to the pump body with electrical tape. The hose was connected to the pump and the filter in 20 m sections using standard stainless steel pipe thread fittings. The hose was usually coiled up with the pump still attached; brass pipe plugs and caps were used to seal the pump inlet and hose outlet respectively when not in use.

2.1.2 Seastar *In-Situ* Water Samplers

Hydrocarbons in water were extracted *in situ* onto Chromosorb T Teflon resin (Manville Corp.) columns using Seastar *in situ* water samplers [*Green*, 1986]. The sampler is a microprocessor controlled battery powered pump which draws water at a preset flow rate through a filter unit and extraction column and measures and displays the volume pumped. Chromosorb T column preparation is described under Analytical Methods (Section 2.7.2).

Stainless steel standoffs (14 cm) were used to modify each Seastar *in situ* water sampler so that the Teflon filter pack was concentric with the sampler case. This allowed the sampler to be deployed and recovered through a 25 cm ice auger hole.

During initial tests of the sampler it was observed that Teflon fittings and filter packs sealed at laboratory temperatures became loose as the temperature approached 0°C due to the high thermal expansion coefficient of Teflon. To minimize leakage, the outer edge of the filter pack was machined to allow the incorporation of a Viton O-ring. The O-rings used were soxhlet extracted with dichloromethane and swelled with 6% OV101 in isooctane. In addition the fittings on the FEP Teflon transfer lines between the filter pack and the column(s) and the *in situ* sampler were changed to stainless steel 3/8" Swagelok fittings.

Before each field trip the Teflon filter pack and tubing were cleaned with 2% RBS detergent, distilled water, acetone and dichloromethane. The inlet (top) and outlet (bottom) lines were attached to the filter pack (with its stainless steel standoffs attached) and the exposed ends wrapped in aluminum foil. The filter pack assembly was enclosed in a polyethylene bag and shipped separately from the body of the *in situ* water sampler. At the beginning of each field trip, the cleaned filter pack assembly was attached to the bottom of the sampler. The inlet line to the filter pack was left covered with aluminum foil until deployment through the ice.

2.1.3 Sedisamp Centrifuge

The Sedisamp continuous flow centrifuge system [Envirodata Ltd., *Ongley and Blachford*, 1982] used a specially modified industrial clarifier (centrifuge) which employs a disc separation technique. The stainless steel conical discs in the centrifuge bowl produced laminar flow in which separation occurs at relatively low rotational speeds and particulates collected on the bowl wall. The bowl, spindle and cones were washed with detergent and water, 2% RBS, distilled water, acetone and dichloromethane.

2.1.4 Sediment Traps

The multi-traps were similar in design to the MLML cylinder-frame system described in *Knauer et al.* [1979]. They were constructed from 8 polycarbonate tubes (opening diameter - 10 cm, length - 34 cm, 1 cm grid Teflon tube baffles) mounted on a steel frame (Figure 2). A Teflon sample cup was attached to the bottom of each tube *via* screw threads. The multi-traps were assembled in the field.

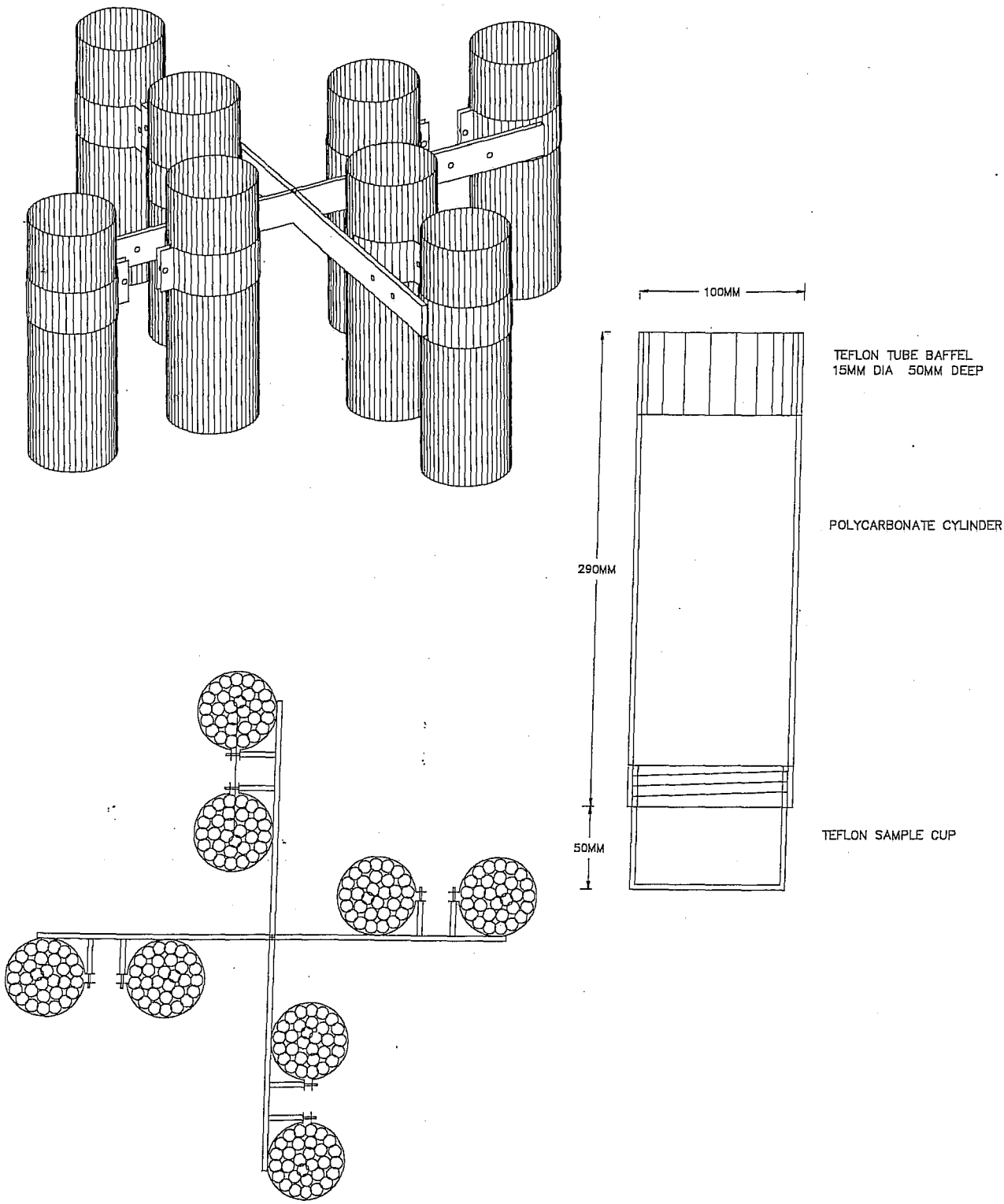


Figure 2: Multi-Trap Design

For hydrocarbon samples, 6 of the cups, tubes and baffles were cleaned first with an overnight soak in 2% RBS, followed by a tap-water rinse, a glass-distilled water rinse, air drying on baked aluminum foil (or an acetone rinse if there was insufficient time to air-dry the pieces) and a methylene chloride rinse. Once assembled in the field the cups and tubes were capped with aluminum pie plates (baked at 500 °C) and stored in sealed plastic bags until deployed. The remaining 2 tubes, cups and baffles were cleaned for POC/N, scanning electron microscopy (SEM), light microscopy, and metal determinations by overnight soak in a 10% HCl solution, followed by a milli-Q water rinse, then air dried and stored in sealed plastic bags as assembled units.

To preserve the samples, 2 g of baked NaCl and 100 mg of $HgCl_2$ (recrystallized by a soxhlet method using dichloromethane) were added to the Teflon cup in the laboratory prior to deployment. The sample cups and tubes were filled with water collected from the depth of deployment at the site with a 10L Go-Flo bottle or submersible pump (Teflon tubing). Where possible, water to fill the traps was filtered through the large volume filter. Care was taken during the ice-work not to let the water freeze in the tubes.

The traps were moored (as described in later sections) on a taut- line either suspended from the ice (ice-work) or anchored to the bottom (*John P. Tully*).

Upon recovery of the traps, the material was allowed to settle and the sea water in the tube drained off. Each Teflon sample cup was unscrewed from the bottom of the tube and sealed with a Teflon screw lid. Spring samples were stored at 4 °C during transport and at Tuktoyaktuk. Before shipping the samples from Tuktoyaktuk to IOS, the samples were allowed to settle in the cups, and extra liquid was decanted. Samples were combined to reduce the number of containers for shipping and extra $HgCl_2$ was added to cups where deemed necessary. The samples were then sealed in double plastic bags and placed in portable coolers with freezer packs and shipped by air (1 day). The samples recovered by the summer sampling were stored in a 4 °C cooler on the *John P. Tully* and transported on board to the Institute of Ocean Sciences (IOS). At IOS samples were stored at 4 °C.

2.1.5 Air Sampling Containers

Sampling containers for atmospheric hydrocarbons were designed as a single unit which incorporated a particulate filter and two polyurethane foam (PUF) plugs. The body of the containers was fabricated out of welded aluminum. Support screens were cut out of 2 mm mesh stainless steel screens and 3 stainless steel latches were used to hold the filter support in place. The sampling containers were designed to "press fit" into a double O-ring sealed inlet hole on the pump.

The PUF plugs were contained in a 30 cm (7.6 cm o.d., 7.0 cm i.d.) tube and held in place by a 7 cm circle of stainless steel screen resting on a 1 cm lip at the bottom (downstream) end. The filter support was 14.2 cm o.d., the size of the glass fiber filter used. The outer 1 cm of the filter was clamped in place by the top assembly and the filter rested flush on a 11.8 cm circle of stainless steel screen. An additional piece of stainless steel screen was incorporated into the top assembly to protect the filter from mechanical damage.

After fabrication, the sampling containers were washed with detergent and water and soaked overnight in 2% RBS solution. They were rinsed with distilled water and baked at 350°C overnight (with latches undone). The PUF plugs (15 x 8 cm) were cleaned by compressing the plug 20 times for each cleaning solvent. The plug was immersed in a glass beaker and compressed with a glass plunger the same diameter as the plug. Each plug was cleaned with acetone (3 x 300 mL) and hexane (3 x 300 mL). After draining the residual solvent the plugs were dried at 60°C for 5-6 h.

Two PUF plugs were loaded into each sampling container and a baked 142 mm glass fiber filter paper (Gelman AE, nominal pore size 1 μm) was placed in the filter support. All manipulations

were performed with clean tweezers or tongs. A baked heavy duty aluminum foil pie plate was used as the cover; baked aluminum foil was wrapped over the other end of the container and the container was wrapped in a heavy polyethylene bag before packaging for shipping.

2.1.6 Peat Sampling Containers

Sampling containers were constructed out of 10 cm diameter smooth surface aluminum air ducting. The ducting was cut into sections approximately 30-35 cm long, baked at 450°C for 4 h and the tubing assembled (a locking tongue and groove held the ducting together). Baked double aluminum pie plates were fitted over each end of the ducting and the seam in the ducting and one end cap were taped in place using duct tape. The containers were then sealed in polyethylene bags.

2.2 Sampling from Ice

All filter paper and Teflon column changes and any system modifications were carried out in a heated laboratory in Tuktoyaktuk. Clean tweezers were used to put the glass fibre filters (GF/F on the bottom and GF/D on the top or inlet) into the stainless steel or Teflon filters. All equipment was kept as warm as possible prior to sampling to prevent water from freezing inside. Equipment was stored in the laboratory (15 - 25 °C) overnight and kept in the heated plane until use.

2.2.1 Large Volume Filtration

On the ice, water sampling holes were augered through the ice and a collapsible tent (Warner Shelter Corp., Hurritent Model L8) was erected over the site and tied down with ice screws. Heated air (Master Heater Model B66E, 60,000 BTU/hr burning JP4 arctic diesel), was directed in through the door of the tent to keep water from freezing during sampling. Before sampling floating ice chips were scooped from the hole, pipe caps were removed from the pump and hose and then the pump was lowered into the hole. A prefilter on the pump was not used for the through-ice sampling. The submersible pump was started immediately; when water was flowing through the hose it was lowered to the required sampling depth. Once the hose had flushed, it was connected to the stainless steel filter and the time recorded and flow rate measured once or twice an hour. The hose and filter were kept off the ice to prevent freezing.

At the end of sampling, the hose was disconnected from the filter and the pump brought up while still running. The power was disconnected and as much of the water as possible was "walked out" of the hose. After coiling, pipe caps were used to seal the pump, hose and filter inlet.

The filter was allowed to thaw on return to the laboratory. Clean tweezers were used to fold the two filters twice (one- quarter round) and place them into a baked labelled aluminum foil pouch. Pieces of clean filter paper were used to wipe away any residual particulate material and new filters were loaded for the next sample. The sample filters were stored frozen.

2.2.2 Sampling by *in situ* pump

Before each deployment, the Seastar sampler battery voltages (heavy duty alkaline D) were checked while methanol was being pumped through the sampler. After filter replacement (see above) the Chromosorb T Teflon column(s) was then attached to the sampler (maintaining flow direction) and all fittings and clamps were tightened securely.

During the first ice trip (March 30 - April 11) a number of *in situ* sampler failures were experienced where the sampler either shut itself off soon after deployment or low volumes were pumped through the column. The most likely cause was the inability of the sampler to contend with the

relatively high backpressure of a Chromosorb T column, particularly at the low water temperatures (with the associated high viscosity and high dissolved gas volumes) being encountered. The *in situ* sampler was replumbed with two Chromosorb T columns in parallel and this dramatically reduced the number of failures.

Care was taken to ensure that the temperature of the Teflon lines and filter pack on the *in situ* sampler were above freezing before deployment (e.g., samplers were prepared and kept in the aircraft until the last minute). The time the sampler was out in the air at sub-zero temperature (temperatures as low as - 40°C were encountered during deployments) was minimized to prevent water from freezing when entering the sampler or lines and the sampler was never rested directly on the ice.

The sampling modes were set usually with flow rate 150 mL/min, continuous sampling setting, and time delay 0.1 min. The sampler was started and lowered into the hole until it was just below the water surface. When the sampler started to pump (0.1 min delay), the time was noted and it was lowered to approximately 10 m for 10 minutes. After this time the sampler was brought up to just below the surface; if it was still pumping it was lowered to the required depth and secured. If not, an attempt was made to restart the sampler and repeat the process.

On recovery, a new hole usually had to be augered. Floating ice chips were cleaned off the hole and the sampler was brought up until the top plate was just above the water surface. While still pumping, the inlet line to the pump was disconnected and the sampler was flushed with methanol until solvent came out of the outlet port. The sampler was turned off and the volume pumped recorded. The sampler inlet line was reattached and the sampler was lifted out of the water. A piece of aluminum foil was put over the inlet tube and the sampler was placed in the aircraft.

On return to the laboratory, the sampler was allowed to warm up, the column(s) was disconnected, capped, labeled and frozen. The filter pack was opened and filter papers were folded one-quarter round, placed in a double folded, labeled aluminum foil pouch and also frozen. Any residual material adhering to the filter pack was wiped off using clean pieces of glass fibre filter paper. If required, the filter support was rinsed with acetone and dichloromethane before new filters were loaded for the next sample.

2.2.3 Ice Core

An ice core was melted from the ice using a 75 cm brass ring with the hole melter; hot water was recirculated through the ring only and not allowed to come in direct contact with the ice core. The ice core was lifted out of the hole by helicopter using wire chokers and lowered to the ice. This ice core measured 165 cm high and 45 cm in diameter for a estimated volume of 0.26 m^3. The top 35 cm of the ice core was discarded because it had been badly damaged in the melting process. The next 55 cm section was cut down to a diameter of 44 cm using a clean 15 cm stainless steel cleaver and slid into a 90 L aluminum pot and the lid was secured. Before use, the pot was rinsed 3 times each with acetone, dichloromethane, GF/F-filtered seawater (from the large filter outflow). An ice algae sample was chopped off the bottom of the core at the same time (see following) and this left an approximately 70 cm section of core remaining.

The ice core section in the pot was flown back to Tuktovaktuk by helicopter and melting commenced using a propane heater (80,000 BTU/h) at a low setting. The core section was melted completely over 7 h (temperature maintained at about < 5°C) the heat output of the propane burner was adjusted frequently to prevent any localized overheating. Using stainless steel and Teflon lines connected to a valve at the bottom of the pot, the meltwater was passed through a 142 mm GF/C filter in a stainless steel filter (Millipore Cat. No. YY22-142-30) and then through two Chromosorb T Teflon columns connected to a Seastar *in situ* water sampler set for a flow of 150

mL/min.

The next day, residual sand and dirt was left in the pot and the pot was taken back out onto the ice. The rest of the ice core was chopped down to pot diameter and another approximately 55 cm section was flown back to Tuktoyaktuk by helicopter. This left approximately 10 - 15 cm of ice core unsampled. The melting and water sampling procedure was repeated until all water had been drained from the pot. Clean GF/C glass filter papers were used to wipe sand and debris from the pot; these filters were stored frozen in a clean aluminum pouch and kept separate. The total volume was 162.0 L.

As part of the above sampling, approximately 16 L of Chromosorb T Teflon column effluent had been collected in a baked glass carboy. This water was placed in the aluminum pot and used for blank determination. Since the previous sample was an ice algae sample (see following) the pot was rinsed with acetone (5 times) and dichloromethane (2 times) before the water was added; note that the lid was not rinsed. The water was drawn through the 142 mm filters and two Chromosorb T Teflon columns as before. The total volume was 15.9 L.

2.2.4 Ice Algae

The first ice algae sample was chopped from the bottom of an ice core piece (75 cm ice hole melter ring) using a clean 15 cm stainless steel cleaver. The ice core sat on the ice for about 1 h before sampling. The sample was chopped into pieces and put in a clean glass bottle. After melting in the dark for 2 days the ice algae sample was filtered through a 142 mm baked GF/C glass fiber filter in a clean Buchner funnel and volume of the filtrate recorded.

The second ice algae sample was chopped from the bottom of an intact 75 cm ice core (see above) and placed in a clean glass vat. The frozen ice algae sample was stored in an aluminum foil lined cooler and then melted over 2 days in a glass vat. The sample was filtered through a GF/C filter as above.

The third ice algae sample was chopped from a piece of coloured floating bottom ice. The sample was collected at the landfast ice edge and stored in an aluminum foil lined cooler for 2 days. The ice algae sample was carefully melted in a solvent rinsed (2 times acetone and 2 times dichloromethane) 90 L aluminum pot using the propane heater (described above) on a low setting and filtered through GF/C filters, as above.

2.2.5 Sediment Traps

For the ice-work, a 1 m diameter hole was melted through the ice to deploy the trap line. A 30 kg anchor weight (chain links) was attached to the bottom of the line, and the multi-traps were connected to the line in series above this (2 - 4 multi-traps per line) by stainless steel shackles connected to the top and bottom of the stainless steel frame. Precut lengths of plastic- coated hydrowire were used between the multi-traps to place them at the planned depths. The top of the trap-line was fastened to a board placed across the hole, and the hole was allowed to refreeze. To recover the traps, a second hole was melted near the first hole and a hook used to recover the top of the line.

2.3 Air Sampling

Air was drawn through the sampling container by a Gast oilless Vane Pump (0.25 m^3/min., 1022-V103) and then passed through a temperature compensated dry gas meter (Rockwell International RCM415TC). Exhaust air from the pump was passed through flexible plastic ducting (about 6 cm

i.d.) and discharged on the ground 5 m from the sampler. A peaked aluminum cover on top of the sampler prevented snow from falling directly into the sample.

The hydrocarbon air sampler was located on the plateau at the end of the power cable terminus approximately 1.5 km north (predominately upwind) of the Mould Bay, Prince Patrick I. weather station (Lat. 76° 14.5'N, Long. 119° 22' W). This location has been used previously for air chemistry observations in the Canadian Arctic [*Barrie and Hoff*, 1985]. Technicians taking the samples were required to leave snowmobiles at least 10 m downwind of the sampler. To start sampling the technician recorded the sampling container number, the date and time and the volume on the dry gas meter. The aluminum foil covering was then removed from the container (and saved) and the container was pressed into the air inlet hole on the pump. Specific instructions on clean sampling were given to the technician. The sampler was allowed to run for approximately 48 h for each sampling container. The aluminum foil was replaced on the sampling container then wrapped in the original polyethylene bag and returned to the storage box.

The first sample was collected on March 14 - 16, 1987. The pump malfunctioned after 1 m^3 of air had passed through the second sample and replacement parts had to be shipped in and installed. Ten more samples were collected at 2 day intervals from April 3 - 23, 1987 and at this time all samples were shipped back to Sidney, B.C. Samples were stored in a box by the air sampler during collection (temperature -11 to -45°C) and in a freezer upon return to the laboratory. The samples were stored for 2 months before extraction.

2.4 River Sampling

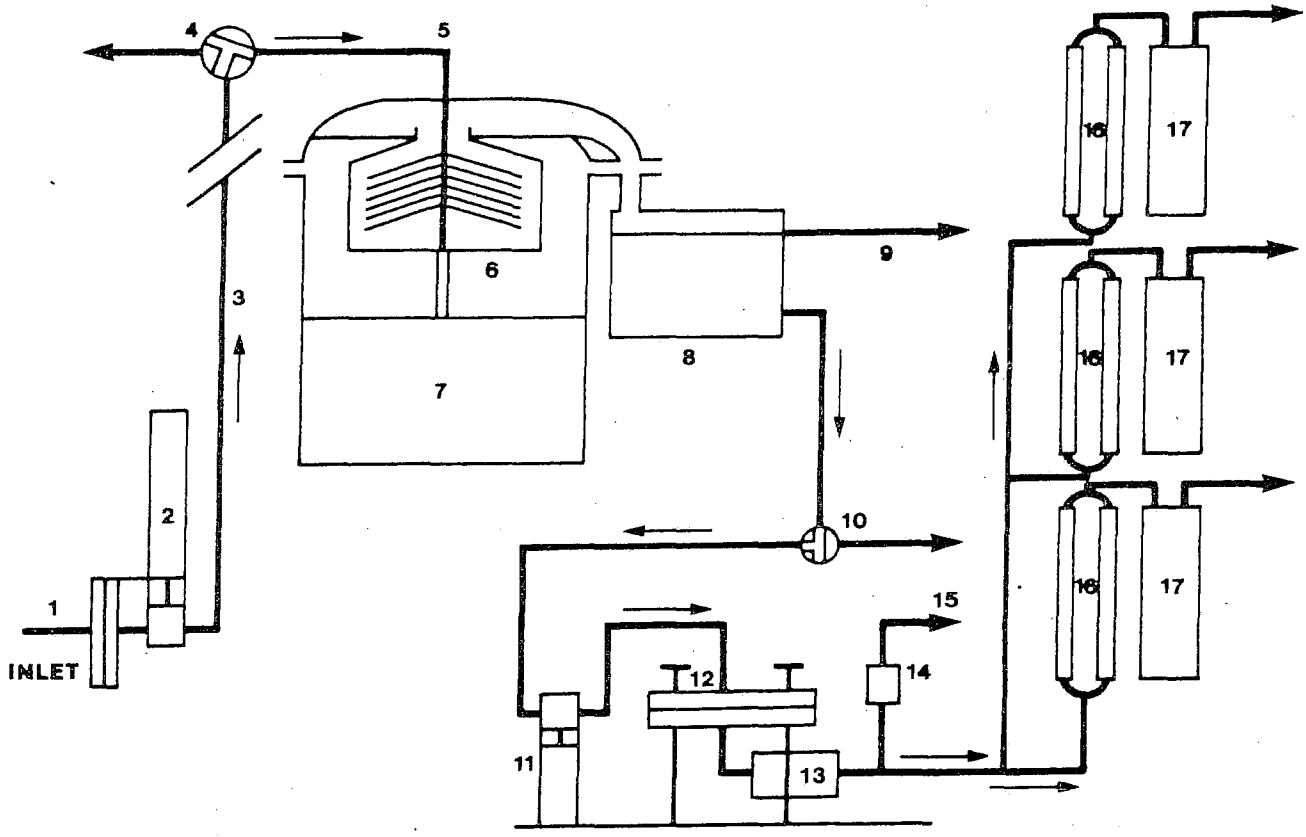
River sampling locations are given in Figure 1 and Table 1. A schematic diagram of the water sampling equipment is shown in Figure 3. Glass fibre filters were loaded into the large filter before each sampling using clean tweezers with GF/F on the bottom (outlet end) and GF/D on top. A GPI digital flow meter was connected to the outlet of the filter. The Teflon columns were attached to the *in situ* sampler and all tubing connections tightened. The cleaned bowl assembly was also placed in the Sedisamp just prior to sampling. The bowl assembly was cleaned between samples, rinsing the individual pieces with filtered river water and with an additional acetone rinse for between-channel sampling.

Because of the high particulate loading in the Mackenzie River, the Sedisamp was used both as a prefilter for the dissolved hydrocarbon samples and as a particulate collection device. During operation, water (2-3 L/min) was pumped from a submersible pump (with a 297 μm Teflon inlet filter) at 1 m depth below the bow of the boat (while at anchor) through the stainless steel covered Teflon hose to the Sedisamp (1.0 $\pm$0.1 L/min). Outflow water from the Sedisamp was pumped through the large filter and then drawn through the Chromosorb T columns by three independent Seastar water samplers at a flow rate of 150 mL/min.

After sampling, the columns were detached and capped. Filter papers were folded one-quarter round and stored in labelled baked aluminum foil pouches. The particulates collected in the Sedis-

Table 1: Positions of River Sampling Stations

Station	Latitude °N	Longitude °W
ME-3,4	69° 0.4	134° 38.0
MM-3,4	69° 10.2	135° 1.6
MR-3,4	68° 53.4	135° 1.8



LEGEND

1.	Water intake and 297 μm Teflon inlet filter.
2.	Submersible pump (2-5 L/min)
3,5.	Stainless steel covered Teflon hose (1.0 cm i.d.).
4,10.	Flow control valves.
6,7.	Sedisamp centrifuge (1 L/min) and bowl
8.	Stainless steel water reservoir (20 L).
9,15.	Water overflow.
11.	Small submersible pump (0.8 L/min).
12.	Stainless steel filter (293 mm) with GF/D and GF/F glass fibre filters.
13.	Flowmeter.
14.	Pressure relief valve set at 1.0-1.2 atm.
16.	Dual parallel Chromosorb T columns.
17.	Seastar *in situ* water samplers.

Figure 3: Continuous centrifuge/Seastar sampler system

amp bowl were scraped into a clean glass jar.

Filtered particulate samples were obtained with the large-volume pump using the large filter and GF/D and GF/F filters. Sediment samples were taken in back eddies close to the water sampling locations with a Ponar grab (0.05 m^2). All samples were stored frozen until extraction.

