Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program

Annual Monitoring Report - Year Three, April 2002

Elliott Bay/Duwamish Restoration Program

Prepared for the
Elliott Bay/Duwamish Restoration Program Panel
by the
King County Department of Natural Resources

Panel Publication 32

December 2002

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Scott Mickelson
King County Department of Natural Resources

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Elliott Bay/Duwamish Restoration Program
NOAA Damage Assessment and Restoration Center Northwest
7600 Sand Point Way NE
Seattle, WA 98115-0070

(206) 526-4338
(FAX) (206) 526-4321

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Individuals and organizations needing further information about the Elliott Bay/Duwamish Restoration Program should contact the Administrative Director at the following address and telephone number:

Dr. Robert C. Clark, Jr., Administrative Director
Elliott Bay/Duwamish Restoration Program
NOAA Damage Assessment and Restoration Center Northwest
7600 Sand Point Way NE
Seattle, WA 98115–0070
(206) 526-4338 FAX: (206) 526-4321

The Panel of Managers holds regularly scheduled meetings that are open to the public. Technical Working Group and committee meetings are scheduled on an as-needed basis, and are also open to the public. Meetings are generally held at the National Oceanic and Atmospheric Administration, National Marine Fisheries Service - Regional Directorate Conference Room, Building 1, 7600 Sand Point Way NE, Seattle. The Panel recommends that you contact the Administrative Director at the above phone number to confirm meeting schedules and locations. The panel also holds periodic special evening and weekend public information meetings and workshops.

General Schedule for Panel and Committee Meeting Dates

Panel: quarterly, first Thursday of January, April, July, October, 9:30 A.M. - 12:30 P.M.
Habitat Development Technical Working Group: third Thursday of every month, 9:30 A.M. - 12:30 P.M.
Sediment Remediation technical Working Group: scheduled as needed.
Public Participation Committee: scheduled as needed.
Budget Committee: scheduled as needed.

Environmental Review of Specific Projects

Formal hearings and comment periods on appropriate environmental documents for proposed sediment remediation and habitat development projects will be observed. Please contact the Administrative Director for more information.

This information is available in accessible formats on request at
(206) 296-0600 (voice) and 1-800-833-6388 (TTY/TDD users only).

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1 INTRODUCTION

This report presents results of the fifth sampling event of a five-year monitoring program at the Norfolk combined sewer overflow (CSO) sediment remediation site. The purpose of the five-year program is to monitor sediment placed as backfill material at the site for potential recontamination from CSO and other discharges. The fifth monitoring event occurred in April 2002, three years after completion of remedial activities. This monitoring event was intended to collect data on the chemical characteristics of the backfill material three years after placement and compare those data to baseline chemical conditions. Included in this report are a project background, descriptions of sampling and analytical methodologies, analytical results, and a quality assurance review of the analytical data. Figures and tables referenced in this report are located at the end of the narrative.

1.1 Project Background

Sediment remediation at the Norfolk CSO site was undertaken to partially fulfill requirements of a 1991 Consent Decree, which defined the terms of a natural resources damage agreement between King County (along with the City of Seattle) and federal, state, and tribal natural resources trustees. The Norfolk CSO site was chosen by the Elliott Bay/Duwamish Restoration Program (EB/DRP) Panel as one of four sites prioritized for potential sediment remediation.

A site characterization and cleanup study was performed in 1994 and 1995, and the cleanup study report was issued in 1996 (EB/DRP, 1996). Chemicals of concern at the site included mercury, 1,4-dichlorobenzene, bis(2-ethylhexyl) phthalate and polychlorinated biphenyls (PCBs), all present at concentrations exceeding State of Washington Sediment Management Standards (SMS) sediment chemical criteria values that define cleanup screening levels. PCB "hot spot" concentrations at the site also exceeded Toxic Substances Control Act (TSCA) limits for hazardous waste disposal.