2.5 Beaufort Sea Shoreline Peat Sampling

Shoreline peat samples were collected working from a helicopter (Figure 1). Samples were taken in duplicate at 11 sites along the Beaufort Sea coast from King Pt. to Russel Inlet (Table 2). At each site the surficial geology was noted and sections of the tundra face were dug back with a shovel. Thickness and constitution of the soil and peat layers were noted and measurements were taken. Representative sections (on the basis of peat thickness and visual appearance) were then photographed and sampled using a clean 30 cm stainless steel cleaver with an aluminum handle. Peat was cut out in blocks and put in the aluminum sampling container without handling; the end cap was fastened in place with duct tape and the container labelled and resealed in a polyethylene bag. Samples were kept cool and frozen upon return to Tuktoyaktuk.

At one site, a core of frozen peat material was taken using a soil auger with a stainless steel core barrel (8 cm i.d.). The core barrel had been cleaned by soaking in 2% RBS detergent followed by rinsing with distilled water, acetone and dichloromethane. The frozen core was slid into the aluminum sampling container using a clean aluminum rod and treated as above. Samples were chosen randomly for extraction and analysis.

2.6 Open Water Sampling

Sampling was carried out from the starboard side of the CSS *John P. Tully* after deck or from a launch.

2.6.1 Large Volume Water Sampling

Each pump was fitted with a 230 μm stainless steel screen prefilter. All filter paper changes were carried out in a Laminar flow hood set up in the C.S.S. *John P. Tully* laboratory. A filter was fully assembled before removal from the hood. The two filters were secured to filter stands at the starboard rail, flowmeters were zeroed and each stainless steel Teflon hose was connected to a 3-way valve fastened to the top of each filter. Each pump was lowered to the required depth and started with the 3-way valve set to bypass the filter. After flushing for a few minutes the pump was stopped, the valve reset to pass water through the filter and sampling started. Typically, two samples were collected simultaneously, one at 3 m and the other at depths to 30 m. Hose angles were a particular problem with the deeper sample and any deviations from vertical were noted. An effort was made to shut the pump off when the filter reached capacity and just started to leak out the side (leaking provided minimal disturbance to the sample). Filter papers were folded one-quarter round and stored frozen in labeled aluminum foil pouches.

The submersible pump and hose was used to provide sample water for the Sedisamp. The cleaned stainless steel cones were assembled in the centrifuge bowl in the laminar flow hood and installed in the Sedisamp (at the rail) prior to sampling. After flushing, the hose was connected to the Sedisamp, and water flow and the centrifuge started. Water flow was adjusted to 4.0 $\pm$ 0.1 L/min and monitored frequently. The Sedisamp was only used for sampling in shallow, turbid, near- shore areas. After sampling, the centrifuge bowl was removed and sediment was allowed to settle in the laminar flow hood. The water was aspirated off using a glass pipette and sediment was scraped off using a clean spatula and placed into a clean jar. The bowl, spindle and cones were

Table 2: Locations and Description of Shoreline Peat Samples

Sample	Location	Position	Description and Comments
		August 16, 1987	
T1	NW Mackenzie Delta	69°19.4'N 135°41'W	Intertidal flats. Grey silt with rootlets, twigs and detrital organic matter. Relief 80-100 cm.
T2	NW Mackenzie Delta	69°19.4'N 135°41'W	Same description. 4 m from T1.
T3	Just W. of Sabine Pt.	69°04.0'N 137°48'W	Glacial till, ice poor cliffs. Subsurface soil material that looked peaty was sampled.
T4	Just W. of Sabine Pt.	69°04.0'N 137°48'W	Same area as T3. Sample of black peaty material cut out of the side of a bank at cliff top.
T5	Between King and Sabine Pts.	69°04.3'N 137°51'W	Lacustrine plain. Ice poor cliffs with ice. Peaty material at cliff edge sampled.
T6	Between King and Sabine Pts.	69°04.3'N 137°51'W	Same area as T5. Subsurface 1 - 2 m layer of black peat sampled.
T7	E. of King Pt.	69°05.2N 137°55'W	Lacustrine plain/Till. Ice rich cliff. Sample of frozen peat chipped out of cliff face.
T8	E. of King Pt.	69°05.2N 137°55'W	Same area as T7. Core taken 10 m back from edge. Depth was 40 cm to bottom of core hole.
T9	E. end of Shallow Bay	68°40.8'N 135°18'W	Intertidal flats - 60 cm relief. Grey silt with rootlets, twigs, etc.
T10	E. end of Shallow Bay	68°40.8'N 135°18'W	Sample taken 5 - 10 m from T9. Same description.
		August 17, 1987	
T11	Toker Pt.	69°38.3'N 132°56'W	Low tundra - 10-35 cm of peat over sand and till.
T12	Toker Pt.	69°38.3'N 132°56'W	Well developed low tundra covered by wind blown sand - 45 cm sand over 40 cm of peat - one-half lacustrine.
T13	Toker Pt.	69°38.3'N 132°56'W	Peat sample 5 m N. of T12. Same description.
T14	Toker Pt.	69°38.3'N 132°56'W	Peat sample from area close to T11. Same description.
T15	E. of Hutchinson Bay	69°43.5'N 132°05'W	Barrier beach - glacial fluvial sand 25 - 40 cm of peat under aeolin sand veneer.
T16	E. of Hutchinson Bay	69°43.5'N 132°05'W	Same area and description as T15.
T17	Russel Inlet	70°5.0'N 130°00'W	Low tundra - aeolin sand veneer - 0-20 cm peaty soil, 15 cm sand/peat, 40 cm very dark bottom peat (sampled).
T18	Russel Inlet	70°5.0'N 130°00'W	Very dark bottom peat sampled - 10-20 m from T17.
T19	Nuvorak Pt.	70°9.4'N 130°24'W	Low tundra - 40 cm peat layer below surface sandy soil.
T20	Nuvorak Pt.	70°9.4'N 130°24'W	Close to T19, 42 cm peat layer below surface soil.
T21	Ice cliff W. of Tuktoyaktuk	69°25.0'N 133°08'W	Glacial moraine - Ice rich cliff. Subsurface peat above ice sampled.
T22	Ice cliff W. of Tuktoyaktuk	69°25.0'N 133°08'W	Subsurface peat near T21 sampled.

cleaned using detergent and water followed by rinses (in the hood) with distilled water, acetone and dichloromethane.

2.6.2 Zooplankton

Zooplankton samples were collected using undulating oblique tows with a bongo net (500 μm Nitex mesh, 0.5 m net opening, 1.27 m net). Typical 15 min. tows at 1.5 - 2.0 knots filtered about 175 - 200 m^3 per net. Samples were transferred to a stainless steel cod end, rinsed with hydrocarbon free water and frozen in glass jars.

2.6.3 Sediment Sampling

A Smith-McIntyre grab was used for all collections made from the *John P. Tully*. The vessel position was recorded when the grab hit the bottom. A Ponar grab was used for sampling from a launch. The doors on top of the grab were opened, the water syphoned off and the surface sediments (the top 2 - 4cm) were sampled from the center of the grab using a clean aluminum scoop. All samples were placed in 2% RBS washed, oven-baked (350 °C) glass jars with a piece of soxhlet extracted Teflon under the lid. The jar was then placed in a polyethylene bag and frozen. The grab and scoop were rinsed with seawater between samples, the scoop had additional rinses with methanol.

2.6.4 Sediment Trap Sampling

The process of connecting the traps to the line during open water sampling was the same as for the ice work except that the anchor (100 kg) was placed on the seabed and the wire lengths cut accordingly. Subsurface flotation (two 14" plastic Viny floats - 40 kg flotation) was used at the top of the mooring to provide a taut line. To relocate and recover the mooring, a secondary line was attached to the anchor and stretched away from the mooring by approximately 100 m where a second anchor was attached. A line from this second anchor led to a Viny float at the sea surface to which was attached a flag and radio beacon.

Samples were treated in the same manner as for the ice work except that they were placed directly into the cooler on the *John P. Tully*.

2.6.5 Collection and Preparation of Sediment for Reference Materials

Initially two mud tows, using a weighted 80 L plastic barrel, and two sediment grabs were carried out from stations 5 to 6. A portion of this sediment was homogenized in a cement mixer and 15 L of the watery sediment slurry was decanted from the mixer and stored in a clean stainless steel cannister. Two further mud tows were carried out using a 170 L steel barrel (70° 10'N, 132° 29'W and 70° 08'N, 132° 38'W). Sediment from these tows and stations 5 to 6 was used to fill five 80 L plastic barrels; this material was forwarded to the National Research Council (NRC) in Halifax, N.S. for preparation as a Beaufort Sea sediment reference sediment. The 15 L of watery sediment was returned to Sidney, B.C. and subsampled into 12 clean 1 L glass jars and frozen for future interlaboratory comparison studies. One jar, GRM1, was homogenized and analyzed at both IOS and Seakem.

Table 3: Sample ID Codes by Sample Type

Sampled Phase	Sampling Method	Analyte State	Code
Water	Seastar water sampler	dissolved	ID
		particulate	IP
	Filtered water	dissolved	FD
		particulate	FP
	Sedisamp continuous centrifuge	particulate	S
Ice	Ice cores	dissolved	CD
		particulate	CP
Biota	Peat		T
	Zooplankton		Z
	Phytoplankton		P
Sediment	Sediment trap (multi-trap)		M
	Sediment grab		G
Air	High volume air sampler	vapour	AC
		particulate	AP

2.7 Analytical Procedures

2.7.1 General

All analytical procedures were carried out in a Class-100 clean room dedicated to hydrocarbon analyses with access to the area restricted to trained analytical staff wearing one piece clean room suits. Solvents (BDH Omnisolv) were redistilled through burle packed columns. Hydrocarbon-free water was prepared from glass-distilled water refluxed overnight with alkaline potassium permanganate. redistilled and further extracted with dichloromethane. Sodium hydroxide (10M, Baker Analysed) was extracted with 7:3 dichloromethane:hexane (6 x 100 mL). Glassware (including 4 L water-sampling bottles) was soaked in 2% RBS detergent (Pierce Chemical) for a minimum of 4 h, baked overnight (a 350°C forced-air oven was used for all baking) and rinsed with dichloromethane before use. Sodium sulfate (BDH assured), sodium chloride (BDH assured), and silica gel (BDH, 60- 120 mesh) were baked overnight. Saturated sodium chloride solution was solvent extracted before use. Teflon fittings and film were soaked in 2% RBS and soxhlet extracted overnight with dichloromethane. Glass fibre filter papers (Whatman), both GF/D (142 and 257 mm; nominal pore size 2.7 μm) and GF/F (142 and 293 mm; nominal pore size 0.7 μm), were baked overnight and stored in baked aluminum foil pouches. Each sample type was given a letter sample code to identify the sample type and analyte state (i.e. dissolved, particulate, etc.) during subsequent analysis (Table 3). The internal standard added to each sample contained known amounts of all 13 perdeuterated hydrocarbons described in Section 2.7.7.

2.7.2 In-Situ Water Sampler Columns

Chromosorb T Teflon TFE resin (Manville Corp., approximately 30/45 mesh, special order) was sieved to 30/45 mesh size range (375-500 μm). The resin was slurried in acetone and packed, with tapping, into Teflon columns (Seastar Instruments, 37 cm long, 2.5 cm o.d., 1.9 cm i.d.) while maintaining a flow (30-50 mL/min) of acetone. Each column contained 55 g of resin retained at each end by FEP Teflon mesh (Micromesh, 297 μm) secured between two Teflon collars. The

0.5 in. (1.25 cm) pipe thread Teflon end plugs for the water sampler columns (supplied by the manufacturer) were replaced by Swagelok stainless steel 0.5 in (1.25 cm) pipe thread to 0.375 in (0.95 cm) tube male connectors and corresponding end caps. This modification provided a more positive seal at low temperatures and reduced the risk of contamination during connection of the columns to the sampler. Single Chromosorb T columns were used for the first ice trip (March 30 - April 11). Dual (parallel) Chromosorb T columns were used for subsequent sampling due to the high flow resistance of the Teflon resin.

Water sample columns were cleaned in batches of four or eight using freshly distilled solvent produced by a 5 L soxhlet still. Methanol was pumped (Micropump, Teflon gears) at 75 mL/min per column for 24 h, and dichloromethane for a further 24 h. An initial cleaning was performed with each solvent being continuously recirculated through the columns overnight. A final cleaning was done throughout a working day with each freshly distilled 3 L batch of solvent being flushed through the columns and back into the distillation flask. Freshly distilled methanol was used for a final rinse until there was no dichloromethane in the effluent. Columns were sealed as described above and stored with the contents under methanol until use.

2.7.3 Column Elution Procedure

After cleaning, approximately two out of each batch of eight columns were eluted to serve as column blanks. In addition, elution blanks were prepared at the approximate ratio of one for every six dissolved hydrocarbon samples. Elution blanks used the entire column elution apparatus, solvents, etc., with an empty stub column used in place of the Chromosorb T column [*Yunker et al.*, 1989].

The elution apparatus was rinsed with methanol and dichloromethane (150 mL each) and methanol again (100 mL). Column elution fittings were installed with care to avoid contamination. For column blanks, methanol was displaced from unused columns with 100 mL of hydrocarbon-free water.

For double column elution, hydrocarbon free water (50 mL) was added to a 2 L separatory funnel and then both Chromosorb T columns were eluted simultaneously upward into the separatory funnel first with methanol (150 mL each) and then with dichloromethane (250 mL each) at a flow rate of 2 - 5 mL/min (each). Internal standard (1.00 mL) was then added to the separatory funnel, followed by hydrocarbon free water (350 mL) and the funnel shaken vigorously for one minute. If phase separation was poor, hydrocarbon-free water saturated with sodium chloride (100 mL) was added: this step was seldom required. The dichloromethane layer was drawn off into a 1L flask and the aqueous methanol extracted twice more with dichloromethane (100 mL). The combined dichloromethane extracts were back-washed twice with 3% hydrocarbon-free aqueous sodium chloride (100 mL) and dried over sodium sulfate (10 g). The extract was transferred in portions to a 250 mL Kuderna-Danish concentrator. 1 mL of carbon tetrachloride was added and the solvent volume was reduced to approximately 0.5 mL in a water bath at 50-55°C. The extract was quantitatively transferred with dichloromethane (2 mL) to a silica gel filter column (60 x 5 mm, 1 g 5% water deactivated silica gel, Biorad 60/120 mesh) and eluted with dichloromethane (10 mL).

For a single column elution (March 30 - April 11 samples) a 1.00 mL aliquot of the working internal standard was added directly to a dichloromethane-wetted 1 L separatory funnel. The column was eluted upwards into the separatory funnel with methanol (150 mL) and dichloromethane (250 mL) at a flow rate of 2-5 mL/min. Hydrocarbon-free water (200 mL) was added and the separatory funnel shaken vigorously for 1 minute. The remainder of the extraction was identical to the dual column procedure except that volumes were halved. Concentration and clean up

procedures were identical.

2.7.4 PUF Plug Extraction Procedure

The air sampling containers were carefully opened and the glass fiber filter papers were folded one-quarter round and stored frozen in a baked aluminum foil pouch. The two PUF plugs were then pushed out of the tube using a clean rod and extracted in separate glass beakers. Internal standard (1.00 mL) and carbon tetrachloride (1 mL) were added to each plug and the plug was extracted by compressing 20 times with a glass plunger for each portion of extraction solvent. The plugs were extracted first with 3:2 acetone/pentane (200 mL) followed by pentane (2 x 200 mL). The combined extracts were dried over baked sodium sulfate (10 - 12 g) and concentrated to 1 mL in a 50°C water bath using a Kuderna-Danish concentrator.

2.7.5 Laboratory Processing of Sediment Trap Samples

A prefilter to remove zooplankton was constructed out of aluminum pipe (9.6 cm i.d.) and 350 μm stainless steel screen. The screen was held tightly between a 6 cm and a 2 cm section of pipe using stainless steel screws. The prefilter was disassembled to clean it of oil residues from manufacturing (2% RBS solution overnight, followed by water and acetone rinse) and reassembled. It was baked at 350 °C overnight before each days use.

The prefilter was clamped over a glass funnel sitting in a 1 L graduated cylinder. Sediment trap samples were slurried gently in their Teflon jars and poured into the 350 μm prefilter. The jar and prefilter were rinsed with a minimum quantity of hydrocarbon free water from a bottle with a dispensing pump. The volume in the graduated cylinder was recorded, the contents were well mixed and a subsample of approximately 10% of the volume was taken for dry weight determination; the volume change in the graduated cylinder was recorded.

Zooplankton were picked off the 350 μm screen using clean stainless steel tweezers and transferred to a baked (350 °C) 47 mm GF/F glass fiber filter (Whatman). These filters were folded in half, placed in baked, labelled aluminum foil pouches and frozen.

The remainder of the sediment trap sample was filtered through 47 mm GF/F filters in an all glass filtration apparatus (Millipore); filters were folded one-quarter round, placed in baked, labelled aluminum foil pouches and frozen. Only these filters were processed for sediment trap analyses. The 350 μm prefilter and 1 L graduated cylinder were rinsed with tap water, distilled water and hydrocarbon free water between samples. At the end of each day they were rinsed well, soaked in 2% RBS and baked overnight at 350 °C.

2.7.6 Particulate and Zooplankton Extraction Procedure

The following is a general particulate extraction procedure that was used for multi-trap, zooplankton, *in situ* water sampler filters, large volume particulate filters, ice core, air particulate and sedisamp samples. For details of reagent volumes used refer to Table 4. Samples were usually processed in batches of eight including six (or seven) samples, one blank and a Mackenzie River suspended particulate reference material (control sample). This control sample was collected by sedisamp in the East Channel in June. The sample was homogenized at IOS, refrozen and subsampled as required. The reference material (usually 5 g wet weight) was included in a minimum of alternate batches.

Blanks were prepared using two baked filters of the same type used for the samples in the particular batch. The filters were dampened with hydrocarbon-free water and treated in the same manner as the samples.

Table 4. Particulate Extractions - Procedural Details (all volumes given in mL).

Sample Type:*	Digestion Flask	Volume Internal Standard	H/C Free water + filter blank	Volume methanol	Volume NaOH (10M)	Volume Methanol rinse	Volume CH_2Cl_2: methanol	Separatory funnel	Volume CH_2Cl_2	H/C Free water or 15% NaCl	Receiving flask	H/C Free water backwash	Anhydrous sodium sulphate (g)
1	125	1.00	-	20	10	5	25	125	25x2	30	125	25	10
2	250	[a]2.00	20	50	25	10	80	250	80x2	50	250	50	10
3	500	2.00	50	100	50	20	150	1000	150x2	75	1000	1x75 2x50	15

* 1: M: Multi-trap (sediment trap)
2: IP: In-situ sampler particulate, AP: Air particulate CP: Ice-core particulate

3: FP: Large volume particulate, S: Sedisamp particulate, T: Peat, Z: Zooplankton

a 1 mL for AP

Zooplankton samples were thawed, homogenized using a Virtus homogenizer and subsampled for dry weight determination and hydrocarbon extraction.

Sedisamp particulates or samples of homogenized peat or zooplankton material were weighed directly into a flask (see Table 4); glass fibre filters were thawed in a powder funnel suspended over the flask and then (using forceps) torn into pieces that could be rolled up and fed through the neck of the flask. Hydrocarbon free water was added to the blanks and an aliquot of the internal standard, methanol and sodium hydroxide were added to each blank and sample. The sample was heated at 55 °C in a water bath for 4 h and decanted into a separatory funnel using a pour spout. The residue was washed twice with methanol and then extracted with 9:1 dichloromethane:methanol for 4 h on a shaker-table. The extract was decanted into the separatory funnel, 15% sodium chloride added, shaken for 1 min. and the dichloromethane separated. Dichloromethane was used for two further 2 h shaker-table extractions of the residue and extraction of the aqueous methanol in the separatory funnel. The combined dichloromethane extracts were backwashed with water and dried over sodium sulfate. The extract was transferred in portions to a 250 mL Kuderna-Danish concentrator and subsequently treated as described for the *in situ* samples.

Peat extracts were separated on a second silica gel column (1 x 10 cm) slurry packed in pentane with 5% deactivated silica gel (Biosil 100-200 mesh, 6.5 g) capped with 1 cm of sodium sulfate and cleaned with pentane (15 mL). The sample was transferred to the top of the column in 1 mL portions in pentane and eluted with pentane (25 mL total) for the non-polar fraction and dichloromethane (15 mL) for the polar fraction. Fractions were concentrated using Kuderna-Danish procedures as above.

2.7.7 Analysis

Samples were analyzed using a Finnigan 9600/3300E GC/MS with Incos 2300 data system running SuperIncos software, rev 5.5. A 1 m uncoated fused silica retention gap was used for most samples except the peat samples (the silica column separation removed highly polar material), some sediments and the post sedisamp large filter samples. The retention gap was installed in conjunction with a 30 m DB-5, 0.25 μm film capillary column (J and W Scientific) inserted directly into the ion source. The mass spectrometer was tuned and mass calibrated daily using perfluorotributylamine (FC43). MS scans were acquired from 41 to 500 amu in 1.00 sec with a 0.01 sec settling time and with storage to disk of mass peaks greater than 50 counts.

Samples (0.5 - 1.0 μL) were introduced using a 1 minute splitless Grob injection at room temperature. At two minutes the oven was heated ballistically to 80 °C and at 4 minutes the MS source and detector were turned on. At 4.5 minutes the oven temperature was programmed at 6 C°/min to 300°C. Data were acquired from the beginning of the temperature program for 38.3 minutes (2300 scans). A GC calibration standard containing 47 hydrocarbons, 13 perdeuterated internal standards and a fragmentation standard (decafluorotriphenylphosphine, DFTPP) was run daily to determine retention times, relative response factors and system performance. The MS fragmentation performance was determined periodically using DFTPP and met the accepted ion abundance criteria for this compound [*Eichelberger et al.*, 1975]. The n-alkanes from C_{11} to C_{36} plus 7 isoprenoids (see Table 5) were quantified relative to [$^2H_{50}$]tetracosane. [$^2H_{26}$]Dodecane and [$^2H_{74}$]hexatriacontane were used to monitor volatility losses and high molecular weight transfer onto the GC column respectively and were also quantified relative to [$^2H_{50}$]tetracosane. The 21 PAH measured from naphthalene to benzo(ghi)perylene were quantified relative to [$^2H_8$]naphthalene, 1- methyl[$^2H_{10}$] naphthalene, [$^2H_8$]acenaphthylene, [$^2H_{10}$]acenaphthene, [$^2H_{10}$]anthracene, [$^2H_{10}$]pyrene, [$^2H_{12}$]chrysene, [$^2H_{12}$]benzo(k)fluoran thene, [$^2H_{12}$]benzo(a)pyrene and [$^2H_{14}$]dibenz(a,h)anthracene with the appropriate deuterated standard being used for each class of PAH. In all cases, target compounds

Table 5: Hydrocarbon Parameter List of n-Alkanes, Isoprenoids and Parent PAH

Undecane	2,6 Dimethyl undecane
Dodecane	Norfarnesane
Tridecane	Farnesane
Tetradecane	2,6,10 Trimethyl tridecane
Pentadecane	Norpristane
Hexadecane	Pristane
Heptadecane	Phytane
Octadecane	Naphthalene
Nonadecane	2-Methyl naphthalene
Eicosane	1-Methyl naphthalene
Heneicosane	Acenaphthylene
Docosane	Acenaphthene
Tricosane	Fluorene
Tetracosane	Phenanthrene
Pentacosane	Anthracene
Hexacosane	Fluoranthene
Heptacosane	Pyrene
Octacosane	Benz(a)anthracene
Nonacosane	Chrysene
Triacontane	Benzo(b)(j)(k)fluoranthene
Untriacontane	Benzo(a)fluoranthene
Dotriacontane	Benzo(e)pyrene
Tritriacontane	Benzo(a)pyrene
Tetratriacontane	Perylene
Pentatriacontane	Dibenz(a,h)anthracene
Hexatriacontane	Indeno(1,2,3,cd)pyrene
	Benzo(ghi)perylene

were located and quantified using relative retention times and mass chromatogram peak maxima for characteristic ions using automated procedures. Where possible, the concentrations of the internal standard components were calibrated using the National Bureau of Standards (NBS) SRM-1647 mixture of PAH in acetonitrile. Perylene was found to be prone to oxidative losses during the base digestion (see following) and an additional standard containing [$^2H_{10}$]biphenyl and [$^2H_{12}$]perylene was added to suspended particulate, sediment and peat samples to monitor losses.

Mean response factors obtained from daily calibration runs are presented in Appendix 3. Day to day changes in response factors were usually very gradual and the separations into different response factor groups were usually determined by GC column or injector insert changes.

2.7.8 Blank Correction

Hydrocarbon data were blank corrected using an extension of the standard protocol [*Keith et al.*, 1983] as outlined in Figure 4.

The data flags shown in Figure 4 document the status of each hydrocarbon measurement and are used in the data tables in Appendix 2.

2.7.9 Suspended Particulate and Sediment Hydrocarbon Sample Quantification Procedures

In most cases, samples were analyzed by GC/MS without separation of the non-polar (alkane) and polar (PAH) fractions. This approach was chosen so that whole GC/MS file time (scan)/intensity (m/z) data matrices could be retained for selected samples and used for principal component analysis as part of an overall hydrocarbon path modeling approach. However, it was subsequently discovered that coeluting alcohols were interfering with the m/z 57 ion quantitation of the n-alkanes in the range of C_{19} to C_{31}. This interference applied to the sediments and large filter and sedisamp particulates only; the dissolved hydrocarbon samples contained sterols and a few non-interfering alkenes but they did not contain the homologous series of alcohols. Peat samples were separated into polar and non-polar fractions.

Peak area ion ratios for m/z 97/57 and 99/57 were tabulated for each carbon number for resolved n-alkanes and alcohols in the range of C_{19} to C_{33} (Appendix 1). The tabulation used both samples of peat material which had been separated into non- polar and polar fractions on silica gel and unchromatographed particulate samples which contained baseline resolved n-alkanes and alcohols. The m/z 97 to 57 ion ratio was then used (on a carbon by carbon basis) to correct the area of n-alkane peaks that contained an unresolved alcohol component and the corrected m/z 57 area was used for subsequent calculations. When tested against n-alkanes from C_{19} to C_{31} which were fully resolved from adjacent alcohols, application of the correction formula to the sum of the alkane and alcohol peak area predicted a m/z 57 peak area for the alkane that was 99.2 $\pm$1.7 (n=83) percent of the original peak area, indicating an excellent deconvolution capability. Resolved C_{32} and C_{33} were excluded from this tabulation (and most subsequent data analysis) due to potential sterol interferences.

The m/z 99 to 57 ion ratio was also tested but it proved to have poor resolving ability. Since the m/z 99 ion is a minor ion in the spectrum of both the n-alkanes and alcohols, while m/z 97 is a minor ion in the n-alkanes but major in the alcohols, it is not surprising that m/z 99 to 57 had an inferior deconvoluting ability.

Because archived mass spectral time/intensity files were not available for all samples, the peak area correction could not be applied to every sample. However virtually all of the sedisamp and large filter samples and a representative number of sediment samples could be corrected for alcohol interferences. Only corrected samples were used for subsequent data analysis.

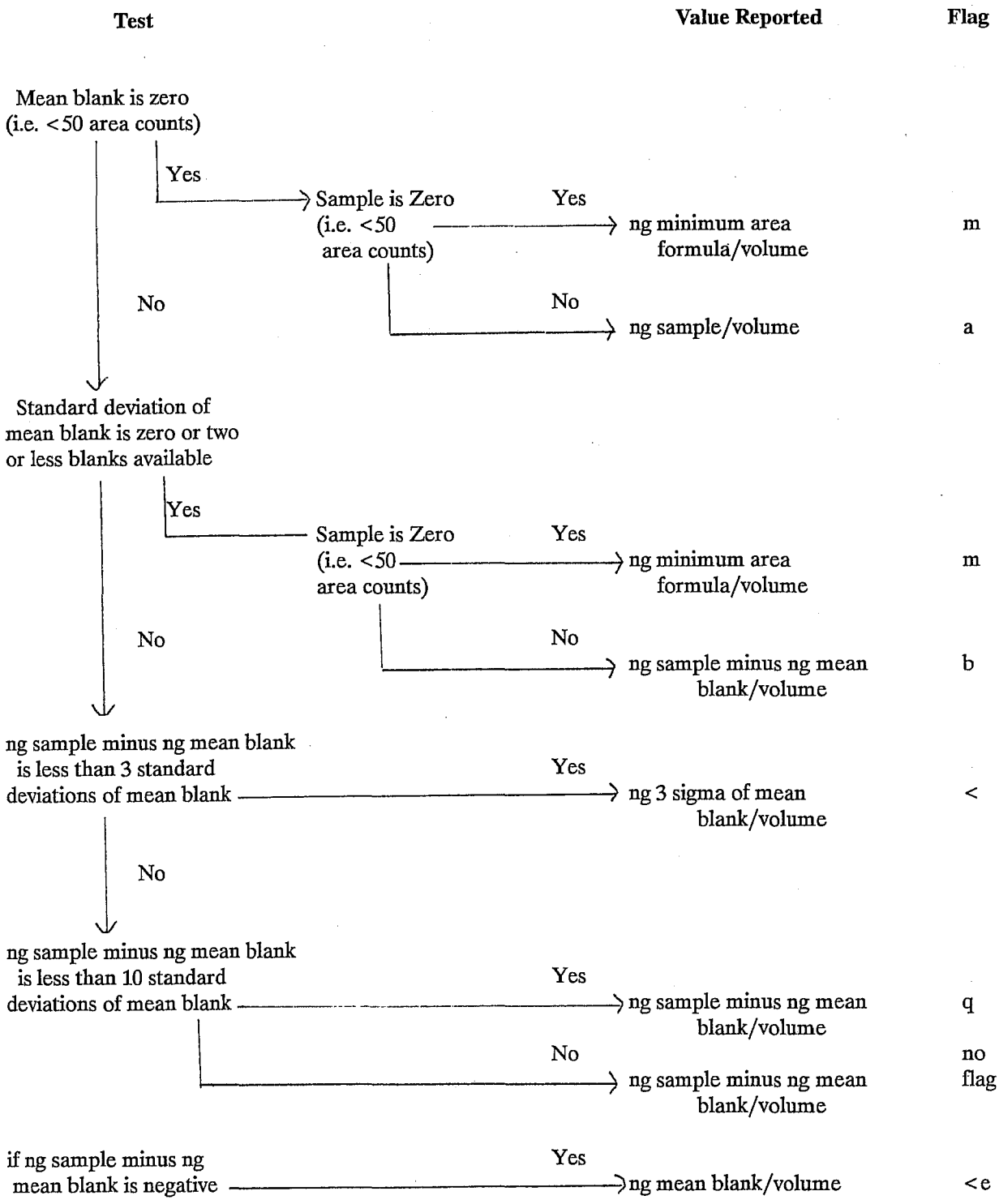


Figure 4: Protocol for blank correction of hydrocarbon data.

2.8 Data Quality Assurance

2.8.1 Beaufort Sea Reference Sediment Analyses

Analyses of GRM1 at IOS (base digest, methylene chloride extraction, without silica-gel column) and by Seakem Oceanography Ltd. (base digest, pentane extraction, silica-gel column) are presented along with the results of a two sample t-test (H_0: $\mu_1 = \mu_2$, $\alpha = 0.05$) for each individual hydrocarbon (Table 6,7). The tables showed good agreement although higher results were reported at IOS for the n-alkanes from docosane to heptacosane. The base digestion used at IOS may be extracting larger amounts of higher alkanes from the plant material present in the sediment or there may be alcohol interferences. For a few of these n-alkanes, the calculated t- statistic was just exceeded. Analytical differences are also apparent for the more volatile n-alkanes and isoprenoids. PAH showed good agreement with the exception of perylene, which was subject to oxidative losses during the base digestion.

2.8.2 Spike Recovery Experiments

As part of the verification process for the analytical methods, the recovery of two spikes was measured for both the dissolved and particulate extraction procedures. Results for the Chromosorb T dissolved hydrocarbon column efficiency determinations have been described in detail elsewhere [*Yunker et al.*, 1989].

The particulate spike recovery experiment was conducted as a series of standard additions at three 10-fold concentration increments, with the lowest level spiked at concentrations just above the blank (Table 8).

At the lowest spike levels (MR4), all of the n-alkanes were below detection and PAH more volatile than fluoranthene showed evaporative losses. The higher PAH in this sample showed erratic recoveries, which may indicate method problems at these low levels. At levels 10 and 100 times higher (MR5 and MR6), acceptable recoveries were obtained for most of the n-alkanes and PAH. The susceptibility of benzo(a)pyrene and perylene to oxidative degradation under basic conditions was borne out in this experiment and these PAH showed erratic recoveries.

Since these spike recovery experiments were conducted prior to the extraction of any samples, in many ways they represent a worst case assessment. Most subsequent sample extractions were performed under argon and contained [$^2H_{12}$]perylene to monitor oxidative losses. All samples were blank-corrected and the wide range of perdeuterated PAH incorporated into the analysis protocol ensured that only variables which were reliably quantified were used for subsequent data interpretation.

2.8.3 Analyses of PAH in Certified Reference Materials

The NRC Canada marine sediment reference materials HS-5 and HS-6 were also analyzed and showed good agreement and no systematic bias for certified PAH (Table 9). A single analysis for PAH of a Duwamish River interim reference sediment (Duwamish II) gave concentrations within the uncertainty limits as reported by laboratory intercalibration [*MacLeod et al.*,1982]. For this single analysis naphthalene and fluorene were significantly higher than the mean of concensus values.

Table 6: Comparison of Beaufort Sea Reference Sediment Analyses (GRM1)

	IOS			Seakem			
	Mean	s	n	Mean	s	n	t Test
	Concentration ng/g						
Undecane	233	46	4				
Dodecane	279	35	4	350	10	3	n
Tridecane	405	28	4	483	15	3	n
Tetradecane	446	36	4	607	31	3	n
Pentadecane	591	52	4	617	23	3	y
Hexadecane	549	62	4	563	25	3	y
Heptadecane	673	71	4	743	38	3	y
Octadecane	559	36	4	573	45	3	y
Nonadecane	604	21	4	607	91	3	y
Eicosane	599	38	4	583	40	3	y
Heneicosane	651	28	4	707	40	3	y
Docosane	577	26	4	490	20	3	n
Tricosane	684	26	4	560	20	3	n
Tetracosane	514	51	4	417	25	3	n
Pentacosane	715	131	4	500	62	3	n
Hexacosane	442	68	4	270	26	3	n
Heptacosane	975	151	4	607	76	3	n
Octacosane	273	44	4	273	38	3	y
Nonacosane	749	123	4	610	105	3	y
Triacontane	206	31	4	317	110	3	y
Untriacontane	540	131	4	607	186	3	y
Dotriacontane	186		1	260	140	3	
Tritriacontane	207	45	3	340	139	3	y
Tetratriacontane	81	20	3	217	102	3	y
Pentatriacontane	80	49	3				
Hexatriacontane	25		1	113	65	3	
2,6-Dimethyl Undecane	119	13	4				
Norfarnesane	146	15	4				
Farnesane	120	14	4	177	15	3	n
2,6,10-Trimethyl Tridecane	258	24	4	320	10	3	n
Norpristane	311	29	4	243	12	3	n
Pristane	707	88	4	653	29	3	y
Phytane	389	30	4	427	60	3	y
Naphthalene	97	6	4	60	1	3	n
2-Methyl Naphthalene	154	67	4				
1-Methyl Naphthalene	158	15	4				
Acenaphthylene	1		1				
Acenaphthene	6	5	4				
Fluorene	36	16	4	41	4	3	y
Phenanthrene	201	15	4	260	10	3	n
Anthracene	9	9	4	3	1	3	y
Fluoranthene	28	4	4	31	1	3	y
Pyrene	53	6	4	41	2	3	n
Benz(a)anthracene	29	4	4	10	1	3	n
Chrysene	137	36	4	94	3	3	y
Benzo(b)(j)(k)fluoranthene	88	18	4	69	2	3	y
Benzo(a)fluoranthene	11	10	3				
Benzo(e)pyrene	304	134	4	108	19	3	y
Benzo(a)pyrene	37	28	4	13	2	3	y
Perylene	130	88	4	287	25	3	n
Dibenz(a,h)anthracene	45	33	3	17	5	3	y
Indeno(1,2,3,c,d)pyrene	53	50	3	17	5	3	y
Benzo(ghi)perylene	238	4	2	137	25	3	

Table 7: Comparison of Beaufort Sea Reference Sediment (GRM1) Analyses; averages and totals

	IOS			Seakem			t Test
	Mean	s	n	Mean	s	n	
	Concentration ng/g						
Total n-alkanes, nC11-36	11,600	740	4	11,400	1,000	3	y
Total nC13-19	3,800	250	4	4,200	240	3	y
Total nC20-29	6,200	550	4	5,000	360	3	n
Total nC30-36	1,100	310	4	1,900	720	3	y
Total isoprenoids	2,100	170	4	1,800	110	3	y
Total target non-polar	13,600	690	4	13,200	1,100	3	y
Total PAH	1,700	180	4	1,200	68	3	
OEP at C25	1.55	0.09	4	1.51	0.06	3	
OEP at C27	2.56	0.08	4	2.18	0.07	3	
OEP at C29	3.14	0.24	4	2.10	0.33	3	

Table 8: Particulate Spike Recovery Experiment

	MR4			MR5			MR6		
	s†	r	%	s	r	%	s	r	%
Dodecane	140 <	35	-	280 q	350	78	2700	3500	77
Tetradecane	77 <	39	-	450	390	117	3300	3900	81
Hexadecane	29 <	36	-	420	360	116	3000	3600	82
Octadecane	19 <	71	-	790	710	112	7100	7100	100
Eicosane	30 <	57	-	690	570	122	9600	5700	169
Docosane	40 <	59	-	780	590	133	6800	5900	116
Tetracosane	58 <	44	-	450	440	102	7200	4400	163
Hexacosane	81 <	32	-	310	320	97	4000	3200	125
Octacosane	76 <	36	-	929‡	356	260	4900	3600	138
Triacontane	110 <	47	-	712	465	153	6500	4700	139
Dotriacontane	480 <	60	-	860 q	600	144	6200	6000	103
Tetratriacontane	105 <	40	-	220	390	55	7100	3900	180
Naphthalene	<m	41	-	460	410	112	4300	4100	104
1-Methyl Naphthalene	<m	38	-	600	380	158	3100	3800	81
Acenaphthylene	<m	41	-	510	410	123	2600 a	4100	62
Acenaphthene	<m	39	-	560	390	143	5400 b	3900	138
Fluorene	<m	44	-	580	440	130	9600 b	4400	217
Phenanthrene	360 a	40	900	780	400	194	9000 a	4000	225
Anthracene	17 <m	42	-	490	430	115	5000 a	4300	118
Fluoranthene	86 a	41	207	560	410	135	2800 a	4100	68
Pyrene	170 a	40	420	660	400	166	3900 a	4000	97
Chrysene	130 b	40	324	320	400	81	3100 b	4000	78
Benzo(e)pyrene	300 a	44	680	4400 a	440	990	17000 a	4400	390
Benzo(a)pyrene	20 <m	48	-	36 <m	480	-	21 <m	4800	-
Perylene	18 <m	44	-	32 <m	440	-	19 <m	4400	-

† s – spike added, ng; r – spike recovery, ng; % = s/r × 100.
‡ Coeluting interference.

Table 9: SRM sediment results

	HS-5 ng g^{-1}		HS- 6 ng g^{-1}		Duwamish II ng g^{-1}	
	Found	Certified	Found	Certified	Found	Certified
Naphthalene	470	250±70	5100	4100±1100	82	51 ± 19
Acenaphthylene	140	150	290	190±50	13	-
Acenaphthene	140	230±100	250	230±70	150	-
Fluorene	450	400±100	650	470±120	180	110 ± 15
Phenanthrene	5300	5200±1000	4000	3050±600	680	720 ± 130
Anthracene	540	380±150	1100	1130±400	300	290 ± 70
Fluoranthene	7900	8400±2660	3400	3540±650	1900	1700 ± 320
Pyrene	5200	5800±1800	2900	2990±600	1600	1400 ± 1400
Benz(a)anthracene	2400	2900±1200	2200	1840±300	690	890 ± 330
Chrysene	2900	2800±900	2800	2050±300	1000	1100 ± 310
Benzo(b)fluoranthene*	(3500)	2000±1000	(3100)	2820±600	1900	-
Benzo(k)fluoranthene*	(2800)	1000±400	(2700)	1430±150	-	-
Benzo(e)pyrene	1500	1700±800	2100	2240±400	360	820 ± 500
Benzo(a)pyrene	-	-	-	-	420	890 ± 450
Perylene	-	-	-	-	240	460 ± 180
Dibenz(a,h)anthracene	350	1200±100	570	470±160	37	-
Indeno(1,2,3,cd)pyrene	720	1300±700	1300	1950±580	250	-
Benzo(ghi)perylene	840	1300±300	1600	1780±720	290	-

*Benzofluoranthene results include Benzo(j)fluoranthene.

3 PEAT

The Arctic Coastal Plain (Figure 1) can be subdivided into the Yukon Coastal Plain and Mackenzie Delta. The coastal morphology is unusual for a major river delta in that most of the Beaufort Sea coast is erosional [*Harper et al.*, 1985;*Harper*, 1990]; mean shoreline retreat rates for the most part exceed 1 m/y and most of the active western Mackenzie River delta appears to be retreating at greater than 2 m/y. These rates are, however, 20 year averages and the actual flux in a given year can be episodic and strongly dependent on storms. The substantial flux of shoreline material into the Beaufort Sea and the high hydrocarbon concentration of peat combine to produce a potentially important source for hydrocarbons.

Harper et al. [1985] divided the Beaufort Sea coast from Cape Dalhousie to the Alaska border into 776 coastal segments and provided a visual description and the erosion rate of each segment. We assembled the best available data on coastal retreat rates and peat thicknesses in a spread sheet [*Harper et al.*, 1985; *Rampton*. 1982; and this work]. Where some or all of a particular coastal segment was non-erosional or contained no peat it was omitted. Active, erosional, tidal flats of the western Mackenzie Delta (which contained almost no peat) were included since they make a large contribution to coastal erosion. The peat thicknesses were multiplied by the segment retreat rate and length to estimate the annual volume of peat input to the sea. The full data base is given in Appendix 4.

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5 APPENDIX 1; DERIVATION OF PEAK DECONVOLUTION FORMULA

APPENDIX 1

DERIVATION OF PEAK DECONVOLUTION FORMULA

(1) $A_{x1} + A_{y1} = A_{m1}$

where A_{x1} is the area of component x, ion y indicates component y and m a mixture of x and y.

(2) $A_{x2} + A_{y2} = A_{m2}$

where A_{x2} is the area of component x, ion 2

$R_x = \frac{A_{x2}}{A_{x1}}$ $\quad R_y = \frac{A_{y2}}{A_{y1}}$ $\quad$ and $\quad R_m = \frac{A_{m2}}{A_{m1}}$

(2) becomes $R_xA_{x1} + R_yA_{y1} = A_{m2}$

from (1) $\quad A_{y1} = A_{m1} - A_{x1}$

$$R_xA_{x1} + R_yA_{m1} - R_yA_{x1} = A_{m2}$$

$$A_{x1} = \frac{A_{m2} - R_yA_{m1}}{R_x - R_y}$$

$$A_{x1} = A_{m1} * \frac{R_m - R_y}{R_x - R_y}$$

For m/z ion 1 = 57 and ion 2 = 97

$$A_{x57} = A_{m57} * \frac{R_{m\,97/57} - R_{y\,97/57}}{R_{m\,97/57} - R_{y\,97/57}}$$

SUMMARY OF M/Z ION RATIOS FOR EACH ALKANE CARBON NUMBER

Alkane 97/57

Carbon	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Mean	0.0680	0.0707	0.0766	0.0839	0.0879	0.0977	0.1057	0.1238	0.1253	0.1584	0.1424	0.1743	0.1521	0.2203	0.1997
Stnd Dev	0.0123	0.0137	0.0167	0.0094	0.0174	0.0115	0.0206	0.0177	0.0114	0.0179	0.0118	0.0198	0.0133	0.0315	0.0411
n	6	7	8	5	5	3	5	7	9	9	11	10	12	12	12

Alcohol 97/57

Carbon	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Mean	0.7730	0.6534	0.8686	0.8261	1.0032	0.9069	0.9879	0.9546	1.0566	0.9610	0.9642	0.7818	1.0629	0.7801	1.0504
Stnd Dev	0.1530	0.1165	0.1071	0.1547	0.0641	0.0637	0.1772	0.1677	0.2103	0.0837	0.0360	0.0763	0.2311		
n	8	1	5	2	4	2	3	4	9	5	9	2	8	1	2

Alkane 99/57

Carbon	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Mean	0.1650	0.1788	0.1840	0.2026	0.2088	0.2088	0.2159	0.2369	0.2491	0.2524	0.2786	0.2887	0.3021	0.2842	0.3218
Stnd Dev	0.0260	0.0359	0.0227	0.0227	0.0242	0.0228	0.0242	0.0247	0.0284	0.0176	0.0250	0.0469	0.0230	0.0244	0.0213
n	10	8	6	7	5	4	5	8	8	9	11	9	12	13	12

Alcohol 99/57

Carbon	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Mean	0.0529	0.0525	0.0652	0.0631	0.0852	0.0998	0.1124	0.0984	0.1126	0.1232	0.1504	0.1346	0.1575	0.1333	0.1540
Stnd Dev	0.0099	0.0167	0.0140	0.0406	0.0150	0.0257	0.0189	0.0413	0.0210	0.0573	0.0171	0.0307	0.0387		
n	5	1	4	1	4	2	4	3	7	4	11	2	11	2	2

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6 APPENDIX 2; HYDROCARBON DATA TABLES

APPENDIX 2

List of Abbreviations

Sample prefixes:

ID	Chromosorb T resin sample
FP	GF/D and GF/F glass fibre filtration
S	Sedisamp centrifuge and sediment grab
T	Peat sample
B	analytical blank
SRM	Mackenzie River reference suspended particulate
FPRM	SRM with glass fibre filter
a	instrumental replicate

Sample suffix:

RRF	Relative response factor (e.g., BZ etc.)

Data Flags

m	concentration is based on a minimum peak area of 50 counts (see also Figure 2)
a	mean blank is zero and blank correction could not be applied
b	a standard deviation was not available for the mean blank and a statistical comparison to the blank could not be made
<	sample minus blank is less than three standard deviations of the mean blank
q	sample minus blank is between 3 and 10 standard deviations of the mean blank
e	sample minus blank was negative - the value used was the mean blank
c	m/z 57 peak area was corrected using procedures outlined in Appendix 1

Notes on analytes

Perdeuter o dodecane and hexatriacontane are expressed as percentages relative to perdeuter o tetracosane. Chrysene includes triphenylene and chrysene. Benzofluoranthene includes the b, j and k isomers.

The numbered notes refer to:

(1) potentially different C5-naphthalenes have been quantified

(2) RRF is approximate since no standards were available. Compounds 72-80 have not been validated to the same extent as the alkanes and PAH.

Data summaries

Total isoprenoids - compounds 30 - 36
Total target non-polar - compounds 4 - 36
Total markers - compounds 72 - 80
ng/L and ng/g concentrations were interconverted using the suspended particulate matter (SPM) data

OEP - odd-even predominance (Scalan and Smith, 1970)
$OEP = C_{i-2} + 6C_i + C_{i+2} / 4 (C_{i-1} + C_{i+1})$

OER - odd even ratio - analogous to CPI (Carbon preference index) for 5 carbons
$OER = C_{i-2} + 2C_i + C_{i+2} / 2 (C_{i-1} + C_{i+1})$

Blanks for glass fibre filter data set

	Mean Blank (ng)	Std. dev (ng)	No. of non-zero blanks (n)
Undecane	36.77	20.52	5
Dodecane	133.73	130.71	5
Tridecane	21.14	14.39	5
Tetradecane	19.08	12.26	5
Pentadecane	41.25	32.42	5
Hexadecane	75.82	57.64	5
Heptadecane	54.08	5.17	5
Octadecane	37.31	12.22	5
Nonadecane	24.63	7.85	5
Eicosane	24.56	12.38	5
Heneicosane	38.89	24.53	5
Docosane	36.99	16.49	5
Tricosane	43.46	23.16	5
Tetracosane	51.24	31.51	5
Pentacosane	64.21	30.31	5
Hexacosane	53.99	26.41	5
Heptacosane	58.19	23.00	5
Octacosane	61.65	17.50	5
Nonacosane	73.75	25.11	5
Triacontane	71.41	22.51	5
Untriacontane	87.17	51.27	5
Dotriacontane	51.77	16.06	5
Tritriacontane	44.58	13.69	5
Tetratriacontane	50.94	32.26	5
Pentatriacontane	34.03	23.18	5
Hexatriacontane	24.09	11.05	5
2,6-Dimethyl Undecane	13.23	7.64	5
Norfarnesane	101.13	127.46	5
Farnesane	24.58	31.98	5
2,6,10-Trimethyl Tridecane	18.79	15.99	5
Norpristane	52.03	16.15	5
Pristane	62.88	14.97	5
Phytane	22.22	9.80	5
Naphthalene	28.98	8.26	4
2-Methyl Naphthalene	20.38	6.19	3
1-Methyl Naphthalene	13.52	4.14	3
Acenaphthylene			0
Acenaphthene	17.51		1
Fluorene	5.87	3.04	3
Phenanthrene	16.92		2
Anthracene			0
Fluoranthene			0
Pyrene	1.05		1
Benz(a)anthracene			0
Chrysene	4.71		1
Benzo(b)(j)(k)fluoranthene			0
Benzo(a)fluoranthene			0
Benzo(e)pyrene			0
Benzo(a)pyrene			0
Perylene			0
Dibenz(a,h)anthracene			0
Indeno(1,2,3,cd)pyrene			0
Benzo(ghi)perylene			0

Blanks for suspended particulate, sediment and peat data set

	Mean Blank (ng)	Std. dev (ng)	No. of non-zero blanks (n)
Undecane	73.86	110.16	5
Dodecane	60.61	115.36	5
Tridecane	62.62	70.06	4
Tetradecane	49.28	54.20	4
Pentadecane	31.29	20.86	4
Hexadecane	40.02	19.51	4
Heptadecane	46.05	38.38	4
Octadecane	25.40	11.97	4
Nonadecane	14.94	12.71	4
Eicosane	18.37	19.55	3
Heneicosane	23.25	31.14	4
Docosane	25.07	25.24	4
Tricosane	26.39	33.63	4
Tetracosane	27.56	36.53	5
Pentacosane	41.20	27.75	5
Hexacosane	78.54	53.19	5
Heptacosane	74.70	45.65	5
Octacosane	83.29	39.98	5
Nonacosane	100.89	69.50	5
Triacontane	95.80	60.65	5
Untriacontane	109.07	59.12	5
Dotriacontane	208.59	324.91	5
Tritriacontane	107.61	169.09	5
Tetratriacontane	67.93	67.52	5
Pentatriacontane	24.60	32.04	5
Hexatriacontane	29.88	37.74	4
2,6-Dimethyl Undecane	18.92	26.53	5
Norfarnesane	16.86	21.82	4
Farnesane	20.54	21.57	4
2,6,10-Trimethyl Tridecane	46.44	62.15	4
Norpristane	27.74	26.10	4
Pristane	34.35	23.33	4
Phytane	15.22	5.56	4
Naphthalene	34.88	39.15	5
2-Methyl Naphthalene	116.02		2
1-Methyl Naphthalene	49.78	65.54	3
Acenaphthylene			0
Acenaphthene	10.47		1
Fluorene	8.40		1
Phenanthrene			0
Anthracene			0
Fluoranthene			0
Pyrene			0
Benz(a)anthracene	1.59		1
Chrysene	2.88		1
Benzo(b)(j)(k)fluoranthene			0
Benzo(a)fluoranthene			0
Benzo(e)pyrene			0
Benzo(a)pyrene			0
Perylene			0
Dibenz(a,h)anthracene			0
Indeno(1,2,3,cd)pyrene			0
Benzo(ghi)perylene			0