Site remediation began in early February 1999 and was completed by late March 1999. Remedial activities consisted of dredging and disposal of contaminated sediment and backfilling the dredged area to original grade with clean sediment from the Duwamish River Turning Basin. Contaminated sediments were removed from the site by mechanical dredge and dewatered on shore in a containment area first arranged to segregate batches about 50 cubic yards (cy) in size and later reconfigured to handle larger batches.

Sediment samples were collected daily from each 50-cy batch and analyzed for PCB concentrations to determine the appropriate disposal destination. Sediments with a PCB concentration greater than 45 parts per million (ppm) were transported to a Subtitle C landfill in Arlington, Oregon for disposal. Sediments with a PCB concentration less than 45 ppm were transported to a Subtitle D landfill in Bremerton, Washington for disposal. A total of 5,190 cy of sediment was removed during the remediation, of which approximately 1,900 cy were transported to the Subtitle C landfill as hazardous waste. Sediment was generally removed to a depth of three feet, however, remediation in the PCB hot spot areas required removal of sediment up to a depth of nine feet. Confirmational testing subsequent to dredging activities indicated that, in some of the deepest-dredged areas, sediments were left in place that contained PCB concentrations greater than SMS chemical criteria. Discussions

with project oversight personnel from the EB/DRP Panel and State of Washington Department of Ecology (Ecology) determined that, at a depth of nine feet below original grade, these PCB-contaminated sediments could be left in place.

Clean backfill sediment was obtained from the Duwamish River Turning Basin during normal maintenance dredging operations by the Army Corps of Engineers (ACOE). Data collected by the Corps prior to maintenance dredging indicated that this material was suitable for use as backfill material (ACOE unpublished data, 1998). A sample was also collected from the Turning Basin sediment after it was placed on a barge and just prior to backfilling activities. Analytical results from this sample confirmed the suitability of the sediment as backfill material (King County unpublished data, 1999). No organic chemicals were detected in the sample and metals were detected at levels indicative of natural, area-wide crustal sediment concentrations. Approximately 6,700 cy of Turning Basin sediment was used to backfill the dredged area at the Norfolk CSO sediment remediation site. A site closure report was issued in August 1999 (EBDRP, 1999).

The site hydraulic permit, issued by the Washington State Department of Fish and Wildlife prior to remediation, requires that the site be monitored for a period of five years following remedial activities to evaluate possible recontamination of the backfill sediment as a result of continuing CSO or storm water discharges. To comply with this permit, a five-year monitoring plan was prepared which includes sampling and analysis of surficial sediments from four stations in the backfilled area. Analytical data will allow King County to evaluate the chemical characteristics of the sediment and assess possible recontamination over time. Monitoring activities will be performed in accordance with a sampling and analysis plan addendum prepared by King County (King County, 1999).

1.2 Site Description

The Norfolk CSO sediment remediation site is located in the Duwamish River, above the Turning Basin, at approximately river kilometer (km) 10 in the City of Tukwila (Figure 1). The site is located upstream of the river reach maintained for commercial navigation and, as such, has maintained its natural channel as well as some riparian habitat (EBDRP, 1996). The shoreline is characterized by a steeply-sloping, erosional bank maintained with large concrete riprap. The bank joins a gently-sloping, intertidal mud shoreline that is completely exposed during extreme low tides.

The Norfolk CSO outfall originates at King County's Norfolk Street Regulator Station near South 102nd Street and East Marginal Way in Tukwila (EBDRP, 1996). The outfall structure has a flap gate over the 84-inch discharge pipe and a concrete splash plate that is exposed during normal low tides. The remediation site is located adjacent to the outfall structure and is characterized by exposed, intertidal mud habitat as well as subtidal riverbed. The intertidal zone has been channelized, both by the discharge of the Norfolk CSO and by a storm drain that drains a Boeing Company parking lot adjacent to the CSO outfall.

2 SAMPLE COLLECTION

This section describes sampling activities conducted in April 2002. All sampling activities were conducted following guidance suggested in the Puget Sound Protocols (PSEP, 1996a and 1998).