Large filter suspended particulate, ng/L

Sample	FP301c	FP302	FP303c	FP304c	FP305c
Location	East	East	Middle	Middle	Reindeer
Date	23/Jun./87	26/Jun./87	25/Jun./87	25/Jun./87	26/Jun./87
Volume (L)	23.65	17.47	17.29	22.55	29.25
SPM (mg/L)	204.8	204.8	188.9	188.9	243.9
Calc sample dry wt (g)	4.84	3.58	3.27	4.26	7.13
RRF	BZ	BZ	DZ	DZ	DZ
Undecane	32.99	38.90	6.86 q	2.73 <	44.37
Dodecane	41.78 q	45.34 q	28.25 q	17.39 <	63.15
Tridecane	67.61	73.21	78.10	37.34	106.10
Tetradecane	71.34	79.55	87.96	72.68	107.68
Pentadecane	89.09	91.65	116.76	108.07	130.02
Hexadecane	90.86	89.18	125.78	112.49	125.65
Heptadecane	121.32	118.51	129.02	115.90	128.17
Octadecane	92.13	93.21	111.23	101.44	75.41
Nonadecane	108.55	112.42	111.21 c	98.65 c	117.11 c
Eicosane	100.16	101.52	124.62 c	109.07 c	106.78 c
Heneicosane	110.28	110.17	154.34 c	137.72 c	140.49 c
Docosane	95.06	95.59	133.15 c	122.98 c	129.17 c
Tricosane	124.06 c	127.71	193.21 c	164.13 c	165.10 c
Tetracosane	84.59	85.51	130.84 c	119.46 c	115.34 c
Pentacosane	133.76 c	145.29	203.25 c	167.32 c	164.45 c
Hexacosane	71.67 c	81.02	108.79 c	101.37 c	94.95 c
Heptacosane	172.26 c	254.51	298.27 c	279.56 c	319.60 c
Octacosane	41.74 c	51.01	84.98 c	72.22 c	79.51 c
Nonacosane	109.60 c	186.66	200.96 c	205.46 c	216.34 c
Triacontane	28.53 c	35.42	63.53 c	56.11 c	53.90 c
Untriacontane	63.12 c	143.61	130.41 c	123.43 c	144.06 c
Dotriacontane	19.48 c	17.11	36.91 c	31.78 c	38.69 c
Tritriacontane	27.05 c	73.25	69.64 c	54.27 c	39.85 c
Tetratriacontane	12.16 q	27.95	35.12	25.79	28.19
Pentatriacontane	2.94 <	32.17	35.04	29.08	99.02
Hexatriacontane	1.40 <	12.08	11.63	12.06	14.58
2,6-Dimethyl Undecane	18.27	19.62	15.82	1.02 <	28.21
Norfarnesane	20.26 q	22.64 q	22.12 <	16.96 <	33.38 q
Farnesane	17.52	18.40	22.03	16.12	28.42
2,6,10-Trimethyl Tridecane	37.11	33.68	49.01	44.13	57.38
Norpristane	49.25	46.29	56.49	51.02	58.01
Pristane	112.14	104.35	112.62	102.97	118.49
Phytane	69.08	63.70	75.85	67.03	74.50
Naphthalene	26.02	21.93	28.12	22.30	26.47
2-Methyl Naphthalene	39.53	33.92	41.74	39.30	45.80
1-Methyl Naphthalene	33.69	27.96	39.50	40.45	36.30
Acenaphthylene	0.19 <m	0.39 <m	0.24 a	0.13 <m	0.13 <m
Acenaphthene	0.88 b	0.81 b	0.89 b	0.88 b	2.11 b
Fluorene	8.19	0.52 <	7.84	8.07	11.19
Phenanthrene	40.72 b	33.57 b	38.55 b	33.69 b	41.24 b
Anthracene	1.56 a	3.28 a	1.12 a	1.06 a	1.38 a
Fluoranthene	3.29 a	5.04 a	5.71 a	4.95 a	5.16 a
Pyrene	6.54 b	10.34 b	9.85 b	9.79 b	10.11 b
Benz(a)anthracene	5.49 a	1.12 <m	2.61 a	2.77 a	5.02 a
Chrysene	24.51 b	23.04 b	20.45 b	19.82 b	23.20 b
Benzo(b)(j)(k)fluoranthene	18.07 a	15.91 a	12.12 a	12.02 a	12.04 a
Benzo(a)fluoranthene	0.64 <m	1.57 <m	0.91 a	0.51 a	2.92 a
Benzo(e)pyrene	54.44 a	73.82 a	39.93 a	35.93 a	43.59 a
Benzo(a)pyrene	5.36 a	9.86 a	4.91 a	4.75 a	8.79 a
Perylene	46.09 a	16.45 a	29.52 a	22.63 a	29.27 a
Dibenz(a,h)anthracene	3.37 a	3.37 <m	9.76 a	2.61 a	2.65 a
Indeno(1,2,3,cd)pyrene	11.45 a	2.48 <m	6.00 a	5.95 a	6.79 a
Benzo(ghi)perylene	64.53 a	78.72 a	46.00 a	52.38 a	50.80 a

QA/QC Statistics

Dodecane-D26	52.55%	40.54%	19.93%	0.78%	51.93%
Tetracosane-D50 area	5965	3869	23051	18287	11232
Hexatriacontane-D74	0.00%	101.62%	151.20%	165.06%	185.09%
Naphthalene/chrysene	317.71	376.29	102.41	2.52	263.67
1-Methyl Naphthalene/chrysene	129.90	180.73	91.73	40.21	135.45
Acenaphthylene/chrysene	245.02	290.49	191.78	163.37	224.64
Acenaphthene/chrysene	184.69	211.12	147.39	132.15	169.74
Anthracene/chrysene	149.39	205.71	123.81	121.03	131.36
Pyrene/chrysene	292.85	318.42	228.35	218.89	244.03
Benzo(k)fluoranthene/chrysene	104.32	104.69	110.37	112.62	125.13
Benzo(a)pyrene/chrysene	43.12	37.17	52.71	57.75	62.28
Perylene/chrysene	42.07	61.46	87.15	34.89	44.61
Dibenz(a,h)anthracene/chrysene	41.92	42.24	66.40	62.75	75.99
Perylene/biphenyl	9.81	11.88	25.47	15.28	10.55

Summary Statistics

(ng/L basis)					
Total n-alkanes, nC11-36	1909.19	2322.54	2809.86	2458.39	2847.67
Total nC11-19	715.67	741.97	795.16	646.57	897.66
Total nC20-29	1043.18	1238.98	1632.41	1479.29	1531.73
Total nC30-36	150.34	341.59	382.29	332.52	418.28
Total isoprenoids	323.62	308.68	331.83	281.28	398.39
Total target non-polar	2232.82	2631.22	3141.69	2739.67	3246.06
Total PAH	393.73	354.65	345.77	319.86	364.82
Total nC13-19	640.90	657.73	760.05	646.57	790.14
Total C20-C31	1134.83	1418.01	1826.35	1658.83	1729.69
Napthalene-Fluorene	108.32	84.61	118.34	111.01	121.87
Phenanthrene-Chrysene	82.10	75.27	78.28	72.08	86.11
Higher PAH (Perylene excl.)	157.22	178.32	119.63	114.14	127.58
Farnesane-Phytane	285.10	266.42	316.01	281.28	336.80
OEP at C25	1.76	1.88	1.79	1.64	1.75
OEP at C27	2.81	3.52	2.83	2.95	3.29
OEP at C29	3.18	4.39	2.75	3.19	3.30
Pristane/Phytane	1.62	1.64	1.48	1.54	1.59

Large filter suspended particulate, ng/L

Sample	FP306c	FP307c	FP308c	FP309c	FP310c
Location	Reindeer	East	East	Middle	Middle
Date	26 June 1987	29 July 1987	29 July 1987	27 July 1987	27 July 1987
Volume (L)	24.6	57.53	48	51.35	49.6
SPM (mg/L)	243.9	50.6	50.6	103.3	103.3
Calc sample dry wt (g)	6.00	2.91	2.43	5.30	5.12
RRF	DZ	DZ	DZ	DZ	DZ
Undecane	31.66	1.38 q	15.58	42.51	41.03
Dodecane	77.00	6.82 <	17.30 q	53.26	48.34
Tridecane	147.38	13.05	25.55	70.47	70.30
Tetradecane	158.19	19.39	24.27	64.91	62.85
Pentadecane	197.02	36.66	39.91	76.24	75.61
Hexadecane	190.36	26.06	26.25	62.34	65.06
Heptadecane	198.98	63.25	64.71	83.13	88.95
Octadecane	170.43	25.29	25.79	60.18	61.44
Nonadecane	180.55 c	27.21 c	26.78 c	53.48 c	65.37 c
Eicosane	173.89 c	24.51 c	26.42 c	62.02 c	65.87 c
Heneicosane	223.28 c	32.96 c	39.34 c	75.30 c	83.16 c
Docosane	190.14 c	30.14 c	30.20 c	66.38 c	76.08 c
Tricosane	250.84 c	41.78 c	36.96 c	89.45 c	88.02 c
Tetracosane	170.38 c	29.41 c	29.04 c	62.32 c	72.43 c
Pentacosane	281.56 c	41.86 c	37.37 c	104.79 c	98.96 c
Hexacosane	150.66 c	21.73 c	26.84 c	60.16 c	54.03 c
Heptacosane	304.84 c	64.13 c	70.04 c	154.49 c	164.37 c
Octacosane	103.60	18.28	18.62	42.31 c	44.02 c
Nonacosane	279.80 c	49.18	53.32 c	108.58 c	114.75 c
Triacontane	72.84	13.29	13.41	32.55 c	31.13 c
Untriacontane	191.90 c	43.29	44.17	80.92 c	82.82 c
Dotriacontane	48.65	10.52	12.26	22.70 c	24.56 c
Tritriacontane	89.82	18.86	18.25	31.94 c	35.17 c
Tetratriacontane	41.65	22.15	6.02 q	19.18	16.52
Pentatriacontane	32.45	16.59	6.08	12.87	15.01
Hexatriacontane	15.13	4.46	3.77	7.56	8.74
2,6-Dimethyl Undecane	37.23	2.69	8.06	21.02	53.03
Norfarnesane	47.90 q	6.65 <	8.05 q	22.72 q	22.80 q
Farnesane	42.83	3.73 q	5.64 q	15.43	16.28
2,6,10-Trimethyl Tridecane	86.05	9.73	11.42	31.75	30.43
Norpristane	96.42	1.39 q	12.37	31.95	36.16
Pristane	183.52	21.88	22.45	58.67	58.01
Phytane	126.90	13.44	15.89	35.66	40.02
Naphthalene	42.42	6.12	4.97	11.04	13.26
2-Methyl Naphthalene	72.63	8.74	9.45	21.99	25.36
1-Methyl Naphthalene	58.11	8.04	7.64	17.25	19.78
Acenaphthylene	0.06 <m	0.07 <m	0.02 <m	0.19 a	0.05 a
Acenaphthene	1.47 b	0.03 b	0.36 <e	0.13 b	1.22 b
Fluorene	9.99	1.56	1.99	4.82	3.32
Phenanthrene	53.00 b	10.70 b	7.50 b	20.03 b	19.04 b
Anthracene	1.59 a	1.11 a	0.20 a	0.35 a	0.52 a
Fluoranthene	8.38 a	2.36 a	1.46 a	3.25 a	2.72 a
Pyrene	15.96 b	3.70 b	3.68 b	6.70 b	5.72 b
Benz(a)anthracene	5.00 a	1.43 a	0.88 a	2.65 a	1.63 a
Chrysene	29.96 b	7.04 b	6.13 b	15.05 b	10.83 b
Benzo(b)(j)(k)fluoranthene	18.63 a	4.38 a	3.84 a	9.77 a	6.28 a
Benzo(a)fluoranthene	0.59 a	0.16 <m	0.33 a	1.66 a	0.28 a
Benzo(e)pyrene	50.01 a	10.91 a	10.39 a	19.26 a	19.68 a
Benzo(a)pyrene	7.06 a	4.28 a	1.84 a	2.73 a	1.76 a
Perylene	48.91 a	1.75 a	1.09 a	4.52 a	3.84 a
Dibenz(a,h)anthracene	5.46 a	0.99 a	1.80 a	5.52 a	1.67 a
Indeno(1,2,3,cd)pyrene	9.05 a	0.76 a	2.45 a	5.52 a	2.96 a
Benzo(ghi)perylene	63.93 a	9.94 a	9.29 a	26.43 a	21.37 a

QA/QC Statistics

Dodecane-D26	36.64%	16.21%	62.83%	52.04%	47.71%
Tetracosane-D50 area	29228	9057	40862	7405	25382
Hexatriacontane-D74	157.66%	178.29%	165.54%	173.36%	180.34%
Naphthalene/chrysene	184.58	120.07	292.09	460.28	350.57
1-Methyl Naphthalene/chrysene	110.65	110.81	121.88	179.40	131.83
Acenaphthylene/chrysene	210.43	267.71	219.30	313.53	217.45
Acenaphthene/chrysene	159.66	176.35	151.04	231.02	164.73
Anthracene/chrysene	143.90	163.84	135.78	150.39	147.20
Pyrene/chrysene	229.17	252.04	205.08	254.19	226.62
Benzo(k)fluoranthene/chrysene	115.13	132.58	114.57	132.55	120.10
Benzo(a)pyrene/chrysene	66.06	59.43	48.71	62.91	58.98
Perylene/chrysene	64.81	7.85	0.86	10.08	8.67
Dibenz(a,h)anthracene/chrysene	77.67	88.29	75.56	80.58	76.16
Perylene/biphenyl	16.88	2.01	0.22	1.83	2.04

Summary Statistics

(ng/L basis)					
Total n-alkanes, nC11-36	3973.02	695.41	738.22	1600.02	1654.57
Total nC11-19	1351.57	212.28	266.12	566.52	578.95
Total nC20-29	2129.00	353.98	368.15	825.78	861.68
Total nC30-36	492.45	129.15	103.95	207.73	213.94
Total isoprenoids	620.85	52.86	83.89	217.20	256.74
Total target non-polar	4593.87	748.27	822.11	1817.22	1911.31
Total PAH	502.15	83.82	74.93	178.84	161.30
Total nC13-19	1242.90	210.90	233.25	470.75	489.58
Total C20-C31	2393.75	410.56	425.72	939.25	975.62
Napthalene-Fluorene	184.62	24.49	24.05	55.42	62.99
Phenanthrene-Chrysene	113.89	26.34	19.85	48.01	40.47
Higher PAH (Perylene excl.)	154.74	31.25	29.94	70.89	54.00
Farnesane-Phytane	535.71	50.17	67.78	173.46	180.90
OEP at C25	1.75	1.75	1.48	1.78	1.67
OEP at C27	2.35	2.97	2.81	2.78	3.06
OEP at C29	3.08	3.19	3.39	2.96	3.11
Pristane/Phytane	1.45	1.63	1.41	1.65	1.45

Large filter suspended particulate, ng/L

Post sedisamp suspended particulate, ng/L

Sample	FP311c	FP312c	FP318c	FP313c	FP316c
Location	Reindeer	Reindeer	East	East	Middle
Date	27 July 1988	27 July 1987	23 June 1987	28 July 1987	24 June 1987
Volume (L)	37.11	37.47	315	1183	120
SPM (mg/L)	175.9	175.9			
Calc sample dry wt (g)	6.53	6.59	0.77	0.72	0.97
RRF	DZ	DZ	BZ	BZ	BZ
Undecane	38.12	64.18	0.20 <	0.05 <	8.17
Dodecane	53.92	74.78	1.24 <	0.33 <	10.29 q
Tridecane	85.11	104.47	0.35 q	0.06 q	11.72
Tetradecane	94.22	98.21	0.61	0.10 q	15.50
Pentadecane	124.81	122.61	1.37	0.34	26.18
Hexadecane	119.55	92.46	1.88	0.26 q	20.88
Heptadecane	146.86	125.62	2.99	1.21	29.85
Octadecane	118.72	85.47	2.00	0.23	15.45
Nonadecane	116.14 c	105.36	3.06 c	0.47	18.73
Eicosane	110.66 c	94.88	2.50 c	0.52	13.85
Heneicosane	136.66 c	114.49	4.20 c	1.35	21.54
Docosane	118.71 c	121.30	3.06 c	0.88 c	13.01
Tricosane	142.82 c	120.73 c	5.90 c	1.84 c	21.62 c
Tetracosane	147.96 c	82.53 c	3.28 c	0.84 c	7.21 c
Pentacosane	237.79 c	144.34 c	5.31 c	1.70 c	21.20 c
Hexacosane	206.59 c	59.71 c	2.83 c	1.29	6.22 c
Heptacosane	416.71 c	214.79 c	10.56 c	2.75 c	26.84 c
Octacosane	221.98 c	50.47 c	1.59 c	0.67	3.08
Nonacosane	373.20 c	133.52 c	4.56 c	3.32	15.17 c
Triacontane	221.16 c	36.22 c	1.00 c	0.48	1.75 q
Untriacontane	258.60 c	96.61 c	3.80 c	2.87	7.69
Dotriacontane	146.67 c	20.64 c	0.93	0.65	2.04
Tritriacontane	132.38 c	36.99 c	1.22 c	1.36	2.52
Tetratriacontane	2.61 <	14.73	1.23	0.17 q	0.95 q
Pentatriacontane	1.87 <	12.05	0.76	0.06 <	0.58 <
Hexatriacontane	0.89 <	7.04	0.25 q	0.03 <	0.28 <
2,6-Dimethyl Undecane	23.40	32.16	0.24 q	0.02 <	2.27
Norfarnesane	27.33 q	10.21 <	1.21 <	0.32 <	3.24 q
Farnesane	24.66	22.83	0.30 <	0.08 <	5.56
2,6,10-Trimethyl Tridecane	47.18	43.72	0.60	0.05 q	5.75
Norpristane	55.03	44.40	1.01	0.14	10.68
Pristane	101.24	95.21	1.59	1.20	12.65
Phytane	70.11	53.13	1.40	0.14	7.78
Naphthalene	21.16	13.97	0.46	0.03 q	4.58
2-Methyl Naphthalene	37.51	27.21	0.37	0.03 q	4.65
1-Methyl Naphthalene	29.66	20.45	0.37	0.02 q	3.89
Acenaphthylene	0.14 a	0.09 a	0.02 <m	0.00 <m	0.11 a
Acenaphthene	1.65 b	0.53 b	0.02 <m	0.01 <e	0.15 <e
Fluorene	4.58	3.94	0.05 q	0.01 <	0.44
Phenanthrene	34.16 b	23.36 b	0.47 b	0.08 b	1.74 b
Anthracene	1.37 a	0.11 a	0.02 a	0.00 <m	0.36 a
Fluoranthene	4.81 a	3.42 a	0.09 a	0.01 a	0.32 a
Pyrene	9.18 b	6.48 b	0.17 b	0.02 b	0.50 b
Benz(a)anthracene	2.39 a	2.85 a	0.03 a	0.00 <m	0.27 a
Chrysene	19.56 b	13.95 b	0.37 b	0.07 b	0.89 b
Benzo(b)(j)(k)fluoranthene	12.13 a	8.34 a	0.34 a	0.04 a	0.77 a
Benzo(a)fluoranthene	0.81 a	0.46 a	0.04 <m	0.00 <m	0.05 <m
Benzo(e)pyrene	35.29 a	23.47 a	0.67 a	0.12 a	1.36 a
Benzo(a)pyrene	5.53 a	6.67 a	0.20 a	0.00 <m	0.23 a
Perylene	19.03 a	2.43 a	0.06 <m	0.00 <m	0.64 a
Dibenz(a,h)anthracene	3.21 a	5.30 a	0.07 <m	0.00 <m	0.08 <m
Indeno(1,2,3,cd)pyrene	6.83 a	3.32 a	0.05 <m	0.00 <m	0.23 a
Benzo(ghi)perylene	36.52 a	26.13 a	0.67 a	0.07 a	1.36 a

QA/QC Statistics

Dodecane-D26	32.18%	59.22%	10.62%	31.63%	9.57%
Tetracosane-D50 area	13370	16323	7124	60973	8442
Hexatriacontane-D74	0.00%	132.40%	106.37%	0.00%	38.59%
Naphthalene/chrysene	302.53	440.93	98.65	162.57	37.03
1-Methyl Naphthalene/chrysene	139.68	187.84	66.42	80.91	54.63
Acenaphthylene/chrysene	242.47	303.45	173.80	203.92	275.35
Acenaphthene/chrysene	186.40	233.29	127.42	131.62	187.79
Anthracene/chrysene	141.72	151.52	185.52	121.05	206.28
Pyrene/chrysene	223.68	259.91	243.99	182.07	259.30
Benzo(k)fluoranthene/chrysene	122.27	115.04	92.72	123.34	104.75
Benzo(a)pyrene/chrysene	64.40	49.19	48.90	46.66	53.02
Perylene/chrysene	23.98	3.94	15.39	1.84	10.37
Dibenz(a,h)anthracene/chrysene	69.42	54.33	49.29	95.83	55.69
Perylene/biphenyl		0.63	6.52	0.63	3.44

Summary Statistics

(ng/L basis)					
Total n-alkanes, nC11-36	3769.34	2234.19	65.24	23.36	321.45
Total nC11-19	897.45	873.15	12.26	2.68	156.76
Total nC20-29	2113.08	1136.76	43.79	15.16	149.73
Total nC30-36	758.81	224.28	9.19	5.52	14.96
Total isoprenoids	348.95	291.44	4.84	1.53	47.94
Total target non-polar	4118.29	2525.63	70.08	24.89	369.39
Total PAH	285.54	192.48	4.27	0.49	22.33
Total nC13-19	805.41	734.20	12.26	2.68	138.30
Total C20-C31	2592.85	1269.58	48.59	18.51	159.17
Napthalene-Fluorene	94.71	66.20	1.25	0.08	13.66
Phenanthrene-Chrysene	71.47	50.16	1.14	0.18	4.07
Higher PAH (Perylene excl.)	100.32	73.69	1.87	0.23	3.96
Farnesane-Phytane	298.22	259.28	4.60	1.53	42.43
OEP at C25	1.40	2.11	1.98	1.73	3.27
OEP at C27	1.81	3.55	4.15	2.75	5.31
OEP at C29	1.64	3.21	4.03	5.59	6.49
Pristane/Phytane	1.44	1.79	1.14	8.33	1.63

Large filter suspended particulate reference material, ng/g

Sample	FPRM1c	FPRM2c	FPRM3c	FPRM4c	FPRM5c
Location	East	East	East	East	East
Date	June 1987	June 1987	June 1987	June 1987	June 1987
Dry wt	3.28	2.90	4.95	4.83	6.98
Dry/wet	0.614	0.614	0.614	0.614	0.614
Wet wt.	5.34	4.73	8.06	7.87	11.37
RRF	BZ	BZ	BZ	BZ	BZ
Undecane	41.33 q	436.34	345.00	257.55	267.18
Dodecane	119.60 <	504.54	401.55	326.30	336.24
Tridecane	244.12	678.24	569.27	502.26	523.37
Tetradecane	328.26	654.51	585.02	526.73	622.58
Pentadecane	476.97	738.75	743.54	627.35	759.70
Hexadecane	510.44	728.31	711.61	625.75	723.70
Heptadecane	636.49	844.37	865.60	798.80	924.21
Octadecane	505.38	642.75	650.03	602.75	663.78
Nonadecane	543.99	740.04 c	731.18	723.85	734.28
Eicosane	529.30	659.41 c	695.17	655.08	680.33
Heneicosane	577.78	752.44 c	744.84	723.68	734.08
Docosane	524.60	655.46 c	634.83	619.28	628.45
Tricosane	637.94 c	837.76 c	744.55 c	734.17 c	791.05 c
Tetracosane	458.31 c	601.70 c	557.34	514.66	525.91
Pentacosane	641.42 c	886.89 c	867.11 c	779.92 c	726.32 c
Hexacosane	361.56 c	516.42 c	435.93 c	433.58 c	392.02 c
Heptacosane	882.13 c	1395.22 c	1071.45 c	1067.45 c	1070.22 c
Octacosane	236.89 c	298.88 c	292.44 c	277.57 c	282.70 c
Nonacosane	493.31 c	701.95 c	749.49 c	640.25 c	661.38 c
Triacontane	163.20 c	192.44 c	208.92 c	170.63 c	185.97 c
Untriacontane	257.14 c	544.79 c	466.72 c	457.16 c	451.47 c
Dotriacontane	87.41	110.11 c	122.27	103.12	113.69 c
Tritriacontane	190.22 c	211.57 c	177.64	228.98	52.24
Tetratriacontane	115.68	75.43 q	83.72	72.92	25.17 q
Pentatriacontane	122.03	81.05	68.64	55.22	23.75 q
Hexatriacontane	36.75	27.92 q	37.51	31.96	4.75 <
2,6-Dimethyl Undecane	57.88	190.96	154.00	124.86	133.19
Norfarnesane	116.63 <	250.28 q	187.00 q	167.76 q	179.52 q
Farnesane	79.33 q	152.11	138.78	124.76	145.44
2,6,10-Trimethyl Tridecane	205.24	324.53	307.35	269.82	303.51
Norpristane	275.17	348.27	353.68	333.02	367.90
Pristane	548.67	786.26	735.49	704.41	780.83
Phytane	374.32	473.64	481.97	430.29	509.27
Naphthalene	159.08	187.98	169.94	155.11	150.82
2-Methyl Naphthalene	242.88	343.90	260.93	258.33	247.83
1-Methyl Naphthalene	209.68	251.27	211.74	203.48	201.02
Acenaphthylene	0.51 <m	0.70 a	1.02 <m	1.48 <m	0.91 <m
Acenaphthene	15.29 b	10.29 b	4.38 b	3.25 b	8.08 b
Fluorene	45.60	3.14 <	4.20 q	3.13 q	53.73
Phenanthrene	220.66 b	237.00 b	216.29 b	218.16 b	206.13 b
Anthracene	0.63 <m	0.52 <m	6.97 a	9.26 a	6.41 a
Fluoranthene	28.18 a	25.78 a	41.71 a	35.38 a	42.56 a
Pyrene	57.66 b	44.64 b	69.81 b	67.47 b	70.35 b
Benz(a)anthracene	28.86 a	22.80 a	32.32 a	38.19 a	33.74 a
Chrysene	114.37 b	111.60 b	191.34 b	154.84 b	213.93 b
Benzo(b)(j)(k)fluoranthene	31.66 a	23.55 a	105.18 a	121.61 a	115.44 a
Benzo(a)fluoranthene	1.86 <m	0.88 <m	3.94 <m	6.03 <m	3.75 <m
Benzo(e)pyrene	194.54 a	193.75 a	354.86 a	331.54 a	289.24 a
Benzo(a)pyrene	32.41 a	24.72 a	89.22 a	75.17 a	27.69 a
Perylene	272.73 a	235.10 a	356.53 a	176.83 a	204.16 a
Dibenz(a,h)anthracene	69.15 a	24.63 a	33.14 a	11.65 <m	37.04 a
Indeno(1,2,3,cd)pyrene	53.91 a	39.56 a	77.44 a	8.59 <m	86.25 a
Benzo(ghi)perylene	242.02 a	213.77 a	542.05 a	506.14 a	412.22 a

QA/QC Statistics

Dodecane-D26	16.00%	52.51%	59.06%	58.98%	62.28%
Tetracosane-D50	27585	24004	4525	3364	3866
Hexatriacontane-D74	115.36%	89.35%	104.95%	99.48%	104.30%
Naphthalene/chrysene	128.25	252.50	346.02	412.53	390.96
1-Methyl Naphthalene/chrysene	88.08	101.15	156.65	181.10	182.73
Acenaphthylene/chrysene	228.98	200.06	289.43	301.73	317.99
Acenaphthene/chrysene	160.37	138.54	199.20	221.24	224.13
Anthracene/chrysene	171.03	129.91	184.64	220.77	241.24
Pyrene/chrysene	218.28	236.59	295.92	324.79	325.40
Benzo(k)fluoranthene/chrysene	90.09	117.86	107.60	106.24	110.51
Benzo(a)pyrene/chrysene	56.55	67.93	50.70	59.30	61.22
Perylene/chrysene	0.00	0.70	52.96	24.98	45.57
Dibenz(a,h)anthracene/chrysene	58.09	78.49	39.04	47.69	47.51
Perylene/biphenyl		14.64	11.44	4.55	8.11