2.1 Sample Locations and Station Positioning

Sampling locations were selected and coordinates determined prior to field activities. Final sampling locations were selected prior to the October 1999 six-month monitoring event (King County, 2000) and were designed to assess potential recontamination at the site and evaluate the chemical characteristics of the backfill material at the following locations:

- within the Norfolk CSO channel, prior to its confluence with the Boeing storm drain (SD) channel (Station NFK501);
- on the delta after the confluence of the Norfolk CSO and Boeing SD channels (Station NFK502);
- within the Boeing SD channel prior to its confluence with the Norfolk CSO channel (Station NFK503); and
- upriver of both the Norfolk CSO and Boeing SD channels (Station NFK504).

Sample station locations were selected to monitor sediment quality in those areas with the greatest potential for recontamination; one station in the Norfolk CSO channel, one station in the Boeing SD channel, and one station on the delta formed after the confluence of the CSO and SD channels. The upriver station was selected to provide background or reference data.

The prescribed station location coordinates are presented in Table 1 and sample locations are shown in Figure 2.

Sediment grab samples were collected from the King County research vessel *Chinook*, which is equipped with a differential global positioning system (DGPS). Coordinates, presented in Table 1, were recorded using DGPS for each individual sediment grab as the sampler contacted the river bottom. The DGPS is a satellite-based navigation system that operates using a receiver to calculate ground position by triangulating scrambled data transmitted by a constellation of satellites operated by the Department of Defense (DOD). The ship-board "differential" receiver receives both the scrambled DOD signal and "corrected" signals originating from base stations operated by various agencies including the Coast Guard and King County. System software applies the differential correction and calculates a precise, real-time navigational position.

Two composite sediment samples were collected from each station. One sample was collected from the 0 to 2 centimeter (cm) depth stratum and the other sample was collected from the 0 to 10 cm depth stratum. Both samples at each station were composited from three separate deployments of the grab sampler. Coordinates for each grab deployment are shown in Table 1.

2.2 Sample Collection and Handling

Eight estuarine sediment samples were collected April 30, 2002 from the Norfolk CSO sediment remediation site. Samples were collected from both the top 2 cm and top 10 cm of sediment at each station using a stainless steel, modified, 0.1 m^2 Van Veen grab sampler deployed from the *Chinook*. Both samples at each station were composited from three separate deployments of the grab sampler. Water depth at the four sampling stations ranged between 0 and 2 meters (~ 0 to 6 feet) on an ebbing to slack tide of between +2 and -1 feet (referenced to mean lower low water). Between 11 and 13 cm of sediment was recovered in each grab, allowing collection of a sample aliquot from the top 10 cm without sampling sediment that had touched the sides or bottom of the grab sampler.

Samples were comprised of sediment aliquots collected from three individual grabs at each station with an equal amount of material collected from each grab. The sediment aliquot for the 0 to 2 cm depth stratum was collected from one side of each grab using a 200 cm^3 stainless-steel "cookie cutter." The sediment aliquot for the 0 to 10 cm depth stratum was collected from the other side of each grab using a stainless-steel spoon. Each of the aliquots were placed into separate stainless-steel bowls, covered with foil, and placed into an ice-filled cooler between grab deployments. After collecting aliquots from three grabs, the sediment sample was thoroughly homogenized and sample aliquots split out into pre-labeled containers. Sample containers were supplied by the King County Environmental Laboratory and were pre-cleaned according to analytical specifications.

Two sets of sample compositing equipment were dedicated to each station, precluding the need for decontamination of the field gear. The Van Veen grab sampler was decontaminated between stations by scrubbing with a brush and river water followed by a thorough *in situ* rinsing.

Samples were stored in ice-filled coolers from the time of collection until delivery to the King County Environmental Laboratory. Samples were delivered under chain-of-custody and were maintained as such throughout the analytical process. Samples were stored frozen (-18°C) by the laboratory until analysis with the exception of samples for particle size distribution (PSD) analysis. PSD samples were stored refrigerated at approximately 4°C. All analyses were conducted by the King County Environmental Laboratory with the exception of PSD, which was analyzed at AmTest, Inc., a subcontracted laboratory accredited by Ecology.

3 SAMPLE ANALYSIS

Eight estuarine sediment samples collected April 30, 2002 were submitted for analysis of conventional, metal, and organic parameters. This section describes the type of analyses performed, as well as analytical methodologies used and the associated quality assurance/quality control (QA/QC) procedures followed. Analyses were selected to allow comparison of sediment data to the SMS sediment chemical criteria found in Tables 1 and 3 of Chapter 173-204 WAC (Ecology, 1995).

3.1 Conventionals

Conventional analyses included percent solids, total organic carbon (TOC), and PSD. Percent solids and TOC analyses were performed to provide data necessary to normalize sediment data to dry weight and organic carbon, respectively. TOC analysis also allows evaluation of possible organic enrichment at the site over time. Percent solids analysis was performed following SM 2540-G, gravimetric determination, and TOC analysis was performed following EPA Method 9060, high-temperature combustion with infrared spectroscopy. PSD analysis allows evaluation of the gross physical characteristics of the backfill material and any changes imparted by sedimentation or scouring. PSD analysis was performed according to method ASTM D422, a combination of sieve and hydrometer analyses.

3.2 Metals

Metal analyses included 12 priority pollutant metals, as well as the crustal metals aluminum, iron, and manganese. Metal analysis allows assessment of potential recontamination at the site over time. SMS provides regulatory chemical criteria for eight of the metals included in this suite of analytes; arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc. With the exception of mercury, all metal analyses were performed following EPA Method 3050A/6010B; strong-acid digestion with inductively coupled plasma optical emission spectroscopy (ICP-OES). Mercury was analyzed according to EPA Method 245.5, cold vapor atomic absorption spectroscopy (CVAA).

3.3 Organics

Organic analyses included base/neutral/acid extractable semivolatile compounds (BNAs) and PCBs. Organic analysis also allows assessment of potential recontamination to the site over time, especially by PCBs and phthalates. BNA analysis was performed following EPA Method 3550B/8270C (SW-846), gas chromatography with mass spectroscopy (GC/MS). PCBs were analyzed by EPA Method 8081A/8082 (SW-846), gas chromatography with electron capture detection (GC/ECD). This suite of analytes includes all organic compounds regulated under SMS.

3.4 Quality Assurance/Quality Control (QA/QC)

All analyses were performed following guidance recommended under Puget Sound Protocols (PSEP 1986, 1996b, and 1996c) including associated QA/QC practices. Laboratory QA/QC practices produced data of sufficient quality to pass QA1 review. Analytical data were reviewed following QA1 guidelines (Ecology, 1989) and flagged with data qualifiers where appropriate. A comprehensive report of analytical data, including qualifier flags is included as Appendix A. The QA1 review narrative is included as Appendix B.

4 ANALYTICAL RESULTS

This section discusses analytical results for the eight estuarine sediment samples collected April 30, 2002 from the Norfolk CSO sediment remediation site and compares the data to sediment criteria specified under SMS (Ecology, 1995). Tables 2 through 10 referenced in this section summarize pertinent analytical data; comprehensive analytical data are located in Appendix A. Metals and organics data have been compared to both Sediment Quality Standards (SQS) and Cleanup Screening Levels (CSL) in Tables 4 through 7. Analytical data for this sampling event have also been compared to previous sampling events in Tables 8 and 9.

4.1 Particle Size Distribution (PSD)

PSD results are summarized in Table 2. The ratio of percent fine material (silt and clay) to percent coarse material (sand and gravel) ranges from 55.2:44.8% at the Boeing SD channel station (0 to 2 cm) to 2.2:97.7% at the combined channel delta station (0 to 10 cm).

Percent fine material increased dramatically in April 2002 samples collected from the Norfolk CSO channel and Boeing SD channel stations (Tables 8 and 9). These results indicate that these two stations are located in depositional areas. Percent fine material has shown a gradual decrease at the combined channel delta station, indicating an area of scouring. Percent fine material has remained relatively stable at the upriver reference station.