Summary Statistics

(ng/g basis)					
Total n-alkanes, nC11-36	9602.62	14517.28	13561.34	12556.95	12899.77
Total nC11-19	3286.97	5967.86	5602.79	4991.33	5555.03
Total nC20-29	5343.23	7306.12	6793.14	6445.63	6492.45
Total nC30-36	972.42	1243.30	1165.41	1119.99	852.29
Total isoprenoids	1540.61	2526.06	2358.27	2154.91	2419.66
Total target non-polar	11143.23	17043.34	15919.61	14711.86	15319.43
Total PAH	2018.67	1991.04	2768.05	2357.92	2406.63
Total nC13-19	3245.65	5026.97	4856.25	4407.48	4951.62
Total C20-C31	5763.57	8043.35	7468.78	7073.42	7129.89
Napthalene-Fluorene	672.52	794.14	651.19	623.31	661.48
Phenanthrene-Chrysene	449.73	441.82	558.45	523.31	573.12
Higher PAH (Perylene excl.)	623.70	519.97	1201.88	1034.47	967.88
Farnesane-Phytane	1482.73	2084.82	2017.27	1862.29	2106.95
OEP at C25	1.64	1.69	1.77	1.71	1.69
OEP at C27	2.69	3.05	2.76	2.75	2.89
OEP at C29	2.56	3.13	3.01	2.99	2.93
Pristane/Phytane	1.47	1.66	1.53	1.64	1.53

Large filter suspended particulate reference material, ng/g

Sample	FPRM6	FPRM9c
Location	East	East
Date	June 1987	June 1987
Dry wt	2.92	3.62
Dry/wet	0.614	0.614
Wet wt.	4.76	5.9
RRF	BZ	BZ
Undecane	299.85	231.52
Dodecane	308.56 q	337.79 q
Tridecane	515.48	593.21
Tetradecane	542.29	608.21
Pentadecane	635.37	715.18
Hexadecane	615.67	709.16
Heptadecane	729.91	855.09
Octadecane	650.45	628.84
Nonadecane	689.39	739.56
Eicosane	636.98	665.21
Heneicosane	659.42	666.96
Docosane	617.24	584.75
Tricosane	752.89	694.47
Tetracosane	535.05	543.37
Pentacosane	1302.74	628.55 c
Hexacosane	505.51	381.31 c
Heptacosane	1391.60	927.14 c
Octacosane	428.76	261.77 c
Nonacosane	1219.58	529.00 c
Triacontane	214.17	216.81 c
Untriacontane	774.41	438.88
Dotriacontane	114.15	114.56
Tritriacontane	174.32	166.95
Tetratriacontane	56.48 q	87.59 q
Pentatriacontane	57.43 q	19.21 <
Hexatriacontane	11.34 <	9.16 <
2,6-Dimethyl Undecane	136.17	145.46
Norfarnesane	161.84 q	192.92 q
Farnesane	129.38	170.94
2,6,10-Trimethyl Tridecane	263.21	296.61
Norpristane	346.82	356.47
Pristane	722.99	741.48
Phytane	436.51	465.81
Naphthalene	155.25	189.37
2-Methyl Naphthalene	241.39	319.93
1-Methyl Naphthalene	218.97	252.77
Acenaphthylene	2.57 <m	1.61 a
Acenaphthene	4.88 <m	9.24 b
Fluorene	37.64	47.57
Phenanthrene	219.22 b	254.17 b
Anthracene	3.72 <m	8.35 a
Fluoranthene	39.17 a	25.09 a
Pyrene	67.42 b	50.92 b
Benz(a)anthracene	9.37 <m	27.65 a
Chrysene	128.50 b	113.00 b
Benzo(b)(j)(k)fluoranthene	61.51 a	108.57 a
Benzo(a)fluoranthene	13.86 <m	2.50 <m
Benzo(e)pyrene	281.39 a	302.77 a
Benzo(a)pyrene	17.31 <m	61.53 a
Perylene	17.17 <m	202.73 a
Dibenz(a,h)anthracene	20.03 <m	26.09 a
Indeno(1,2,3,cd)pyrene	14.76 <m	44.96 a
Benzo(ghi)perylene	20.87 <m	278.51 a

QA/QC Statistics

Dodecane-D26	44.51%		30.58%
Tetracosane-D50	2792	9270	
Hexatriacontane-D74	115.50%		0.00%

Naphthalene/chrysene	409.75	326.36
1-Methyl Naphthalene/chrysene	181.94	149.31
Acenaphthylene/chrysene	372.54	230.48
Acenaphthene/chrysene	205.75	211.47
Anthracene/chrysene	238.42	188.80
Pyrene/chrysene	258.62	285.19
Benzo(k)fluoranthene/chrysene	98.91	95.65
Benzo(a)pyrene/chrysene	55.35	46.19
Perylene/chrysene	14.45	59.90
Dibenz(a,h)anthracene/chrysene	59.38	51.59
Perylene/biphenyl	1.29	5.43

Summary Statistics

(ng/g basis)		
Total n-alkanes, nC11-36	14427.71	12325.86
Total nC11-19	4986.98	5418.54
Total nC20-29	8049.76	5882.53
Total nC30-36	1390.97	1024.79
Total isoprenoids	2196.93	2369.69
Total target non-polar	16624.63	14695.55
Total PAH	1450.47	2324.83
Total nC13-19	4378.57	4849.24
Total C20-C31	9038.34	6538.22
Napthalene-Fluorene	653.25	820.49
Phenanthrene-Chrysene	454.32	479.18
Higher PAH (Perylene excl.)	342.90	822.43
Farnesane-Phytane	1898.91	2031.32
OEP at C25	2.39	1.46
OEP at C27	2.91	2.61
OEP at C29	3.69	2.37
Pristane/Phytane	1.66	1.59

Sedisamp suspended particulate, ng/g

Sample	S305c	S306c	S307c	S315c	S316
Location	Middle	East	Reindeer	East	Middle
Date	June 1987	July 1987	July 1987	July 1987	June 1987
Dry weight (g)	5.92	4.34	3.67	3.19	5.90
Wet/dry	0.681	0.568	0.578	0.598	0.689
Wet weight (g)	8.69	7.64	6.35	5.34	8.56
RRF	DZ	DZ	DZ	CZ	CZ
Undecane	500.46	76.16 <	148.40 q	168.70 q	337.33
Dodecane	541.46	79.75 <	299.64 q	213.74 q	58.68 <
Tridecane	682.35	48.43 <	502.02	400.26	647.48
Tetradecane	662.59	42.14 q	504.12	384.06	557.55
Pentadecane	743.14	310.69	585.18	534.59	627.35
Hexadecane	630.70	360.33	565.68	477.18	611.25
Heptadecane	735.31	1627.92	626.29	735.10	702.80
Octadecane	597.27	468.54	552.46	435.73	536.50
Nonadecane	577.00	627.16	506.08 c	423.96	527.87
Eicosane	571.18	576.40	463.98 c	456.97	542.49
Heneicosane	718.75	780.14	599.42 c	521.69	571.98
Docosane	634.79	797.22	554.52 c	463.46 c	510.77
Tricosane	828.94 c	771.99 c	696.40 c	597.27 c	687.26
Tetracosane	583.29 c	592.36 c	513.05 c	403.29 c	518.70
Pentacosane	858.60 c	796.55 c	854.46 c	405.32 c	1606.27
Hexacosane	539.81 c	507.94 c	480.42	275.71 c	493.89
Heptacosane	1437.43 c	1210.13 c	1323.91 c	702.68 c	2044.45
Octacosane	398.31 c	404.78 c	399.60	180.22 c	328.83
Nonacosane	957.61 c	868.81 c	1044.17	435.82 c	1510.06
Triacontane	498.07 c	317.74 c	291.40	152.10 q c	258.88
Untriacontane	748.56 c	933.02 c	723.05	256.11 c	579.37
Dotriacontane	174.72 q	224.61 <	265.57 <	305.24 < c	165.27 <
Tritriacontane	356.52	392.55	454.06 q	158.85 <	212.71 q
Tetratriacontane	230.70	157.71	163.36 q	63.44 <	90.58 q
Pentatriacontane	146.94	168.91	141.96	98.03 q	161.14
Hexatriacontane	521.28	63.38 q	75.34 q	35.45 <	52.64 q
2,6-Dimethyl Undecane	213.93	18.34 <	121.34	96.15	26.32 q
Norfarnesane	251.61	15.08 <	161.31	129.71	15.45 q
Farnesane	171.68	14.91 <	137.93	103.51	148.20
2,6,10-Trimethyl Tridecane	321.38	42.97 <	243.86	196.61	276.01
Norpristane	327.84	200.58	281.26	258.37	296.42
Pristane	542.86	406.39	504.65	489.48	619.83
Phytane	387.21	267.22	289.35	281.75	381.98
Naphthalene	249.74	88.16 q	203.87	77.63 q	100.59
2-Methyl Naphthalene	411.36 b	109.46 b	259.90 b	124.62 b	187.73 b
1-Methyl Naphthalene	321.53	134.19 q	256.47	119.26 q	158.19
Acenaphthylene	2.88 a	1.18 <m	2.51 a	2.10 a	6.36 a
Acenaphthene	17.21 b	3.41 b	7.88 b	3.28 <e	11.09 b
Fluorene	71.42 b	82.50 b	57.15 b	21.73 b	34.36 b
Phenanthrene	219.07 a	282.34 a	469.74 a	191.50 a	171.89 a
Anthracene	3.00 a	4.98 a	19.09 a	7.59 a	2.88 a
Fluoranthene	25.51 a	24.42 a	47.14 a	28.27 a	24.45 a
Pyrene	45.22 a	39.03 a	47.81 a	51.88 a	47.61 a
Benz(a)anthracene	18.19 b	9.33 b	16.95 b	11.15 b	84.31 b
Chrysene	95.10 b	81.12 b	94.43 b	88.06 b	88.22 b
Benzo(b)(j)(k)fluoranthene	86.96 a	44.24 a	93.93 a	73.77 a	74.55 a
Benzo(a)fluoranthene	1.94 a	1.21 a	3.01 a	2.59 <m	0.77 <m
Benzo(e)pyrene	496.03 a	599.26 a	1540.84 a	178.92 a	155.06 a
Benzo(a)pyrene	6.39 a	17.68 a	401.15 a	37.85 a	20.12 a
Perylene	12.86 a	56.83 a	184.99 a	4.96 <m	23.46 a
Dibenz(a,h)anthracene	73.33 a	14.75 a	18.45 a	4.85 a	20.36 a
Indeno(1,2,3,cd)pyrene	26.89 a	19.61 a	79.41 a	17.86 a	48.50 a
Benzo(ghi)perylene	151.60 a	113.81 a	290.79 a	144.27 a	146.48 a

QA/QC Statistics

Dodecane-D26	28.52%	0.00%	29.73%	43.97%	11.43%
Tetracosane-D50 area	11004	36214	9709	9122	15908
Hexatriacontane-D74	167.13%	173.72%	174.52%	125.79%	154.14%
Naphthalene/chrysene	128.48	0.97	117.76	318.43	381.67
1-Methyl Naphthalene/chrysene	65.20	2.32	75.95	149.34	149.93
Acenaphthylene/chrysene	127.14	43.67	138.54	279.02	264.63
Acenaphthene/chrysene	110.00	39.43	118.19	195.79	184.80
Anthracene/chrysene	83.38	57.61	49.29	144.48	160.23
Pyrene/chrysene	203.11	196.01	212.59	227.42	217.05
Benzo(k)fluoranthene/chrysene	103.77	108.11	101.64	93.44	103.99
Benzo(a)pyrene/chrysene	14.33	11.27	7.89	38.74	55.11
Perylene/chrysene	0.00	0.66	0.75	0.00	0.00
Dibenz(a,h)anthracene/chrysene	62.43	73.95	53.12	51.81	76.86
Perylene/biphenyl					

Summary Statistics

(ng/g basis)					
Total n-alkanes, nC11-36	15875.78	12776.43	13068.95	8721.99	14718.15
Total nC11-19	5670.28	3436.79	4289.88	3773.32	4548.12
Total nC20-29	7528.72	7306.32	6929.91	4442.44	8814.71
Total nC30-36	2676.78	2033.32	1849.17	506.23	1355.32
Total isoprenoids	2216.51	874.19	1739.72	1555.59	1764.21
Total target non-polar	18092.29	13650.62	14808.67	10277.59	16482.36
Total PAH	2336.23	1726.33	4095.50	1181.33	1406.22
Total nC13-19	4628.37	3436.79	3841.83	3390.88	4210.79
Total C20-C31	8775.34	8557.08	7944.36	4850.64	9652.96
Napthalene-Fluorene	1074.13	417.73	787.78	345.35	498.33
Phenanthrene-Chrysene	406.10	441.22	695.15	378.46	419.36
Higher PAH (Perylene excl.)	843.14	810.55	2427.57	457.53	465.07
Farnesane-Phytane	1750.97	874.19	1457.06	1329.73	1722.45
OEP at C25	1.65	1.54	1.80	1.37	3.05
OEP at C27	2.78	2.44	2.80	2.77	4.67
OEP at C29	2.21	2.55	3.01	2.69	4.97
Pristane/Phytane	1.40	1.52	1.74	1.74	1.62

Sedisamp suspended particulate, ng/g

Sample	S317	S334c	S335c	SRM1c	SRM2c	SRM3
Location	Reindeer	East	Middle	East	East	East
Date	July 1987	July 1987	July 1987	June 1987	June 1987	June 1987
Dry weight (g)	5.34	5.54	5.72	2.95	3.59	3.62
Wet/dry	0.63	0.547	0.676	0.614	0.613	0.614
Wet weight (g)	8.48	10.13	8.46	4.81	5.85	5.9
RRF	CZ	DZ	DZ	BZ	BZ	CZ
Undecane	206.60	263.61	302.12	270.87 q	389.57	182.17 q
Dodecane	225.55	314.30	367.68	386.05 q	448.84	241.71 q
Tridecane	389.51	457.56	486.07	541.31	666.04	450.79
Tetradecane	350.92	494.84	483.37	551.29	643.17	444.69
Pentadecane	461.38	850.73	589.20	698.47	748.97	585.03
Hexadecane	418.22	572.60	507.68	651.47	692.83	588.07
Heptadecane	520.09	1168.79	737.96	808.33	877.01	715.13
Octadecane	383.65	480.33	510.62	623.02	689.05	592.24
Nonadecane	384.55	536.26 c	516.67 c	701.83	721.65 c	593.04
Eicosane	410.09	516.50 c	507.90 c	702.34	691.40	598.54
Heneicosane	445.57	668.63 c	605.42 c	801.51	802.44	673.47
Docosane	400.10	649.75 c	536.89 c	705.42	641.10	601.96
Tricosane	506.20	750.11 c	759.89 c	832.71	757.18 c	927.95
Tetracosane	371.20	568.02 c	573.18 c	645.02 c	569.34 c	505.48
Pentacosane	1515.54	769.38 c	909.77 c	1047.16 c	766.63 c	1163.69
Hexacosane	409.70	496.83 c	435.82 c	516.27 c	478.47 c	465.65
Heptacosane	1717.30	1248.30 c	1289.35 c	1343.45 c	1291.33 c	1060.96
Octacosane	273.89	385.11	328.81 c	324.38 c	311.63 c	337.88
Nonacosane	1294.53	961.47 c	986.24 c	821.07 c	830.33 c	791.68
Triacontane	208.09	252.45	232.92	216.46 c	269.18 c	263.79
Untriacontane	469.43	809.74	725.30	602.61	447.63 c	511.19
Dotriacontane	182.45 <	312.17 q	185.41 q	330.04 <	271.81 < c	269.07 <
Tritriacontane	185.29 q	391.20	341.38	263.68 q	246.85 q	259.12 q
Tetratriacontane	56.11 q	115.81 q	133.45	120.65 q	85.94 q	109.31 q
Pentatriacontane	154.78	100.35	147.52	191.71	66.94 q	26.53 <
Hexatriacontane	32.66 q	50.87 q	66.14	48.70 q	35.55 q	31.25 <
2,6-Dimethyl Undecane	109.95	122.59	145.68	169.33	173.74	115.64
Norfarnesane	133.28	174.20	168.05	189.66	217.98	117.34
Farnesane	96.73	123.19	129.70	145.88	151.61	119.08
2,6,10-Trimethyl Tridecane	180.15	259.50	242.12	299.21	299.08	236.02
Norpristane	214.80	274.92	271.56	365.72	344.50	317.57
Pristane	424.48	432.92	550.89	723.37	857.44	708.40
Phytane	266.12	277.81	322.56	462.52	484.01	424.57
Naphthalene	87.05	88.86	95.65	153.74	192.22	151.45
2-Methyl Naphthalene	149.72 b	175.93 b	165.11 b	279.70 b	299.46 b	246.49 b
1-Methyl Naphthalene	121.94 q	145.93	143.31	226.12	254.39	205.69
Acenaphthylene	1.35 a	0.22 <m	0.36 a	0.51 <m	2.15 <m	0.80 a
Acenaphthene	5.06 b	3.21 b	5.19 b	13.40 b	7.67 b	7.13 b
Fluorene	28.86 b	26.43 b	26.97 b	48.85 b	35.19 b	50.88 b
Phenanthrene	139.55 a	152.20 a	139.66 a	257.77 a	467.54 a	207.95 a
Anthracene	4.78 a	2.82 a	5.91 a	0.90 <m	38.20 a	8.63 a
Fluoranthene	19.33 a	38.83 a	24.44 a	31.81 a	28.58 a	41.02 a
Pyrene	40.35 a	41.50 a	49.67 a	57.72 a	55.26 a	71.17 a
Benz(a)anthracene	21.29 b	9.79 b	12.47 b	30.33 b	23.68 b	21.74 b
Chrysene	73.48 b	82.09 b	80.79 b	134.55 b	138.96 b	100.59 b
Benzo(b)(j)(k)fluoranthene	46.84 a	48.11 a	46.81 a	106.12 a	110.41 a	123.05 a
Benzo(a)fluoranthene	1.92 a	2.32 a	3.06 a	5.60 a	6.79 <m	123.79 a
Benzo(e)pyrene	142.82 a	124.62 a	127.51 a	258.76 a	568.66 a	209.86 a
Benzo(a)pyrene	25.81 a	20.71 a	26.00 a	29.23 a	36.44 a	53.11 a
Perylene	16.87 a	198.27 a	136.48 a	72.12 a	79.03 a	258.95 a
Dibenz(a,h)anthracene	16.55 a	16.18 a	15.18 a	42.53 a	13.02 <m	19.45 a
Indeno(1,2,3,cd)pyrene	12.54 a	26.29 a	25.71 a	53.70 a	21.49 a	35.50 a
Benzo(ghi)perylene	102.20 a	172.03 a	160.18 a	281.01 a	375.24 a	229.05 a

QA/QC Statistics

Dodecane-D26	41.32%	57.90%	62.05%	51.61%	78.73%	30.47%
Tetracosane-D50 area	21035	33738	24022	31008	3577	13906
Hexatriacontane-D74	159.06%	159.92%	160.58%	112.28%	98.25%	138.97%
Naphthalene/chrysene	342.54	263.10	290.99	441.19	314.42	327.73
1-Methyl Naphthalene/chrysene	143.31	103.92	123.37	169.60	141.81	149.53
Acenaphthylene/chrysene	250.75	213.13	237.64	344.02	236.13	235.45
Acenaphthene/chrysene	179.23	143.70	160.50	213.21	196.92	187.03
Anthracene/chrysene	170.57	148.57	141.10	182.37	104.40	175.93
Pyrene/chrysene	215.46	207.87	214.75	229.68	328.63	218.39
Benzo(k)fluoranthene/chrysene	117.51	109.60	108.10	96.81	106.94	92.43
Benzo(a)pyrene/chrysene	55.49	63.91	60.60	52.40	28.40	55.40
Perylene/chrysene	0.00	97.99	57.64	0.29	0.00	0.00
Dibenz(a,h)anthracene/chrysene	82.85	66.09	63.84	63.41	48.39	59.90
Perylene/biphenyl		58.14	14.46	5.67		

Summary Statistics

(ng/g basis)						
Total n-alkanes, nC11-36	11790.96	14185.70	13266.77	14415.80	14169.06	12663.56
Total nC11-19	3340.47	5139.02	4501.38	5232.65	5877.13	4392.88
Total nC20-29	7344.12	7014.10	6933.27	7739.34	7139.85	7127.27
Total nC30-36	1106.37	2032.58	1832.12	1443.81	1152.09	1143.41
Total isoprenoids	1425.50	1665.13	1830.57	2355.69	2528.37	2038.61
Total target non-polar	13216.46	15850.84	15097.34	16771.49	16697.43	14702.17
Total PAH	1058.31	1376.12	1290.47	2083.04	2732.42	2166.29
Total nC13-19	2908.32	4561.11	3831.58	4575.73	5038.72	3969.00
Total C20-C31	8021.63	8076.28	7891.49	8558.41	7856.66	7902.25
Napthalene-Fluorene	393.98	440.37	436.59	721.81	788.93	662.44
Phenanthrene-Chrysene	298.77	327.23	312.95	512.17	752.21	451.10
Higher PAH (Perylene excl.)	348.68	410.25	404.46	776.94	1112.24	793.80
Farnesane-Phytane	1182.27	1368.34	1516.84	1996.70	2136.65	1805.62
OEP at C25	3.62	1.55	1.86	1.82	1.59	2.31
OEP at C27	4.80	2.61	3.15	2.95	2.96	2.59
OEP at C29	5.16	3.07	3.53	3.18	2.89	2.63
Pristane/Phytane	1.60	1.56	1.71	1.56	1.77	1.67

Sedisamp suspended particulate, ng/g

Sample	SRM4	SRM5c
Location	East	East
Date	June 1987	June 1987
Dry weight (g)	5.12	5.39
Wet/dry	0.61	0.619
Wet weight (g)	8.4	8.7
RRF	CZ	CZ
Undecane	293.49	501.90
Dodecane	320.86	458.46
Tridecane	571.87	733.05
Tetradecane	505.58	631.79
Pentadecane	608.89	772.71
Hexadecane	596.22	695.03
Heptadecane	718.01	849.11
Octadecane	549.66	651.20
Nonadecane	591.27	614.82
Eicosane	603.20	657.96
Heneicosane	747.52	721.06
Docosane	579.09	658.96
Tricosane	1000.90	743.41 c
Tetracosane	552.42	534.47
Pentacosane	1415.64	756.44 c
Hexacosane	474.49	414.89 c
Heptacosane	1612.88	1170.92 c
Octacosane	359.94	306.36 c
Nonacosane	839.84	758.57 c
Triacontane	265.71	248.43 c
Untriacontane	572.37	427.98 c
Dotriacontane	198.92 q	181.00 < c
Tritriacontane	280.78 q	94.20 <
Tetratriacontane	116.33 q	37.62 <
Pentatriacontane	135.45	45.54 q
Hexatriacontane	61.15 q	41.53 q
2,6-Dimethyl Undecane	151.55	182.97
Norfarnesane	190.48	235.38
Farnesane	128.15	156.48
2,6,10-Trimethyl Tridecane	249.64	303.26
Norpristane	306.28	340.83
Pristane	628.31	832.92
Phytane	371.26	425.10
Naphthalene	144.36	169.61
2-Methyl Naphthalene	257.54 b	282.00 b
1-Methyl Naphthalene	199.53	227.88
Acenaphthylene	1.07 a	0.95 <m
Acenaphthene	10.15 b	6.86 b
Fluorene	48.32 b	4.52 b
Phenanthrene	210.02 a	341.92 a
Anthracene	5.13 a	17.50 a
Fluoranthene	35.25 a	31.13 a
Pyrene	65.31 a	62.42 a
Benz(a)anthracene	21.75 b	27.36 b
Chrysene	96.31 b	107.87 b
Benzo(b)(j)(k)fluoranthene	87.95 a	117.29 a
Benzo(a)fluoranthene	2.31 a	2.69 <m
Benzo(e)pyrene	185.79 a	573.33 a
Benzo(a)pyrene	22.91 a	7.78 <m
Perylene	19.56 a	64.72 a
Dibenz(a,h)anthracene	17.78 a	29.77 a
Indeno(1,2,3,cd)pyrene	24.61 a	63.49 a
Benzo(ghi)perylene	168.24 a	283.06 a

QA/QC Statistics

Dodecane-D26	45.60%	75.00%
Tetracosane-D50 area	26707	4519
Hexatriacontane-D74	155.76%	162.81%
Naphthalene/chrysene	448.82	393.12
1-Methyl Naphthalene/chrysene	176.08	159.87
Acenaphthylene/chrysene	303.39	272.97
Acenaphthene/chrysene	210.51	214.26
Anthracene/chrysene	190.15	130.75
Pyrene/chrysene	235.32	335.89
Benzo(k)fluoranthene/chrysene	106.95	112.51
Benzo(a)pyrene/chrysene	58.61	31.17
Perylene/chrysene	0.00	0.00
Dibenz(a,h)anthracene/chrysene	80.60	54.18
Perylene/biphenyl		

Summary Statistics

(ng/g basis)		
Total n-alkanes, nC11-36	14572.47	13394.57
Total nC11-19	4755.84	5908.06
Total nC20-29	8185.92	6723.04
Total nC30-36	1630.71	763.48
Total isoprenoids	2025.66	2476.94
Total target non-polar	16598.13	15871.51
Total PAH	1623.89	2410.72
Total nC13-19	4141.49	4947.70
Total C20-C31	9024.00	7399.44
Napthalene-Fluorene	660.97	690.87
Phenanthrene-Chrysene	433.77	588.20
Higher PAH (Perylene excl.)	509.59	1066.93
Farnesane-Phytane	1683.63	2058.59
OEP at C25	2.70	1.70
OEP at C27	3.58	2.96
OEP at C29	2.89	2.77
Pristane/Phytane	1.69	1.96