4.2 Conventionals

Conventional analytical results are summarized in Table 3 and include percent solids, used to calculate dry-weight sediment concentrations of metal and organic data and TOC, used to normalize certain organic parameters to organic carbon content.

Percent solids results range from 47.4 to 84.2%. TOC concentrations in the 0 to 2 cm depth stratum samples range from 1,260 to 26,200 milligrams per kilogram (mg/Kg) dry weight, or ~ 0.1 to 2.6%. TOC concentrations in the 0 to 10 cm depth stratum samples range from 980 to 25,500 mg/Kg, or ~ 0.1 to 2.6%.

TOC concentrations in the April 2002 samples collected from both depth strata at the Norfolk CSO channel and Boeing SD channel stations increased dramatically over past monitoring events (Tables 8 and 9). TOC concentrations have shown a gradual decrease over time at the combined channel delta station and a gradual increase over time at the upriver reference station.

4.3 Metals

Metals analytical results are summarized in Table 4. Metals data have been normalized to dry weight for comparison to SMS chemical criteria.

Cadmium and silver were not detected in any samples collected during this monitoring event. Reported concentrations of all other metals (Appendix A) are at levels indicative of natural, area-wide crustal concentrations (Dexter et al, 1981). Metal concentrations or method

detection limit (MDL) values for those metals regulated under SMS are all below SQS chemical criteria.

A comparison of metals data between the April 2002 and past monitoring events (Tables 8 and 9) indicates that concentrations of certain metals have been gradually increasing at the following sampling stations:

- Norfolk CSO channel – arsenic, chromium, copper, lead, mercury, and zinc in the 0 to 2 cm depth stratum and arsenic, chromium, copper, lead, and zinc in the 0 to 10 cm depth stratum;
- Boeing SD channel – mercury and zinc in the 0 to 2 cm depth stratum and arsenic, chromium, copper, and zinc in the 0 to 10 cm depth stratum; and
- upriver reference – copper in the 0 to 2 cm depth stratum and copper and zinc in the 0 to 10 cm depth stratum.

4.4 Organics

Organic analytical results are summarized in Tables 5, 6, and 7. Data for ionic organic compounds have been normalized to dry weight for comparison to SMS chemical criteria and are presented in Table 5.

Data for non-ionic organic compounds have been normalized to organic carbon and are presented in Table 6 for comparison to SQS and CSL chemical criteria. Normalization to organic carbon can produce biased results, however, when the organic carbon content of the sample is very low (Ecology, 1992). When the organic carbon content of a sample is near 0.1 or 0.2% (1,000 to 2,000 mg/Kg dry weight), even background concentrations of certain organic compounds can exceed the SQS or CSL. The combined channel delta station (NFK502) had an organic carbon content of ~0.1% in both depth strata.

For sediment with a TOC content less than 0.5% (5,000 mg/Kg dry weight), Ecology recommends comparing dry weight-normalized, non-ionic organic data to Puget Sound lowest apparent effects thresholds (LAET) and second lowest apparent lowest effects thresholds (2LAET) (EPA, 1988), which are considered to be equivalent to the SQS and CSL values, respectively. This comparison allows a more appropriate evaluation of sediment quality relative to organic compounds (Ecology, 1992). Table 7 presents dry weight-normalized data for the combined channel delta station (NFK502), as well as the other three stations, for comparative purposes.

The quality assurance narrative (Appendix B) states that analytical results for three organic compounds were impacted by laboratory contamination, indicated by positive results in the laboratory method blank. Table 10 compares sample analytical results for benzyl butyl phthalate, bis(2-ethylhexyl) phthalate, and 1,4-dichlorobenzene, on which various data analyses have been performed to evaluate the impact of laboratory contamination.
Table 10 compares analytical results for these three compounds using the following five methods of adjusting sample results to account for method blank contamination:

- sample concentration reported with no adjustment for the method blank concentration;
- sample concentration reported with the method blank concentration subtracted from the dry weight sample result after normalization to dry weight;
- sample concentration reported with the method blank concentration subtracted from the wet weight sample result prior to normalization to dry weight (because the method blank is anhydrous sodium sulfate, it is considered to be 100% solids and the wet weight and dry weight values for any compound are the same);
- sample concentration reported with its associated dry weight MDL raised to five times the method blank concentration; and
- sample concentration reported with its associated dry weight MDL raised to ten times the method blank concentration.