Sediment, ng/g

Sample	S310	S311	S312	S313	S314
Location	East	East	East	East	East
Date	Main Ch.	Main Ch.	Main Ch.	Back Eddy	Back Eddy
Dry weight (g)	3.59	4.82	3.89	4.75	3.96
Wet/dry	0.723	0.756	0.75	0.719	0.67
Wet weight (g)	4.97	6.38	5.19	6.6	5.91
RRF	BZ	BZ	BZ	BZ	BZ
Undecane	95.77 q	129.69 q	84.90 <	136.10 q	143.79 q
Dodecane	124.31 q	164.49 q	88.91 <	161.31 q	165.22 q
Tridecane	170.01 q	237.68	121.94 q	228.61	223.61
Tetradecane	162.01	219.51	131.35 q	229.84	226.19
Pentadecane	184.13	262.89	160.30	285.21	284.82
Hexadecane	162.61	262.07	140.83	259.55	270.46
Heptadecane	197.19	299.35	160.61	285.08	342.07
Octadecane	160.01	229.77	148.42	228.63	269.64
Nonadecane	189.03	237.66	155.38	248.80	314.12
Eicosane	167.23	229.99	146.42	226.28	294.61
Heneicosane	232.99	240.67	166.32	251.64	318.43
Docosane	164.76	204.12	147.47	227.59	301.51
Tricosane	273.46	391.89	323.91	305.63	627.25
Tetracosane	161.54	202.49	154.37	222.58	300.44
Pentacosane	414.66	667.23	543.75	1257.30	1156.85
Hexacosane	101.28 q	140.40	92.84 q	221.64	213.70
Heptacosane	320.58	415.59	341.16	1260.39	1049.51
Octacosane	79.88 q	85.48	73.79 q	125.86	128.96
Nonacosane	209.06	273.53	264.36	845.96	432.01
Triacontane	63.07 q	65.06 q	60.41 q	89.84 q	85.91 q
Untriacontane	154.15 q	180.96	227.98	317.86	327.30
Dotriacontane	271.26 <	202.09 <	250.41 <	205.40 <	246.16 <
Tritriacontane	141.17 <	105.17 <	130.32 <	110.13 q	128.11 <
Tetratriacontane	56.37 <	42.00 <	52.04 <	42.69 <	51.16 <
Pentatriacontane	26.75 <	30.10 q	26.08 q	43.30 q	47.44 q
Hexatriacontane	31.51 <	23.47 <	29.09 <	23.86 <	28.59 <
2,6-Dimethyl Undecane	22.15 <	75.11	44.32 q	76.74	73.73
Norfarnesane	68.96	83.10	50.94 q	88.87	81.31
Farnesane	42.57 q	65.79	39.45 q	63.56	58.00
2,6,10-Trimethyl Tridecane	89.84 q	119.76 q	68.29 q	129.92 q	118.87 q
Norpristane	91.84	135.24	82.53	136.00	156.39
Pristane	195.22	300.84	169.11	284.23	340.37
Phytane	112.69	174.93	118.59	178.78	199.12
Naphthalene	33.11 q	43.53 q	30.17 <	43.48 q	72.82 q
2-Methyl Naphthalene	49.68 b	73.34 b	29.56 b	67.37 b	113.82 b
1-Methyl Naphthalene	54.72 <	61.99 q	50.51 <	60.68 q	96.85 q
Acenaphthylene	0.41 <m	1.56 a	3.05 a	1.39 a	0.37 <m
Acenaphthene	2.91 <e	1.80 b	2.69 <e	2.21 <e	1.59 b
Fluorene	6.54 b	13.62 b	6.88 b	10.34 b	19.45 b
Phenanthrene	80.20 a	103.05 a	75.70 a	102.32 a	138.04 a
Anthracene	0.63 a	2.65 a	5.35 a	11.74 a	2.60 a
Fluoranthene	10.17 a	18.07 a	11.28 a	15.83 a	25.01 a
Pyrene	18.97 a	29.05 a	20.42 a	27.11 a	43.66 a
Benz(a)anthracene	2.27 b	8.93 b	4.30 b	11.22 b	12.19 b
Chrysene	35.50 b	56.44 b	34.83 b	52.42 b	92.85 b
Benzo(b)(j)(k)fluoranthene	12.61 a	37.18 a	24.64 a	39.66 a	52.30 a
Benzo(a)fluoranthene	1.82 <m	1.07 <m	1.62 <m	1.77 <m	1.47 a
Benzo(e)pyrene	101.35 a	120.36 a	72.40 a	133.44 a	163.47 a
Benzo(a)pyrene	3.90 <m	18.63 a	9.93 a	18.73 a	23.21 a
Perylene	3.87 <m	1.81 <m	2.71 <m	9.97 a	8.12 a
Dibenz(a,h)anthracene	2.41 <m	8.45 a	4.61 a	6.32 a	9.12 a
Indeno(1,2,3,cd)pyrene	1.78 <m	14.06 a	3.71 a	9.75 a	20.37 a
Benzo(ghi)perylene	41.93 a	80.96 a	51.99 a	84.87 a	120.91 a

QA/QC Statistics

Dodecane-D26	74.53%	77.65%	68.34%	78.85%	48.37%
Tetracosane-D50 area	18673	20494	18617	9265	23886
Hexatriacontane-D74	90.25%	79.64%	99.63%	85.06%	92.16%
Naphthalene/chrysene	516.63	505.99	491.27	402.16	458.08
1-Methyl Naphthalene/chrysene	192.59	200.81	191.93	162.06	177.01
Acenaphthylene/chrysene	298.31	278.23	312.62	239.42	262.05
Acenaphthene/chrysene	227.47	231.62	208.53	193.90	208.36
Anthracene/chrysene	149.96	170.29	166.68	149.26	176.91
Pyrene/chrysene	220.34	232.01	244.64	228.86	226.23
Benzo(k)fluoranthene/chrysene	97.46	97.78	107.63	102.67	95.59
Benzo(a)pyrene/chrysene	31.70	40.19	44.55	40.86	42.52
Perylene/chrysene	0.01	0.00	0.00	0.00	0.00
Dibenz(a,h)anthracene/chrysene	63.71	60.46	70.14	69.23	63.36
Perylene/biphenyl					

Summary Statistics

(ng/g basis)					
Total n-alkanes, nC11-36	3787.72	5170.61	3587.69	7569.13	7523.85
Total nC11-19	1445.06	2043.11	1018.83	2063.13	2239.92
Total nC20-29	2125.43	2851.39	2254.40	4944.87	4823.28
Total nC30-36	217.22	276.11	314.47	561.13	460.65
Total isoprenoids	601.11	954.78	573.23	958.10	1027.79
Total target non-polar	4388.83	6125.39	4160.92	8527.23	8551.64
Total PAH	392.96	693.64	358.66	706.60	1017.85
Total nC13-19	1224.99	1748.92	1018.83	1765.72	1930.91
Total C20-C31	2342.65	3097.40	2542.78	5352.57	5236.49
Napthalene-Fluorene	89.34	195.83	39.50	183.24	304.52
Phenanthrene-Chrysene	147.73	218.18	151.89	220.64	314.35
Higher PAH (Perylene excl.)	155.89	279.63	167.28	292.75	390.85
Farnesane-Phytane	532.15	796.57	477.97	792.49	872.75
OEP at C25	2.93	3.51	3.97	5.13	4.19
OEP at C27	3.52	3.80	4.28	6.95	5.75
OEP at C29	3.02	3.72	4.02	7.71	4.62
Pristane/Phytane	1.73	1.72	1.43	1.59	1.71

Sediment, ng/g

Sample	S337c	S318	S319	S320	S321c
Location	East	Middle	Middle	Middle	Middle
Date	Back Eddy	Side Ch.	Side Ch.	Side Ch.	Side Ch.
Dry weight (g)	8.39	8.16	6.92	6.82	6.66
Wet/dry	0.694	0.625	0.662	0.645	0.62
Wet weight (g)	12.09	13.06	10.45	10.57	10.74
RRF	FZ	BZ	BZ	BZ	FZ
Undecane	245.50	136.68	47.77 <	278.59	443.58
Dodecane	333.00	160.82	133.88 q	310.41	526.09
Tridecane	445.45	236.04	30.38 <	424.67	612.74
Tetradecane	432.88	225.87	423.60	412.05	638.53
Pentadecane	597.35	268.36	500.71	451.81	672.59
Hexadecane	475.99	262.17	458.78	434.72	650.94
Heptadecane	575.31	320.71	520.75	502.25	758.07
Octadecane	476.06	274.81	408.34	391.29	565.61
Nonadecane	562.22	292.49	413.43	422.36	556.79 c
Eicosane	506.19	280.31	381.55	395.48	572.52 c
Heneicosane	666.54	301.74	419.38	422.64	589.39 c
Docosane	480.89	277.91	378.16	363.42	492.04 c
Tricosane	654.90 c	343.87	500.73	508.64	692.51 c
Tetracosane	403.64 c	289.58	382.51	356.94	441.58 c
Pentacosane	755.59 c	1808.82	1671.23	1667.97	867.71 c
Hexacosane	411.53	353.83	356.93	377.84	364.91 c
Heptacosane	1122.06 c	1712.80	1916.47	1733.44	1523.98 c
Octacosane	237.46	215.36	231.89	221.65	234.41 c
Nonacosane	1021.18	934.46	636.12	559.13	858.96 c
Triacontane	188.95	141.62	117.66	129.90	205.01 c
Untriacontane	731.84	288.29	404.70	396.18	703.82 c
Dotriacontane	116.17 <	119.41 <	140.90 <	142.97 <	146.38 < c
Tritriacontane	324.53	122.54 q	160.57 q	150.13 q	321.64 c
Tetratriacontane	95.44	83.06	31.94 q	38.10 q	82.04 q
Pentatriacontane	107.32	97.97	69.40	49.93	100.47
Hexatriacontane	39.43 q	15.12 q	16.37 <	20.31 q	38.96 q
2,6-Dimethyl Undecane	147.32	70.34	11.51 <	141.11	189.48
Norfarnesane	149.90	84.09	10.70 q	145.60	223.37
Farnesane	113.00	65.81	127.19	106.81	156.12
2,6,10-Trimethyl Tridecane	233.27	123.32	243.45	217.64	313.68
Norpristane	265.01	150.97	244.88	228.56	334.94
Pristane	552.62	287.77	511.66	488.93	740.80
Phytane	340.75	195.09	306.56	272.48	398.05
Naphthalene	71.10	60.22	96.15	89.84	78.83
2-Methyl Naphthalene	135.87 b	99.03 b	179.57 b	153.95 b	166.68 b
1-Methyl Naphthalene	104.17	82.88	144.00	122.30	116.73
Acenaphthylene	0.21 a	2.27 a	0.56 <m	4.35 a	0.80 a
Acenaphthene	5.22 b	3.05 b	3.99 b	4.29 b	4.92 b
Fluorene	16.95 b	18.76 b	23.98 b	23.39 b	1.26 <e
Phenanthrene	105.70 a	118.55 a	157.98 a	150.82 a	189.36 a
Anthracene	1.38 a	2.80 a	2.47 a	1.53 a	2.19 a
Fluoranthene	14.97 a	12.81 a	25.87 a	18.64 a	20.52 a
Pyrene	30.10 a	24.22 a	43.88 a	33.30 a	36.70 a
Benz(a)anthracene	9.18 b	11.42 b	12.78 b	15.59 b	12.65 b
Chrysene	54.51 b	48.69 b	96.67 b	73.51 b	70.98 b
Benzo(b)(j)(k)fluoranthene	45.41 a	33.15 a	53.69 a	65.63 a	61.22 a
Benzo(a)fluoranthene	4.37 a	0.59 <m	1.63 <m	9.68 a	2.68 a
Benzo(e)pyrene	90.59 a	101.63 a	204.91 a	150.42 a	182.33 a
Benzo(a)pyrene	11.96 a	12.17 a	37.66 a	22.95 a	15.60 a
Perylene	56.22 a	23.24 a	33.02 a	44.38 a	0.40 a
Dibenz(a,h)anthracene	15.54 a	15.12 a	13.49 a	13.55 a	6.34 a
Indeno(1,2,3,cd)pyrene	17.38 a	15.89 a	1.57 <m	26.50 a	12.94 a
Benzo(ghi)perylene	94.03 a	89.06 a	139.65 a	143.46 a	99.59 a

QA/QC Statistics

Dodecane-D26	81.35%	45.64%	71.22%	86.03%	92.13%
Tetracosane-D50 area	41808	16972	4762	7567	22255
Hexatriacontane-D74	149.32%	108.22%	94.17%	93.27%	127.68%
Naphthalene/chrysene	307.94	309.99	328.20	320.97	349.33
1-Methyl Naphthalene/chrysene	106.92	128.51	140.42	131.80	117.81
Acenaphthylene/chrysene	214.44	207.64	220.50	224.37	213.12
Acenaphthene/chrysene	138.17	166.28	178.03	165.55	173.76
Anthracene/chrysene	137.06	137.80	155.46	151.14	98.75
Pyrene/chrysene	195.58	191.38	217.01	219.94	179.49
Benzo(k)fluoranthene/chrysene	120.62	110.69	109.34	110.64	111.71
Benzo(a)pyrene/chrysene	69.31	53.03	45.57	54.99	42.11
Perylene/chrysene	48.58	0.00	0.00	0.00	69.63
Dibenz(a,h)anthracene/chrysene	89.51	68.29	72.70	67.16	88.89
Perylene/biphenyl	13.89				2482.16

Summary Statistics

(ng/g basis)					
Total n-alkanes, nC11-36	11891.23	9445.21	10518.71	11019.87	13514.91
Total nC11-19	4143.76	2177.94	2859.49	3628.16	5424.96
Total nC20-29	6259.97	6518.68	6874.95	6607.15	6638.01
Total nC30-36	1487.51	748.59	784.27	784.55	1451.95
Total isoprenoids	1801.87	977.40	1444.45	1601.14	2356.45
Total target non-polar	13693.10	10422.60	11963.15	12621.00	15871.36
Total PAH	884.86	774.95	1269.76	1168.08	1081.46
Total nC13-19	3565.25	1880.44	2725.61	3039.16	4455.28
Total C20-C31	7180.76	6948.58	7397.31	7133.24	7546.85
Napthalene-Fluorene	333.51	266.21	447.68	398.12	367.96
Phenanthrene-Chrysene	215.84	218.48	339.67	293.38	332.40
Higher PAH (Perylene excl.)	279.29	267.02	449.39	432.19	380.70
Farnesane-Phytane	1504.65	822.97	1433.75	1314.43	1943.59
OEP at C25	1.94	5.02	4.21	4.17	2.30
OEP at C27	3.28	5.72	5.86	5.27	4.53
OEP at C29	4.68	5.33	4.39	3.90	4.20
Pristane/Phytane	1.62	1.48	1.67	1.79	1.86

Sediment, ng/g

Sample	S322c	S323c	S324c	S325c	S326c
Location	Middle	Middle	Reindeer	Reindeer	Reindeer
Date	Side Ch.	Side Ch.	Side Ch.	Side Ch.	Side Ch.
Dry weight (g)	5.79	6.36	6.57	6.64	6.68
Wet/dry	0.626	0.624	0.626	0.656	0.661
Wet weight (g)	9.25	10.2	10.49	10.12	10.11
RRF	FZ	FZ	FZ	FZ	FZ
Undecane	363.94	347.88	391.14	318.96	272.37
Dodecane	416.05	357.47	446.75	430.36	299.70
Tridecane	564.87	452.53	619.24	655.91	453.91
Tetradecane	571.15	454.16	602.30	710.02	473.76
Pentadecane	607.32	481.01	560.34	724.17	487.16
Hexadecane	548.40	468.93	501.65	699.37	499.83
Heptadecane	663.15	634.52	639.52	890.42	539.58
Octadecane	528.96	488.01	472.71	674.64	455.50
Nonadecane	555.60 c	540.31 c	555.53 c	708.16	508.24
Eicosane	550.04 c	470.89 c	514.58 c	647.10	475.59
Heneicosane	578.63 c	600.15 c	655.16 c	1066.94	614.90
Docosane	505.93 c	538.21 c	518.17 c	654.14 c	452.63
Tricosane	618.00 c	655.30 c	804.64 c	848.13 c	568.73 c
Tetracosane	455.22 c	439.46 c	458.17 c	621.54 c	402.53 c
Pentacosane	823.24 c	397.81 c	764.03 c	889.22 c	661.85 c
Hexacosane	377.51 c	326.08 c	444.47 c	550.94	310.76 c
Heptacosane	1809.83 c	803.16 c	1600.21 c	1530.63 c	1822.19 c
Octacosane	240.14 c	264.82 c	362.88 c	350.52	252.05
Nonacosane	988.14 c	749.25 c	999.41 c	1208.83	1092.61
Triacontane	216.88 c	250.64 c	313.77 c	302.04	186.95
Untriacontane	660.74 c	780.37 c	1295.24 c	973.38	857.94
Dotriacontane	168.33 < c	153.14 < c	148.43 < c	183.50 q	145.86 <
Tritriacontane	284.60 q c	386.95 c	604.86 c	465.15	365.11
Tetratriacontane	109.71 q	104.32 q	136.42	127.90	114.64
Pentatriacontane	106.95	141.42	140.18	114.82	101.16
Hexatriacontane	38.69 q	51.85 q	69.77	57.55	47.31 q
2,6-Dimethyl Undecane	212.60	143.26	199.11	193.71	142.77
Norfarnesane	212.94	190.06	252.12	236.66	171.45
Farnesane	132.16	126.72	195.33	198.72	141.37
2,6,10-Trimethyl Tridecane	295.86	207.16	364.76	363.71	247.50
Norpristane	302.93	301.89	296.95	427.12	309.85
Pristane	573.24	90.00	151.28	116.63	110.80
Phytane	358.36	332.10	344.87	457.84	315.95
Naphthalene	85.19	87.68	96.29	158.45	87.02
2-Methyl Naphthalene	174.17 b	152.73 b	169.29 b	242.60 b	133.37 b
1-Methyl Naphthalene	131.75	120.50	132.81	175.42	115.40
Acenaphthylene	0.63 a	0.60 a	2.40 a	0.28 <m	0.24 <m
Acenaphthene	2.78 b	4.11 b	9.18 b	5.70 b	2.94 b
Fluorene	17.46 b	19.27 b	0.06 b	40.72 b	26.02 b
Phenanthrene	177.44 a	256.44 a	238.63 a	267.80 a	175.89 a
Anthracene	1.32 a	0.99 a	2.77 a	6.68 a	2.54 a
Fluoranthene	21.66 a	20.49 a	22.90 a	43.85 a	30.44 a
Pyrene	38.83 a	38.52 a	41.60 a	67.66 a	46.96 a
Benz(a)anthracene	13.55 b	8.53 b	17.76 b	26.09 b	14.98 b
Chrysene	71.22 b	74.91 b	84.76 b	109.04 b	72.75 b
Benzo(b)(j)(k)fluoranthene	70.49 a	53.42 a	74.20 a	76.56 a	53.86 a
Benzo(a)fluoranthene	5.31 a	1.09 a	5.22 a	0.69 <m	0.52 <m
Benzo(e)pyrene	170.59 a	256.41 a	226.83 a	286.45 a	155.49 a
Benzo(a)pyrene	22.66 a	18.05 a	21.71 a	45.10 a	24.07 a
Perylene	23.86 a	22.56 a	53.18 a	18.92 a	63.23 a
Dibenz(a,h)anthracene	25.34 a	12.16 a	23.77 a	21.83 a	13.45 a
Indeno(1,2,3,cd)pyrene	20.66 a	16.50 a	20.15 a	30.98 a	24.28 a
Benzo(ghi)perylene	116.14 a	107.22 a	118.72 a	159.16 a	115.84 a

QA/QC Statistics

Dodecane-D26	84.21%	81.90%	90.65%	60.92%	78.42%
Tetracosane-D50 area	28079	79223	31124	14194	20033
Hexatriacontane-D74	143.44%	166.25%	189.06%	163.05%	157.29%
Naphthalene/chrysene	309.31	237.07	302.25	218.74	273.94
1-Methyl Naphthalene/chrysene	114.06	98.01	103.36	115.37	120.83
Acenaphthylene/chrysene	198.90	161.30	163.98	227.43	194.37
Acenaphthene/chrysene	161.74	120.64	116.36	151.80	150.20
Anthracene/chrysene	104.89	65.43	75.48	93.71	89.26
Pyrene/chrysene	191.13	175.70	167.42	179.77	183.00
Benzo(k)fluoranthene/chrysene	109.83	117.86	119.81	116.20	113.48
Benzo(a)pyrene/chrysene	43.53	31.42	42.08	38.32	48.18
Perylene/chrysene	71.98	0.67	1.62	0.54	0.43
Dibenz(a,h)anthracene/chrysene	80.98	95.88	98.29	89.45	89.52
Perylene/biphenyl	2981.58	39.17	82.55	17.17	

Summary Statistics

(ng/g basis)					
Total n-alkanes, nC11-36	13183.68	11185.48	14471.15	16404.32	12316.99
Total nC11-19	4819.44	4224.81	4789.19	5812.01	3990.04
Total nC20-29	6946.67	5245.12	7121.73	8367.98	6653.84
Total nC30-36	1417.57	1715.55	2560.24	2224.33	1673.11
Total isoprenoids	2088.09	1391.19	1804.43	1994.38	1439.68
Total target non-polar	15271.77	12576.66	16275.58	18398.70	13756.68
Total PAH	1191.07	1272.16	1362.23	1783.04	1158.53
Total nC13-19	4039.45	3519.46	3951.29	5062.69	3417.98
Total C20-C31	7824.29	6276.12	8730.74	9643.40	7698.74
Napthalene-Fluorene	411.99	384.87	410.03	622.90	364.74
Phenanthrene-Chrysene	324.02	399.87	408.41	521.13	343.57
Higher PAH (Perylene excl.)	431.20	464.85	490.61	620.09	387.00
Farnesane-Phytane	1662.54	1057.87	1353.20	1564.01	1125.46
OEP at C25	2.21	1.26	1.94	1.64	2.23
OEP at C27	5.13	2.52	3.52	3.13	5.64
OEP at C29	4.59	2.95	3.29	3.74	5.26
Pristane/Phytane	1.60	0.27	0.44	0.25	0.35

Sediment, ng/g

Sample	S327c	S328c	S329c
Location	Reindeer Side Ch.	Reindeer Side Ch.	Reindeer Side Ch.
Date	7.69	7.55	7.38
Dry weight (g)	0.699	0.706	0.675
Wet/dry	11	10.69	10.93
Wet weight (g)	FZ	FZ	FZ
RRF			
Undecane	238.84	102.48 q	44.79 <
Dodecane	285.38	126.52 q	112.31 q
Tridecane	441.17	415.75	425.71
Tetradecane	457.01	469.27	556.92
Pentadecane	501.60	505.66	663.40
Hexadecane	443.20	494.53	678.32
Heptadecane	667.84	574.85	725.88
Octadecane	486.58	509.49	534.99
Nonadecane	544.88	502.33	700.34
Eicosane	486.74	460.09	573.09
Heneicosane	607.91	578.11	773.19
Docosane	489.28 c	486.97	552.44
Tricosane	509.84 c	528.16 c	718.54 c
Tetracosane	459.77 c	421.07 c	484.36 c
Pentacosane	532.64 c	800.62 c	672.59 c
Hexacosane	413.52 c	379.98 c	447.02 c
Heptacosane	1090.94 c	2199.74 c	2611.34 c
Octacosane	369.44	275.68	299.86
Nonacosane	1516.73	1717.69	1394.58
Triacontane	371.31	299.18	220.06
Untriacontane	1028.94	936.05	1069.66
Dotriacontane	213.94 q	129.15 <	132.12 <
Tritriacontane	469.63	422.27	465.40
Tetratriacontane	170.66	91.46	101.57
Pentatriacontane	166.72	153.21	132.72
Hexatriacontane	78.78	73.34	52.75
2,6-Dimethyl Undecane	143.81	139.53	124.67
Norfarnesane	181.58	162.51	147.37
Farnesane	120.79	149.02	157.24
2,6,10-Trimethyl Tridecane	217.43	261.00	310.54
Norpristane	283.53	293.51	342.31
Pristane	503.59	516.45	625.25
Phytane	349.56	344.59	399.08
Naphthalene	97.93	65.06	79.29
2-Methyl Naphthalene	172.31 b	102.08 b	123.56 b
1-Methyl Naphthalene	131.83	93.05	107.53
Acenaphthylene	0.90 a	0.26 <m	0.27 <m
Acenaphthene	4.99 b	1.78 b	2.86 b
Fluorene	22.32 b	13.10 b	11.37 b
Phenanthrene	147.07 a	139.49 a	118.50 a
Anthracene	3.07 a	1.87 a	6.05 a
Fluoranthene	23.00 a	21.85 a	17.78 a
Pyrene	44.28 a	39.40 a	36.99 a
Benz(a)anthracene	14.38 b	12.09 b	6.28 b
Chrysene	78.39 b	70.05 b	67.94 b
Benzo(b)(j)(k)fluoranthene	57.93 a	49.61 a	46.11 a
Benzo(a)fluoranthene	1.88 a	0.64 <m	0.75 <m
Benzo(e)pyrene	126.76 a	131.68 a	104.36 a
Benzo(a)pyrene	21.17 a	20.97 a	13.08 a
Perylene	75.13 a	36.96 a	43.31 a
Dibenz(a,h)anthracene	14.01 a	11.13 a	0.93 <m
Indeno(1,2,3,cd)pyrene	17.09 a	21.47 a	9.57 a
Benzo(ghi)perylene	119.80 a	115.37 a	98.74 a

QA/QC Statistics

Dodecane-D26	53.09%	75.45%	56.79%
Tetracosane-D50 area	43851	13556	11911
Hexatriacontane-D74	175.15%	167.03%	148.98%
Naphthalene/chrysene	260.40	253.65	198.10
1-Methyl Naphthalene/chrysene	100.52	122.45	99.56
Acenaphthylene/chrysene	191.93	231.38	247.19
Acenaphthene/chrysene	120.95	162.21	156.23
Anthracene/chrysene	118.91	112.82	143.37
Pyrene/chrysene	185.38	187.14	190.18
Benzo(k)fluoranthene/chrysene	123.54	117.97	112.98
Benzo(a)pyrene/chrysene	73.39	57.13	65.14
Perylene/chrysene	121.35	94.46	107.70
Dibenz(a,h)anthracene/chrysene	98.24	90.68	85.33
Perylene/biphenyl	37.53	24.44	27.33

Summary Statistics

(ng/g basis)			
Total n-alkanes, nC11-36	13043.29	13524.50	14967.03
Total nC11-19	4066.50	3700.88	4397.87
Total nC20-29	6476.80	7848.11	8527.00
Total nC30-36	2499.99	1975.51	2042.16
Total isoprenoids	1800.28	1866.61	2106.47
Total target non-polar	14843.57	15391.11	17073.49
Total PAH	1174.26	947.00	893.33
Total nC13-19	3542.28	3471.89	4285.56
Total C20-C31	7877.06	9083.34	9816.73
Napthalene-Fluorene	430.29	275.07	324.61
Phenanthrene-Chrysene	310.20	284.74	253.54
Higher PAH (Perylene excl.)	358.64	350.22	271.86
Farnesane-Phytane	1474.89	1564.57	1834.43
OEP at C25	1.37	2.35	1.98
OEP at C27	2.74	5.99	5.94
OEP at C29	3.79	5.85	5.79
Pristane/Phytane	1.44	1.50	1.57

Peat, ng/g

Sample	T-01	T-03	T-05	T-07	T-11
Location	Mackenzie	Yukon Coast	Yukon Coast	Yukon Coast	Toker Pt.
Date	Delta	E. Sabine Pt.	W. Sabine Pt.	King Pt.	
Dry weight (g)	8.49	2.85	3.69	2.53	7.15
Wet/dry	0.749	0.304	0.369	0.244	0.684
Wet weight (g)	11.33	9.37	10.00	10.35	10.46
RRF	GZ	GZ	GZ	GZ	GZ
Undecane	38.94 <	116.02 <	215.55 q	130.86 <	46.19 <
Dodecane	60.76 q	121.50 <	634.26	137.04 <	48.37 <
Tridecane	131.21	76.25 q	1978.46	142.26 q	31.80 q
Tetradecane	135.98	96.18 q	1339.08	163.07 q	22.72 <
Pentadecane	191.65	154.82	2546.89	259.26	41.35
Hexadecane	189.96	184.12	5237.74	362.79	72.79
Heptadecane	247.02	329.96	6542.08	682.94	103.27
Octadecane	251.57	193.01	5455.59	1346.83	100.29
Nonadecane	260.10	351.86	5064.71	2121.49	148.23
Eicosane	233.36	434.74	3187.23	1740.34	171.86
Heneicosane	254.37	1701.81	18834.90	5563.06	702.44
Docosane	214.98	1082.00	6820.62	3162.53	381.53
Tricosane	256.12	2994.01	28803.58	8843.48	2351.16
Tetracosane	189.87	1296.56	7445.07	4396.73	570.03
Pentacosane	253.60	5016.75	27339.02	13337.92	1911.36
Hexacosane	168.11	1916.67	8766.33	4728.56	600.20
Heptacosane	371.23	22341.46	55066.94	34391.23	5885.50
Octacosane	126.73	2505.68	7459.95	4644.20	1071.37
Nonacosane	388.22	38782.45	104403.1	46688.88	20381.84
Triacontane	143.52	2262.85	6170.51	5213.73	942.39
Untriacontane	530.63	43015.02	100621.6	91119.29	14243.48
Dotriacontane	114.86 <	1422.27	2878.21	3969.23	607.67
Tritriacontane	128.25 q	12265.72	18016.11	30890.63	4349.32
Tetratriacontane	27.00 q	212.22 q	695.26	196.63 q	198.23
Pentatriacontane	28.74 q	375.63	2107.16	552.43	283.24
Hexatriacontane	13.34 <	77.91 q	491.73	315.31	466.75
2,6-Dimethyl Undecane	27.55 q	27.95 <	548.85	150.59	11.13 <
Norfarnesane	37.70	22.98 <	1721.66	106.96	19.43 q
Farnesane	31.97	22.71 <	639.89	66.35 q	9.04 <
2,6,10-Trimethyl Tridecane	63.90 q	65.46 <	800.53	113.17 q	28.82 q
Norpristane	93.65	60.48 q	301.45	135.19	40.32
Pristane	226.93	231.56	3025.71	215.21	45.15
Phytane	135.45	56.49	2231.11	181.08	32.63
Naphthalene	20.64 q	41.23 <	36.58 q	46.51 <	16.42 <
2-Methyl Naphthalene	50.80 b	24.09 b	131.14 b	13.64 b	16.22 <e
1-Methyl Naphthalene	24.68 q	69.03 <	53.28 <	77.86 <	27.48 <
Acenaphthylene	0.17 a	3.02 <m	1.19 a	0.67 <m	0.59 a
Acenaphthene	0.34 b	3.75 <m	2.84 <e	4.15 <e	0.22 b
Fluorene	8.82 b	3.90 <m	5.88 b	61.40 b	1.17 <e
Phenanthrene	52.20 a	43.27 a	80.02 a	68.38 a	5.34 a
Anthracene	2.29 a	3.65 <m	3.55 a	6.60 a	1.16 a
Fluoranthene	7.10 a	4.10 <m	11.37 a	19.46 a	2.57 a
Pyrene	14.75 a	3.99 a	16.16 a	24.51 a	4.01 a
Benz(a)anthracene	3.41 b	7.28 <m	11.47 b	10.13 b	2.32 b
Chrysene	28.04 b	8.24 <m	37.01 b	47.00 b	5.68 b
Benzo(b)(j)(k)fluoranthene	18.54 a	10.18 <m	72.48 a	40.02 a	6.72 a
Benzo(a)fluoranthene	2.32 a	10.88 <m	4.44 a	6.05 a	0.43 a
Benzo(e)pyrene	126.54 a	25.25 <m	166.55 a	59.44 a	14.44 a
Benzo(a)pyrene	8.35 a	25.18 <m	31.17 a	12.33 a	5.90 a
Perylene	0.50 a	25.56 <m	527.12 a	256.43 a	33.65 a
Dibenz(a,h)anthracene	6.94 a	17.95 <m	17.57 a	5.11 a	6.40 a
Indeno(1,2,3,cd)pyrene	8.76 a	13.73 <m	33.36 a	3.68 a	2.40 a
Benzo(ghi)perylene	36.67 a	21.18 <m	33.37 a	17.17 a	3.28 a

QA/QC Statistics

Dodecane-D26	44.15%	85.94%	78.09%	67.11%	60.38%
Tetracosane-D50 area	37061	5587	886	3598	2357
Hexatriacontane-D74	102.93%	110.87%	94.69%	130.96%	142.09%
Naphthalene/chrysene	111.40	303.64	240.61	132.24	93.73
1-Methyl Naphthalene/chrysene	61.55	149.24	93.24	72.80	62.35
Acenaphthylene/chrysene	157.99	333.44	203.13	157.05	155.12
Acenaphthene/chrysene	108.36	218.87	125.93	101.32	90.55
Anthracene/chrysene	84.35	235.56	128.42	120.89	129.97
Pyrene/chrysene	167.52	237.93	169.41	164.02	180.98
Benzo(k)fluoranthene/chrysene	100.26	88.66	111.36	105.54	104.39
Benzo(a)pyrene/chrysene	20.97	33.03	31.33	38.33	22.66
Perylene/chrysene	34.67	0.00	9.70	63.57	4.45
Dibenz(a,h)anthracene/chrysene	54.36	43.44	58.87	55.39	61.02
Perylene/biphenyl	15.28		2.85	25.25	2.01

Summary Statistics

(ng/g basis)					
Total n-alkanes, nC11-36	4782.99	139090.0	428121.6	264832.8	55616.1
Total nC11-19	1468.25	1386.2	29014.4	5078.6	497.7
Total nC20-29	2456.60	78072.1	268126.7	127496.9	34027.3
Total nC30-36	858.14	59631.6	130980.6	132257.2	21091.1
Total isoprenoids	617.15	348.5	9269.2	968.6	166.3
Total target non-polar	5400.15	139438.5	437390.9	265801.4	55782.4
Total PAH	421.88	71.3	1220.4	651.3	95.1
Total nC13-19	1407.49	1386.2	28164.6	5078.6	497.7
Total C20-C31	3130.75	123350.0	374918.8	223830.0	49213.2
Napthalene-Fluorene	105.46	24.09	174.79	75.03	0.81
Phenanthrene-Chrysene	107.78	47.26	159.59	176.09	21.08
Higher PAH (Perylene excl.)	208.13	0.00	358.94	143.79	39.56
Farnesane-Phytane	551.91	348.53	6998.70	711.00	146.92
OEP at C25	1.50	4.31	3.82	3.38	4.21
OEP at C27	2.43	10.05	7.12	7.11	8.62
OEP at C29	2.99	15.63	14.34	10.29	17.68
Pristane/Phytane	1.68	4.10	1.36	1.19	1.38

Peat, ng/g

Sample	T-12	T-15	T-17	T-20	T-22
Location	Toker Pt.	Hutchinson B.	Russel Inlet	Nuvorak Pt.	Tuktoyaktuk Pen.
Date					
Dry weight (g)	5.19	7.99	3.09	4.79	4.43
Wet/dry	0.464	0.665	0.292	0.431	0.482
Wet weight (g)	11.19	12.02	10.58	11.12	9.20
RRF	GZ	GZ	GZ	GZ	GZ
Undecane	63.65 <	41.34 <	4335.90	68.95 <	74.53 <
Dodecane	66.65 <	43.30 <	13777.37	72.21 <	78.04 <
Tridecane	40.48 <	26.29 <	1835.00	43.85 <	47.40 <
Tetradecane	31.31 <	26.98 q	1912.58	33.92 <	36.67 <
Pentadecane	45.36	64.03	4712.71	81.28	87.30
Hexadecane	55.45	45.42	9750.50	162.75	182.74
Heptadecane	63.72 q	68.92	13749.36	396.04	221.90
Octadecane	70.36	67.89	10630.47	393.57	201.36
Nonadecane	174.18	239.76	7677.15	1126.58	393.58
Eicosane	346.75	356.36	3097.66	1307.80	550.40
Heneicosane	1159.80	2124.67	4262.37	6761.90	5801.77
Docosane	797.02	838.09	1936.40	3349.36	902.49
Tricosane	2039.28	2343.23	5035.18	9538.91	3105.44
Tetracosane	873.48	1354.73	2252.17	4178.19	1525.16
Pentacosane	2657.86	4370.93	9086.48	11629.43	6317.74
Hexacosane	789.65	1427.69	1498.75	3581.18	2195.34
Heptacosane	7183.95	8453.80	12808.09	17239.74	21247.82
Octacosane	665.94	2031.00	846.13	3897.65	4131.77
Nonacosane	7354.87	30435.92	6555.37	38104.85	76358.52
Triacontane	349.24	2483.08	375.21	4487.15	6391.36
Untriacontane	6271.77	53883.05	5143.15	47811.85	102109.7
Dotriacontane	187.73 <	1849.97	315.51 <	2704.26	4746.18
Tritriacontane	1593.19	16803.78	1687.02	21045.52	46566.27
Tetratriacontane	39.02 <	155.95	65.57 <	362.67	294.88
Pentatriacontane	96.08	371.11	74.35 q	462.76	794.28
Hexatriacontane	21.81 <	14.16 <	136.45	30.66 q	71.59 q
2,6-Dimethyl Undecane	15.33 <	9.96 <	67.34 q	16.61 <	17.95 <
Norfarnesane	12.60 <	11.53 q	1629.45	21.13 q	39.27 q
Farnesane	13.11 q	14.38 q	1196.17	16.77 q	67.35
2,6,10-Trimethyl Tridecane	35.91 <	23.33 <	588.66	38.90 <	108.70 q
Norpristane	23.13 q	34.15	4544.94	58.25	71.09
Pristane	41.45 q	37.83	5394.29	123.42	91.39
Phytane	7.42 q	18.50	4126.18	70.84	63.09
Naphthalene	22.62 <	14.69 <	38.02 <	24.51 <	26.49 <
2-Methyl Naphthalene	22.35 <e	14.52 <e	37.56 <e	24.21 <e	26.16 <e
1-Methyl Naphthalene	37.87 <	24.60 <	63.64 <	41.02 <	44.34 <
Acenaphthylene	1.44 <m	0.51 <m	4.20 a	0.73 <m	0.48 a
Acenaphthene	1.90 b	1.31 <e	7.45 b	2.18 <e	0.54 b
Fluorene	0.55 <m	2.60 b	5.38 b	1.84 b	12.03 b
Phenanthrene	3.62 a	4.04 a	18.99 a	23.44 a	19.53 a
Anthracene	0.41 <m	0.78 <m	4.88 a	6.60 a	3.66 a
Fluoranthene	0.37 <m	0.73 <m	3.92 a	4.75 a	6.50 a
Pyrene	0.38 a	0.69 <m	4.71 a	7.75 a	10.07 a
Benz(a)anthracene	0.32 b	0.92 <m	1.52 b	0.92 b	4.09 b
Chrysene	0.72 b	0.87 b	9.58 b	6.92 b	18.76 b
Benzo(b)(j)(k)fluoranthene	2.38 a	1.09 <m	15.92 a	12.09 a	19.77 a
Benzo(a)fluoranthene	2.56 a	1.17 <m	5.17 a	1.61 <m	12.68 a
Benzo(e)pyrene	1.99 <m	4.78 <m	12.68 a	2.91 a	29.35 a
Benzo(a)pyrene	79.64 a	4.77 <m	9.88 <m	2.59 <m	10.45 a
Perylene	6.37 a	141.66 a	170.35 a	237.32 a	232.24 a
Dibenz(a,h)anthracene	0.92 a	1.59 <m	10.58 a	2.61 <m	10.71 a
Indeno(1,2,3,cd)pyrene	1.41 a	1.22 <m	4.95 a	14.80 a	4.90 a
Benzo(ghi)perylene	2.18 a	4.29 a	23.65 a	50.87 a	3.75 a

QA/QC Statistics

Dodecane-D26	65.49%	55.67%	79.06%	36.95%	23.12%
Tetracosane-D50 area	4493	1461	1064	5665	2687
Hexatriacontane-D74	89.96%	167.18%	121.76%	107.00%	139.03%
Naphthalene/chrysene	154.96	194.81	150.72	176.07	97.20
1-Methyl Naphthalene/chrysene	77.27	109.08	90.78	79.38	69.62
Acenaphthylene/chrysene	42.36	250.43	261.30	230.31	195.74
Acenaphthene/chrysene	94.89	163.68	169.18	154.56	162.24
Anthracene/chrysene	126.82	138.77	142.78	156.15	156.92
Pyrene/chrysene	158.53	169.15	179.70	192.37	189.57
Benzo(k)fluoranthene/chrysene	101.80	104.06	94.66	99.32	91.13
Benzo(a)pyrene/chrysene	25.43	22.02	19.25	53.24	43.52
Perylene/chrysene	2.20	36.40	7.30	21.94	14.19
Dibenz(a,h)anthracene/chrysene	53.35	61.71	54.64	49.52	45.49
Perylene/biphenyl	0.79	10.57	2.43	6.29	5.16

Summary Statistics

(ng/g basis)					
Total n-alkanes, nC11-36	32587.9	129796.4	123175.8	178654.1	284197.5
Total nC11-19	409.1	513.0	68381.0	2160.2	1086.9
Total nC20-29	23868.6	53736.4	47378.6	99589.0	122136.4
Total nC30-36	8310.3	75546.9	7416.2	76904.9	160974.2
Total isoprenoids	85.1	116.4	17547.0	290.4	440.9
Total target non-polar	32673.0	129912.8	140722.9	178944.5	284638.4
Total PAH	102.4	153.5	303.9	370.2	399.5
Total nC13-19	409.1	513.0	50267.8	2160.2	1086.9
Total C20-C31	30489.6	110102.5	52897.0	151888.0	230637.5
Napthalene-Fluorene	1.9	2.6	17.0	1.8	13.1
Phenanthrene-Chrysene	5.0	4.9	43.6	50.4	62.6
Higher PAH (Perylene excl.)	89.1	4.3	73.0	80.7	91.6
Farnesane-Phytane	85.1	104.9	15850.2	269.3	401.6
OEP at C25	3.78	3.33	4.82	3.11	4.18
OEP at C27	9.12	6.18	9.86	5.12	8.30
OEP at C29	14.18	13.57	11.73	8.76	13.82
Pristane/Phytane	5.59	2.04	1.31	1.74	1.45

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7 APPENDIX 3; GC/MS RELATIVE RESPONSE FACTORS AND THEIR PRECISION

RRF name **	CZ			EZ			BZ			DZ		FZ		GZ		
Initial date	17/11			21/12			27/1			14/7		11/8		23/9		
Final date	18/12			27/1			4/3			15/7		11/8		30/9		
	Mean	Std. dev.	n	Mean	Std. dev.	n	Mean	Std. dev.	n	Mean	n	Mean	n	Mean	Std. dev.	n
UNDECANE	1.775	0.357	18	1.802	0.266	21	1.508	0.310	17	0.987	2	0.968	1	0.941	0.092	3
DODECANE	1.716	0.306	18	1.618	0.168	21	1.435	0.317	17	1.000	2	0.919	1	0.988	0.075	3
TRIDECANE	1.239	0.197	18	1.247	0.152	21	1.285	0.252	17	0.915	2	0.801	1	0.880	0.095	3
TETRADECANE	1.572	0.249	18	1.542	0.160	21	1.492	0.259	17	1.128	2	0.963	1	1.045	0.123	3
PENTADECANE	1.491	0.196	18	1.598	0.179	21	1.460	0.236	17	1.167	2	0.980	1	1.085	0.103	3
HEXADECANE	1.430	0.183	18	1.402	0.154	21	1.430	0.213	17	1.208	2	0.892	1	1.000	0.095	3
HEPTADECANE	1.336	0.162	18	1.464	0.137	21	1.335	0.197	17	1.213	2	0.837	1	0.938	0.141	3
OCTADECANE	1.314	0.158	18	1.450	0.132	21	1.350	0.165	17	1.168	2	0.879	1	0.916	0.088	3
NONADECANE	1.381	0.123	18	1.383	0.111	21	1.253	0.143	17	1.108	2	0.786	1	0.912	0.098	3
EICOSANE	1.142	0.087	18	1.186	0.055	21	1.170	0.117	17	1.032	2	0.790	1	0.895	0.096	3
HENEICOSANE	1.081	0.079	18	1.117	0.076	21	1.115	0.095	17	0.923	2	0.746	1	0.905	0.099	3
DOCOSANE	1.027	0.063	18	1.092	0.056	21	1.062	0.093	17	0.872	2	0.751	1	0.892	0.101	3
TRICOSANE	0.970	0.042	18	0.977	0.084	21	1.049	0.080	17	0.846	2	0.766	1	0.908	0.096	3
TETRACOSANE	0.936	0.035	18	0.948	0.068	21	0.993	0.101	17	0.794	2	0.728	1	0.893	0.059	3
PENTACOSANE	0.876	0.048	18	0.873	0.050	21	0.963	0.085	17	0.793	2	0.699	1	0.892	0.026	3
HEXACOSANE	0.785	0.048	18	0.771	0.064	21	0.858	0.122	17	0.708	2	0.665	1	0.798	0.049	3
HEPTACOSANE	0.790	0.064	18	0.802	0.091	21	0.908	0.132	17	0.699	2	0.333	1	0.813	0.048	3
OCTACOSANE	0.795	0.077	18	0.831	0.102	21	0.957	0.122	17	0.690	2	0.771	1	0.829	0.054	3
NONACOSANE	0.748	0.088	18	0.758	0.123	21	0.884	0.151	17	0.644	2	0.386	1	0.775	0.050	3
TRIACONTANE	0.701	0.073	18	0.685	0.095	21	0.812	0.141	17	0.597	2	0.608	1	0.721	0.047	3
UNTRIACONTANE	0.697	0.084	18	0.710	0.121	21	0.818	0.143	17	0.579	2	0.304	1	0.732	0.076	3
DOTRIACONTANE	0.693	0.093	18	0.735	0.137	21	0.825	0.143	17	0.560	2	0.569	1	0.743	0.105	3
TRITRIACONTANE	0.693	0.093	18	0.735	0.137	21	0.797	0.167	17	0.526	2	0.285	1	0.683	0.078	3
TETRATRIACONTANE	0.600	0.125	18	0.577	0.196	21	0.769	0.184	17	0.492	2	0.515	1	0.624	0.053	3
PENTATRIACONTANE	0.555	0.136	18	0.531	0.196	21	0.759	0.172	17	0.461	2	0.258	1	0.597	0.087	3
HEXATRIACONTANE	0.510	0.132	18	0.476	0.186	21	0.748	0.158	17	0.430	2	0.450	1	0.569	0.125	3
2,6 DIMETHYL UNDECANE	1.447	0.304	18	1.432	0.245	21	1.360	0.296	17	0.958	2	0.860	1	0.934	0.085	3
NORFARNESANE	1.447	0.304	18	1.432	0.245	21	1.360	0.296	17	0.958	2	0.860	1	0.934	0.085	3
FARNESANE	1.406	0.279	18	1.394	0.215	21	1.388	0.276	17	1.022	2	0.882	1	0.963	0.109	3
2,6,10 TRIMETHYL TRIDECANE	1.512	0.197	18	1.570	0.172	21	1.476	0.249	17	1.148	2	0.972	1	1.065	0.111	3
NORPRISTANE	1.398	0.176	18	1.444	0.131	21	1.382	0.211	17	1.211	2	0.865	1	0.969	0.107	3

RRF name **	CZ			EZ			BZ			DZ		FZ		GZ		
Initial date	17/11			21/12			27/1			14/7		11/8		23/9		
Final date	18/12			27/1			4/3			15/7		11/8		30/9		
	Mean	Std. dev.	n	Mean	Std. dev.	n	Mean	Std. dev.	n	Mean	n	Mean	n	Mean	Std. dev.	n
PRISTANE	1.340	0.162	18	1.457	0.135	21	1.342	0.181	17	1.191	2	0.858	1	0.927	0.105	3
PHYTANE	1.347	0.140	18	1.417	0.127	21	1.301	0.162	17	1.138	2	0.833	1	0.914	0.090	3
NAPHTHALENE	1.069	0.025	18	1.105	0.065	21	1.084	0.043	18	1.051	2	1.069	1	1.094	0.076	3
2-METHYL NAPHTHALENE	1.531	0.043	18	1.541	0.095	20	1.561	0.057	17	1.455	2	1.556	1	1.619	0.145	3
1-METHYL NAPHTHALENE	1.531	0.043	18	1.541	0.095	20	1.561	0.057	17	1.455	2	1.556	1	1.619	0.145	3
ACENAPHTHYLENE	1.163	0.024	18	1.139	0.058	21	1.170	0.057	18	1.103	2	1.109	1	1.087	0.056	3
ACENAPHTHENE	1.268	0.041	18	1.194	0.061	21	1.229	0.052	18	1.275	2	1.263	1	1.334	0.181	3
FLUORENE	1.153	0.056	18	1.109	0.102	21	1.171	0.083	18	1.161	2	1.228	1	1.284	0.338	3
PHENANTHRENE	1.290	0.061	18	1.354	0.167	21	1.246	0.059	18	1.469	2	1.312	1	1.650	0.089	3
ANTHRACENE	1.267	0.062	18	1.316	0.069	21	1.328	0.077	18	1.456	2	1.265	1	1.273	0.037	3
FLUORANTHENE	1.060	0.039	17	1.043	0.071	21	1.056	0.063	18	1.040	2	0.963	1	1.123	0.074	3
PYRENE	1.132	0.038	17	1.146	0.067	20	1.145	0.059	18	1.141	2	1.072	1	1.178	0.018	3
BENZ(A)ANTHRACENE	1.267	0.052	18	1.213	0.096	21	1.255	0.109	18	1.270	2	1.224	1	1.504	0.147	3
CHRYSENE	1.263	0.052	18	1.225	0.095	21	1.217	0.071	18	1.310	2	1.185	1	1.330	0.075	3
BENZO(B)FLUORANTHENE	1.017	0.055	18	0.974	0.340	21	0.920	0.220	18	0.539	2	1.122	1	1.382	0.117	3
BENZO(K)FLUORANTHENE	1.005	0.060	17	1.568	0.503	21	1.164	0.413	18	1.390	2	1.047	1	1.214	0.331	3
BENZO(A)FLUORANTHENE	0.999	0.058	18	0.893	0.129	21	0.858	0.112	18	0.955	2	0.821	1	1.136	0.198	3
BENZO(E)PYRENE	1.248	0.056	18	1.205	0.219	21	1.121	0.121	18	1.353	2	1.087	1	1.313	0.076	3
BENZO(A)PYRENE	1.248	0.058	18	1.169	0.065	21	1.228	0.062	18	1.263	2	1.285	1	1.317	0.027	3
PERYLENE	1.260	0.065	18	1.119	0.102	21	1.238	0.075	18	1.364	2			1.297	0.069	3
DIBENZ(A,H)ANTHRACENE	1.002	0.069	18	0.922	0.097	21	0.989	0.122	18	0.988	2	0.985	1	1.404	0.208	3
INDENO(1,2,3,CD)PYRENE	1.318	0.189	18	1.493	0.428	21	1.342	0.193	18	1.136	2	1.384	1	1.835	0.043	3
BENZO(GHI)PERYLENE	1.042	0.153	18	0.868	0.204	21	0.949	0.201	18	0.969	2	0.742	1	1.190	0.303	3

** RRF applied in the calculations for concentrations reported in Appendix 2

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8 APPENDIX 4; PEAT EROSION RATES

See section on Peat (page 27) for description of how this table was constructed.

Table 10: Symbols used in Appendix 4 tables

BB	Barrier Beach
IP	Ice-poor Cliff
IR	Ice-rich Cliff
IT	Inundated Tundra
LT	Low Tundra
TF	Tidal Flat

Site	Segment	Coastal Feature	Retreat Measurement	Erosion Rate (m/y)	Segment length (km)	Peat Thickness m	Volume Eroded m^3x10^3/y
6	1	IP	0	0.80	3.5	0.30	0.84
6	2	IT	0	0.80	2.0	0.30	0.48
6	3	LT	0	0.80	6.5	0.30	1.56
6	4	LT	0	0.80	1.5	0.30	0.36
6	5	LT	0	0.80	2.5	0.30	0.60
6	6	IT	0	0.80	4.0	0.30	0.96
6	7	IT	0	0.80	3.7	0.30	0.89
6	8	IP	0	0.80	1.0	0.30	0.24
6	9	IP	0	0.80	2.0	0.30	0.48
6	10	IP	0	0.80	0.9	0.30	0.22
6	11	IP	0	0.80	3.7	0.30	0.89
6	12	LT	0	0.80	4.0	0.30	0.96
6	13	IP	0	0.80	1.9	0.30	0.46
6	14	LT	0	0.80	4.2	0.30	1.01
6	15	IT	0	0.80	1.0	0.30	0.24
6	16	IP	0	0.80	5.5	0.30	1.32
6	17	IT	0	0.80	2.1	0.30	0.50
6	18	LT	0	0.80	2.5	0.30	0.60
6	19	LT	0	0.80	2.8	0.30	0.67
6	20	IT	0	0.80	1.1	0.30	0.26
6	21	IP	0	0.80	3.5	0.30	0.84
6	22	IP	0	0.80	2.9	0.30	0.70
6	23	IP	0	0.80	4.6	0.30	1.10
6	24	IP	0	0.80	2.7	0.30	0.65
6	25	IP	0	0.80	7.0	0.30	1.68
6	26	IP	0	0.80	7.0	0.30	1.68
6	29	IT	0	0.80	2.7	0.30	0.65
6	30	LT	0	0.80	4.6	0.30	1.10
6	31	LT	0	0.80	3.2	0.30	0.77
6	32	LT	0	0.80	2.5	0.30	0.60
6	33	LT	0	0.80	6.0	0.30	1.44
6	34	IT	0	0.80	1.1	0.30	0.26
6	35	LT	0	0.80	5.8	0.30	1.39
6	36	IT	0	0.80	6.8	0.30	1.63
6	37	LT	0	0.80	6.8	0.65	3.54
6	38	LT	0	0.80	5.8	0.65	3.02
6	39	LT	0	0.80	10.3	0.65	5.36
6	40	LT	0	0.80	3.0	0.65	1.56
6	41	LT	0	0.80	6.8	0.65	3.54
6	42	LT	0	0.80	3.3	0.15	0.40
6	43	LT	0	0.80	6.8	0.15	0.82
6	44	LT	0	0.80	4.2	0.15	0.50
6	45	LT	0	0.80	2.7	0.15	0.32
6	46	LT	0	0.80	2.7	0.15	0.32
6	47	IP	0	0.80	5.6	0.15	0.67
6	48	IP	0	0.80	1.2	0.15	0.14
6	49	LT	0	0.80	3.6	0.15	0.43
6	50	LT	0	0.80	3.8	0.40	1.22

Site	Segment	Coastal Feature	Retreat Measurement	Erosion Rate (m/y)	Segment length (km)	Peat Thickness	Volume Eroded
6	51	LT	0	0.80	7.8	0.40	2.50
6	52	LT	0	0.80	6.4	0.40	2.05
6	53	LT	0	0.80	0.9	0.40	0.29
6	54	LT	0	0.80	2.5	0.40	0.80
6	55	IT	0	0.80	5.3	0.40	1.70
6	56	IT	0	0.80	7.0	0.40	2.24
6	57	IT	0	0.80	3.6	0.40	1.15
6	58	LT	0	0.80	5.4	0.40	1.73
6	59	LT	0	0.80	3.5	0.40	1.12
6	60	LT	0	0.80	3.2	0.40	1.02
6	61	LT	0	0.80	9.3	0.40	2.98
6	64	IP	0	0.80	3.0	0.40	0.96
6	65	IP	1	1.52	1.3	0.40	0.79
6	67	IP	0	0.80	2.3	0.40	0.74
6	69	IP	3	0.59	1.9	0.40	0.45
6	70	IP	4	0.69	2.9	0.40	0.80
7	1	LT	1	3.48	0.9	0.20	0.63
7	2	LT	1	0.52	0.4	0.20	0.04
7	4	LT	3	0.74	1.4	0.20	0.21
7	5	BB	1	0.81	0.7	0.20	0.11
7	9	BB	1	1.91	0.8	0.20	0.31
7	10	LT	2	2.14	1.1	0.20	0.47
7	11	LT	6	1.90	1.7	0.20	0.63
7	12	BB	6	1.63	1.4	0.20	0.46
7	13	LT	4	1.43	0.9	0.20	0.26
7	14	LT	3	0.79	1.5	0.20	0.24
7	15	LT	1	2.38	1.4	0.20	0.67
7	18	LT	2	1.07	0.4	0.20	0.09
7	19	IT	2	2.85	1.2	0.20	0.68
7	20	IT	3	2.38	0.7	0.20	0.33
7	21	IT	1	1.81	1.5	0.20	0.54
7	23	IT	0	1.60	1.4	0.20	0.45
7	38	BB	2	2.26	2.4	0.20	1.08
7	39	BB	1	2.20	3.5	0.20	1.54
7	43	BB	2	1.66	1.1	0.20	0.37
7	44	BB	2	0.35	1.5	0.20	0.11
7	45	LT	3	1.66	2.4	0.20	0.80
7	46	LT	1	2.17	2.1	0.20	0.89
7	47	LT	1	0.71	1.2	0.20	0.17
7	48	IT	0	0.30	1.0	0.20	0.06
7	50	LT	1	0.60	1.4	0.20	0.16
7	51	IT	0	0.30	1.4	0.20	0.08
7	52	IT	0	0.30	1.6	0.20	0.10
7	53	IT	0	0.30	1.6	0.20	0.10
7	54	IT	0	0.30	2.3	0.20	0.14
7	55	IT	0	0.30	1.1	0.20	0.07
7	56	IT	0	0.30	2.7	0.20	0.16
7	57	IT	1	0.36	0.8	0.20	0.06
7	58	LT	4	1.42	5.6	0.20	1.59
7	59	IT	1	0.52	2.0	0.20	0.21

Site	Segment	Coastal Feature	Retreat Measurement	Erosion Rate (m/y)	Segment length (km)	Peat Thickness	Volume Eroded
7	62	LT	3	2.80	3.4	0.20	1.90
7	64	IT	0	1.60	0.7	0.35	0.39
7	65	IT	0	1.60	5.0	0.35	2.80
7	69	BB	4	0.65	1.6	0.35	0.36
7	72	LT	3	0.64	2.3	0.35	0.52
7	73	LT	3	1.75	2.3	0.35	1.41
7	74	LT	1	0.25	2.4	0.35	0.21
7	75	LT	5	1.00	2.9	0.35	1.02
7	76	LT	3	0.80	2.0	0.35	0.56
7	77	LT	2	1.54	1.7	0.35	0.92
7	78	BB	2	1.37	1.3	0.35	0.62
7	79	LT	0	1.37	1.0	0.35	0.48
7	80	IT	0	1.57	6.8	0.35	3.74
7	81	LT	1	0.17	1.5	0.35	0.09
7	82	IT	0	1.57	1.4	0.35	0.77
7	83	LT	1	3.58	0.6	0.35	0.75
7	84	LT	1	1.00	2.9	0.35	1.02
7	85	IT	1	1.40	0.6	0.35	0.29
7	86	LT	1	1.37	1.3	0.35	0.62
7	87	LT	1	0.63	2.1	0.35	0.46
7	88	LT	0	0.50	1.1	0.35	0.19
7	89	LT	0	0.50	1.3	0.35	0.23
7	90	LT	3	1.27	2.8	0.35	1.24
7	93	IT	2	0.37	2.7	0.35	0.35
7	94	IT	0	1.40	3.6	0.35	1.76
7	98	IT	0	1.00	1.6	0.35	0.56
7	99	BB	0	0.40	3.2	0.35	0.45
7	100	BB	0	0.40	0.8	0.35	0.11
7	101	IR	0	0.40	0.6	0.35	0.09
7	104	IP	0	0.33	0.5	0.35	0.05
7	105	BB	1	0.33	1.4	0.35	0.16
7	106	IP	0	0.33	0.6	0.35	0.07
7	108	IP	1	0.17	1.1	0.35	0.07
7	109	BB	2	0.58	2.8	0.35	0.57
7	110	BB	0	0.50	1.0	0.35	0.18
7	111	IP	0	0.63	1.5	0.35	0.32
7	112	IP	1	0.63	1.9	0.35	0.41
7	114	LT	0	1.40	1.9	0.35	0.93
7	115	LT	0	1.40	1.2	0.35	0.59
7	116	LT	0	1.40	0.4	0.35	0.20
7	117	LT	0	1.30	1.9	0.35	0.86
7	120	LT	0	1.00	0.9	0.35	0.32
7	121	LT	0	1.00	1.7	0.35	0.60
7	122	LT	1	1.50	0.6	0.35	0.32
7	123	LT	0	1.00	2.1	0.35	0.74
7	128	IP	1	3.00	1.2	0.35	1.26
7	129	IT	0	1.57	1.0	0.35	0.52
7	131	IR	0	1.57	0.7	0.35	0.38
7	132	LT	0	1.58	0.6	0.35	0.33
7	134	LT	2	1.31	1.5	0.35	0.69

Site	Segment	Coastal Feature	Retreat Measurement	Erosion Rate (m/y)	Segment length (km)	Peat Thickness	Volume Eroded
7	135	LT	0	1.30	1.2	0.35	0.55
7	136	LT	1	1.92	3.0	0.35	2.02
7	137	IP	2	1.58	0.8	0.35	0.44
7	138	LT	0	1.37	0.8	0.35	0.36
7	139	LT	1	1.21	0.7	0.35	0.30
8	1	IP	1	0.73	0.6	0.35	0.15
8	2	IP	1	0.46	1.3	0.35	0.21
8	3	IP	3	0.59	1.8	0.35	0.37
8	4	IP	3	1.06	2.0	0.35	0.74
8	5	BB	3	0.41	1.6	0.35	0.23
8	9	IT	1	1.59	3.0	0.35	1.67
8	10	LT	2	0.57	1.8	0.35	0.36
8	11	IT	0	1.00	2.1	0.35	0.74
8	12	IT	0	1.00	1.5	0.35	0.53
8	13	IP	1	0.91	0.7	0.35	0.22
8	14	BB	1	0.68	0.8	0.35	0.19
8	15	BB	2	0.91	1.1	0.35	0.35
8	16	LT	1	1.14	1.0	0.35	0.40
8	17-23	-	10	0.70	6.1	0.35	1.49
8	24-33	-	5	0.30	12.2	0.35	1.28
8	41	IT	2	3.64	1.3	0.60	2.84
8	44	IT	1	5.46	1.6	0.60	5.24
8	45	IT	12	0.60	0.7	0.60	0.25
8	47	BB	1	5.70	0.9	0.60	3.08
8	49	BB	1	2.30	0.6	0.60	0.83
8	50	-	2	1.25	1.5	0.60	1.13
8	53	LT	1	3.41	0.7	0.60	1.43
8	55-60	-	16	1.06	10.0	0.60	6.36
8	61	LT	6	1.71	2.2	0.60	2.21
8	62	BB	1	3.48	1.1	0.60	2.30
8	64	LT	1	1.09	1.1	0.60	0.72
8	66	LT	2	0.79	1.6	0.60	0.75
8	67	LT	1	3.81	0.9	0.30	0.97
8	68	IT	1	2.70	1.2	0.75	2.43
8	70	LT	4	9.03	1.5	0.30	4.06
8	71	LT	2	13.65	0.6	0.30	2.46
8	72	IT	1	9.48	1.1	0.75	7.47
8	73	IP	1	0.70	0.3	0.30	0.06
8	74	LT	3	5.04	3.3	0.30	4.99
8	75	LT	0	3.81	2.2	0.30	2.51
8	76	LT	0	1.04	1.7	0.30	0.53
8	77	IP	1	0.09	0.5	0.30	0.01
8	78	IP	2	1.81	2.0	0.30	1.08
8	80	IP	5	0.25	3.8	0.30	0.29
8	81	TF	0	1.12	1.9	0.30	0.64
8	82	TF	0	1.12	1.6	0.30	0.54
9	9	LT	1	0.70	0.6	0.30	0.13
9	18	IT	1	0.08	1.0	0.30	0.02
9	21	IP	3	0.87	1.6	0.60	0.84
9	20	LT	3	0.28	2.8	0.60	0.47

Site	Segment	Coastal Feature	Retreat Measurement	Erosion Rate (m/y)	Segment length (km)	Peat Thickness	Volume Eroded
9	23	LT	1	1.54	1.5	0.60	1.39
9	24	LT	1	2.17	1.6	0.60	2.08
9	25	LT	1	1.50	1.8	0.60	1.62
9	26	IT	1	0.75	1.0	0.60	0.45
9	27	LT	1	0.50	0.8	0.60	0.24
9	29	LT	0	0.50	0.6	0.60	0.18
9	30	BB	2	3.46	1.1	0.60	2.28
9	31	BB	1	2.38	1.2	0.60	1.71
9	32	IP	3	1.26	3.0	0.60	2.27
9	33		4	0.48	5.5	0.60	1.58
9	34	IP	3	0.79	2.4	0.60	1.14
9	35	IT	1	1.08	0.7	0.60	0.45
9	36	LT	2	1.09	1.7	0.60	1.11
9	39	LT	1	0.08	0.9	0.30	0.02
9	40	IT	2	1.08	1.5	0.30	0.49
9	41	LT	1	0.21	0.8	0.30	0.05
9	50	IT	1	0.50	0.4	0.30	0.06
9	54	IT	0	0.81	1.1	0.30	0.27
9	56	IT	2	2.63	1.2	0.30	0.95
9	57		2	0.50	1.2	0.30	0.18
9	58		3	0.18	3.4	0.30	0.18
9	59		2	0.71	2.4	0.30	0.51
9	60		2	1.08	1.8	0.30	0.58
9	61		2	1.00	1.6	0.30	0.48
9	62		2	0.41	2.8	0.30	0.34
9	63-65		4	0.28	8.3	0.30	0.70
9	66		3	0.57	1.6	0.30	0.27
9	67-68		0	0.50	4.5	0.30	0.68
9	69		1	0.70	2.3	0.30	0.48
9	70		0	0.50	1.1	0.30	0.17
9	71		2	0.30	3.3	0.30	0.30
9	72		0	0.30	1.5	0.30	0.14
9	73		0	0.30	0.7	0.30	0.06
9	74		0	0.30	0.8	0.30	0.07
9	75	IT	1	0.81	1.2	0.30	0.29
9	76	LT	2	0.81	1.3	0.30	0.32
9	77	IT	1	0.17	1.2	0.30	0.06
9	78	LT	1	1.01	0.7	0.30	0.21
9	80	LT	1	3.00	0.8	0.30	0.72
9	84		0	0.30	0.7	0.30	0.06
9	87		2	0.23	1.9	0.30	0.13
9	88		0	0.20	1.7	0.30	0.10
9	89		2	0.64	2.3	0.30	0.44
9	90		2	0.30	2.1	0.30	0.19
9	91		1	0.19	1.9	0.30	0.11
9	92		0	0.20	0.7	0.30	0.04
9	93		2	0.50	1.8	0.30	0.27
9	95		1	0.54	0.9	0.30	0.15
9	96		1	0.25	1.0	0.30	0.08
9	98		1	0.67	0.9	0.30	0.18

Site	Segment	Coastal Feature	Retreat Measurement	Erosion Rate (m/y)	Segment length (km)	Peat Thickness	Volume Eroded
9	102		1	0.29	0.9	0.30	0.08
9	103		1	0.46	3.2	0.30	0.44
9	106-114		4	0.12	9.3	0.30	0.33
9	122		1	0.04	1.1	0.30	0.01
9	123		1	0.52	2.1	0.30	0.33
9	124		0	0.30	1.1	0.30	0.10
9	128		1	0.21	1.7	0.30	0.11
9	129		1	0.08	2.2	0.30	0.05
9	138		1	1.25	1.0	0.30	0.38
9	141	LT	0	0.10	0.7	0.50	0.04
9	146	BB	0	0.30	0.6	0.50	0.09
9	153		2	0.27	1.6	0.50	0.22
9	154		1	0.30	2.3	0.50	0.35
9	155		2	0.46	2.5	0.50	0.58
9	157		1	0.67	0.9	0.30	0.18
9	159		1	0.25	2.5	0.30	0.19
9	160		0	0.25	3.5	0.30	0.26
9	163-170		0	0.30	13.0	0.50	1.95
9	192	BB	0	0.50	1.8	0.50	0.45
9	194	BB	1	0.83	1.0	0.50	0.42
9	195	LT	0	0.50	1.0	0.50	0.25
9	202	BB	1	1.08	1.0	0.50	0.54
9	204	LT	1	0.75	1.1	0.50	0.41
9	235	IT	0	0.81	8.3	0.75	5.04
10	1	BB	2	2.00	4.5	0.50	4.50
10	13	IP	0	0.76	1.9	0.50	0.72
10	30	TF	1	1.30	2.7	0.50	1.76
10	33	TF	1	0.70	0.5	0.50	0.18
10	34	IT	0	0.70	1.8	0.50	0.63
10	39	IT	0	0.20	3.5	0.50	0.35
10	46	LT	1	0.17	3.4	0.50	0.29
10	47	IP	1	0.92	3.5	0.50	1.61
10	50	IT	0	1.56	1.5	0.50	1.17
10	51	IP	1	0.75	2.6	0.50	0.98
10	52	BB	0	0.75	1.0	0.50	0.38
10	53	IP	0	0.76	1.2	0.50	0.46
10	55	BB	1	1.57	0.7	0.50	0.55
10	56	IP	0	1.57	0.4	0.50	0.31
10	67	TF	1	0.70	1.6	0.50	0.56
10	14	TF	1	2.09	11.8	0.90	22.20
10	15	TF	0	2.40	8.0	0.90	17.28
10	16	TF	0	2.40	6.5	0.90	14.04
10	19	TF	0	2.40	3.4	0.90	7.34
10	20	TF	0	2.40	6.3	0.90	13.61
10	75	TF	0	2.40	3.8	0.90	8.21
10	76	TF	3	6.43	3.2	0.90	18.51
10	77	TF	7	5.26	7.4	0.90	35.03
10	78	TF	0	1.57	5.4	0.90	7.63
10	79	TF	1	1.57	5.8	0.90	8.20

Site	Segment	Coastal Feature	Retreat Measurement	Erosion Rate (m/y)	Segment length (km)	Peat Thickness	Volume Eroded
10	80	TF	8	2.76	6.5	0.90	16.12
10	81	TF	2	1.77	2.7	0.90	4.29
10	82	TF	3	1.17	1.6	0.90	1.68
10	83	TF	0	1.50	3.2	0.90	4.32
10	84	TF	0	1.50	3.8	0.90	5.13
10	85	TF	0	1.50	4.6	0.90	6.21
10	86	TF	0	1.50	4.3	0.90	5.81
10	87	TF	0	1.50	6.0	0.90	8.10
10	88	TF	0	1.50	4.4	0.90	5.94
10	89	TF	3	1.73	7.0	0.90	10.92
10	90	TF	8	1.41	8.7	0.90	11.06
10	91	TF	1	2.70	3.5	0.90	8.51
10	92	TF	1	0.30	8.7	0.90	2.35
10	93	TF	5	0.51	5.5	0.90	2.51
10	94	TF	5	2.74	7.4	0.90	18.28
10	95	TF	3	3.37	9.0	0.90	27.27
10	96	TF	0	2.40	5.3	0.90	11.45
10	97	TF	0	2.40	6.0	0.90	12.96
10	98	TF	0	2.40	4.5	0.90	9.72
10	99	TF	0	2.40	9.9	0.90	21.38
10	100	TF	0	2.40	7.3	0.90	15.77
10	101	TF	0	2.40	3.6	0.90	7.78
10	102	TF	0	2.40	4.0	0.90	8.64
10	103	TF	0	2.40	7.0	0.90	15.12
10	104	TF	0	2.40	4.9	0.90	10.58
10	105	TF	2	3.16	4.0	0.90	11.38
10	106	TF	5	3.39	8.0	0.90	24.42
10	108	TF	1	10.81	7.0	0.90	68.10
10	109	TF	3	0.29	5.6	0.60	0.98
10	111	TF	1	2.26	6.8	0.60	9.22
10	112	TF	6	0.74	4.8	0.60	2.12
10	113	TF	4	1.11	7.6	0.60	5.05
10	114	TF	3	0.46	5.2	0.60	1.44
10	115	TF	1	3.13	10.0	0.60	18.78
10	116	TF	0	2.40	6.5	0.60	9.36
10	117	TF	0	2.40	3.0	0.60	4.32
10	118	TF	1	5.04	3.5	0.60	10.58
10	119	TF	1	1.22	6.3	0.60	4.61
10	120	TF	5	2.47	12.0	0.60	17.78
11	1	TF	0	1.10	2.6	0.60	1.72
11	2	TF	10	1.07	8.5	0.60	5.46
11	3	TF	8	1.40	11.4	0.60	9.58
11	4	TF	10	1.05	7.8	0.60	4.90
11	5	TF	8	4.31	6.4	0.60	16.54
11	6	TF	7	5.38	4.3	0.60	13.89
11	7	TF	10	3.66	6.8	0.60	14.93
11	8	TF	3	8.35	7.0	0.60	35.08
11	9	TF	3	7.24	3.8	0.60	16.51
11	10	TF	9	3.95	10.0	0.60	23.70

Site	Segment	Coastal Feature	Retreat Measurement	Erosion Rate (m/y)	Segment length (km)	Peat Thickness	Volume Eroded
11	11	TF	4	5.79	2.8	0.60	9.72
11	12	TF	3	6.93	6.3	0.60	26.18
11	13	TF	1	7.14	1.7	0.60	7.28
11	14	TF	13	6.24	6.5	0.60	24.34
11	15	TF	12	7.93	5.0	0.60	23.79
11	16	TF	3	1.98	1.9	0.60	2.26
11	17	TF	9	5.51	4.6	0.60	15.21
11	18	TF	6	1.74	4.5	0.60	4.68
11	19	TF	0	4.66	3.0	0.60	8.40
11	20	TF	0	4.66	2.3	0.60	6.44
11	21	TF	2	9.25	2.6	0.60	14.43
11	22	TF	1	7.00	4.2	0.60	17.64
11	23	TF	0	4.66	4.7	0.60	13.15
11	24	TF	0	4.66	3.0	0.60	8.40
11	25	TF	0	4.66	3.8	0.60	10.63
11	26	TF	0	4.66	2.1	0.60	5.88
11	27	TF	0	4.66	1.6	0.60	4.48
8	37	IR	3	1.52	0.8	0.60	0.73
8	39	IP	1	1.59	1.0	0.60	0.95
8	46	IR	3	2.42	1.0	0.60	1.38
8	48	IR	2	2.00	0.5	0.75	0.75
8	63	IP	1	0.78	0.5	0.60	0.23
8	83	IP	3	0.30	6.3	0.30	0.57
9	10	IP	5	0.48	2.7	0.30	0.39
9	11	IP	2	0.29	0.7	0.30	0.06
9	12	IP	3	0.06	2.1	0.30	0.04
9	13	IP	1	0.33	0.8	0.30	0.07
9	15	IP	1	0.17	1.5	0.30	0.07
9	17	IP	0	0.10	0.5	0.30	0.02
9	37	IP	1	0.13	1.6	0.30	0.06
9	43	IP	0	0.41	0.7	0.30	0.09
9	44	IP	0	0.41	0.4	0.30	0.05
9	45	IP	2	2.11	0.8	0.30	0.47
9	48	IP	1	0.46	0.8	0.30	0.11
9	49	IP	2	0.29	1.3	0.30	0.11
9	51	IP	0	0.41	0.3	0.30	0.04
9	55	IP	2	0.81	1.9	0.30	0.46
9	79	IR	1	0.33	0.4	0.30	0.04
9	82	IR	2	0.63	1.7	0.30	0.32
9	83	IP	2	1.63	1.7	0.30	0.80
9	116	IR	0	1.00	1.4	0.30	0.42
9	117	IP	0	1.00	0.4	0.30	0.12
9	118	IP	0	1.00	0.7	0.30	0.21
9	119	IP	1	0.54	1.4	0.30	0.23
9	135	IR	0	0.31	1.1	0.50	0.17
9	142	IR	3	0.04	1.6	0.50	0.03
9	143	IP	1	0.08	1.9	0.50	0.07
9	145	IP	1	0.33	1.1	0.50	0.18
9	147	IR	3	0.43	2.4	0.50	0.52

Site	Segment	Coastal Feature	Retreat Measurement	Erosion Rate (m/y)	Segment length (km)	Peat Thickness	Volume Eroded
9	148	IP	0	0.67	1.5	0.50	0.50
9	149	IR	0	0.83	1.0	0.50	0.42
9	172	IP	0	0.41	0.6	0.50	0.12
9	177	IP	0	0.10	1.3	0.50	0.07
9	178	IP	0	0.10	1.2	0.50	0.06
9	179	IP	1	0.08	1.2	0.50	0.05
9	187	IP	0	0.41	0.8	0.50	0.16
9	193	IR	0	0.31	0.6	0.50	0.09
9	197	IR	1	1.00	1.7	1.00	1.70
9	198	IR	1	1.50	1.0	1.00	1.50
9	199	IR	0	2.00	0.6	1.00	1.20
9	201	IR	0	1.00	0.8	0.50	0.40
9	203	IR	0	0.13	0.5	0.50	0.03
9	205	IP	0	0.41	1.7	0.50	0.35
9	214	IP	2	0.13	3.3	0.50	0.21
9	234	IR	2	0.77	3.6	0.75	2.08
9	237	IR	0	0.75	0.9	0.75	0.48
9	239	IR	0	0.75	2.1	0.75	1.18
9	240	IR	0	0.75	2.5	0.75	1.41
10	2	IR	0	0.48	1.5	0.50	0.36
10	4	IR	0	0.48	0.8	0.50	0.19
10	6	IR	1	0.50	3.3	0.50	0.83
10	7	IR	3	0.58	5.3	0.50	1.54
10	31	IP	1	0.76	1.3	0.50	0.49
10	32	IR	1	0.74	2.2	0.50	0.81
10	35	IR	1	0.50	1.4	0.50	0.35
10	36	IR	0	0.48	2.2	0.50	0.53
10	37	IR	0	0.48	1.4	0.50	0.34
10	38	IP	0	0.40	1.5	0.50	0.30
10	40	IR	1	0.22	2.9	0.50	0.32
10	41	IR	1	0.78	1.8	0.50	0.70
10	44	IR	1	0.26	1.8	0.50	0.23
10	45	IR	0	0.48	1.8	0.50	0.43
10	54	IR	0	1.83	1.5	0.50	1.37
10	58	IP	0	0.50	1.3	0.50	0.33
10	61	IR	0	0.48	2.7	0.50	0.65
10	62	IR	0	0.48	0.8	0.50	0.19
10	64	IR	1	0.17	2.3	0.50	0.20
10	65	IP	0	0.50	2.7	0.50	0.68
10	66	IP	1	0.61	3.7	0.50	1.13
12	1	LT	2	1.01	3.2	0.25	0.80
12	2	IP	7	0.50	4.0	0.25	0.50
12	4	IP	0	0.30	3.9	0.25	0.29
12	5	IP	0	0.30	1.2	0.25	0.09
12	6	IP	0	0.30	2.1	0.25	0.16
12	11	IP	0	0.80	2.7	0.25	0.54
12	12	IP	2	0.43	1.3	0.25	0.14
12	13	IR	2	0.72	0.7	0.25	0.13
12	14	IR	5	0.18	4.0	0.25	0.18

Site	Segment	Coastal Feature	Retreat Measurement	Erosion Rate (m/y)	Segment length (km)	Peat Thickness	Volume Eroded
12	15	IR	3	0.15	1.8	1.20	0.32
12	16	IR	3	1.22	1.4	1.20	2.05
12	17	IR	3	1.30	1.4	1.20	2.19
12	18	IR	1	0.17	0.9	1.20	0.18
12	19	IP	11	0.62	5.5	1.20	4.06
12	21	IR	3	1.06	1.4	1.50	2.23
12	22	IP	1	2.44	1.0	1.50	3.66
12	25	IR	6	0.92	6.4	0.50	2.94
12	26	IP	0	0.82	2.0	0.50	0.82
12	27	IP	7	0.72	6.3	0.50	2.27
12	28	IR	3	1.27	5.1	0.50	3.24
12	29	IP	1	0.72	1.2	1.00	0.87
12	30	IR	4	1.68	1.5	1.00	2.52
12	36	IT	2	0.58	3.1	1.50	2.67
12	42	IR	1	0.03	1.3	0.50	0.02
12	43	IP	3	0.02	2.1	0.50	0.02
12	44	IP	3	0.38	2.0	0.50	0.38
12	47	IR	9	0.80	4.3	1.00	3.45
12	49	IR	10	0.15	4.7	0.75	0.51
12	53	LT	1	0.06	1.6	0.50	0.05
12	54	BB	5	0.41	2.1	0.50	0.43
12	55	BB	3	1.67	0.8	0.50	0.67
12	56	BB	3	0.15	2.6	0.50	0.20
12	58	IP	3	0.71	2.8	1.00	1.98
12	59	IR	14	0.74	8.0	1.00	5.93
12	61	IR	24	0.46	20.1	1.00	9.31
12	64	IT	1	0.96	2.1	1.00	2.02
12	68	LT	14	0.49	7.4	0.50	1.81
12	69	IR	3	0.52	2.7	0.50	0.70
12	78	IT	2	1.38	2.2	0.75	2.28
12	79	IP	7	1.41	11.3	0.75	11.94
12	80	LT	1	0.08	0.6	0.75	0.04
12	81	IR	1	0.86	2.0	0.75	1.29
12	82	IP	11	0.96	7.3	0.75	5.26
12	85	IR	9	1.27	7.0	0.50	4.46
						TOTAL	1,298.30

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