4.4.1 Ionic Organic Compounds

Benzoic acid was detected in seven of eight samples at concentrations ranging from 84.3 to 210 micrograms per kilogram normalized to dry weight (µg/Kg DW). These concentrations are below the SQS/CSL criterion of 650 µg/Kg DW and are similar to concentrations detected during previous monitoring events (Tables 8 and 9). No other ionic organic chemicals were detected in any of the samples collected during this monitoring event.

4.4.2 Non-Ionic Organic Compounds Compared to SQS/CSL Criteria

Organic carbon values in samples collected during this monitoring event from the Norfolk CSO channel station, the Boeing SD channel station, and the upriver reference station range from ~1.1 to 2.6%. This section discusses organic analytical results primarily for these three stations (NFK501, NFK503, and NFK504) since the data should be normalized to organic carbon for comparison to sediment standards. Analytical results for the combined channel delta station (NFK502) will be discussed mainly in section 4.4.3 because the organic carbon values (0.10 and 0.13%) are so low that data should be compared to sediment standards on a dry weight basis.

4.4.2.1 Low-Molecular Weight Polynuclear Aromatic Hydrocarbons (LPAHs)

Anthracene and phenanthrene were detected in samples collected from both depth strata at the Norfolk CSO channel station, Boeing SD channel station, and upriver reference station but were not present in either depth stratum at the combined channel delta station. Organic carbon-normalized anthracene concentrations range from 0.55 to 3.70 milligrams per kilogram organic carbon (mg/Kg OC), all less than 2% of the SQS criterion of 220 mg/Kg OC. Organic carbon-normalized phenanthrene concentrations range from 3.67 to 7.96 mg/Kg OC, all less than 10% of the SQS criterion of 100 mg/Kg OC. No other LPAH compounds were detected in samples collected from these three stations.

Changes in the anthracene MDL make it difficult to determine if concentrations of this compound have been increasing over time (Tables 8 and 9). Phenanthrene concentrations appear to be increasing at all three stations. Total LPAH results for all three stations are less than 4% of the SQS chemical criterion of 370 mg/Kg OC.

4.4.2.2 High-Molecular Weight Polynuclear Aromatic Hydrocarbons (HPAHs)
Dibenzo(a,h)anthracene was detected in three of six samples and the remaining eight HPAH compounds were detected in all six samples collected from the two depth strata at the Norfolk CSO channel, Boeing SD channel, and upriver reference stations. Reported HPAH concentrations do not exceed the SQS criterion for any individual compound and total HPAH results are all less than 13% of the SQS criterion of 960 mg/Kg OC. Concentrations of most HPAH compounds appear to be increasing at all three stations (Tables 8 and 9). Only four HPAH compounds were detected at the combined channel delta station.

4.4.2.3 Chlorobenzenes
1,4-Dichlorobenzene was detected in all six samples collected from the Norfolk CSO channel, Boeing SD channel, and upriver reference stations at concentrations ranging from 0.0452 to 1.60 mg/Kg OC. This compound, however, was also detected in the QC method blank. Deuterated (d8) 1,4-dichlorobenzene is one of the internal standards used during BNA analysis and this compound can appear as a positive sample result in the method blank and associated samples. The dry weight-normalized concentration of 1,4-dichlorobenzene detected in the laboratory method blank is 0.56 µg/Kg DW, compared to dry weight-normalized sample concentrations of 1.12 to 34.1 µg/Kg DW (Table 7). Four of these six reported dry weight-normalized sample concentrations are less than five times the method blank concentration and a fifth is less than ten times the method blank concentration. Section 4.4.4.3 and Table 10 summarize the impacts of method blank contamination on reported sample concentrations of 1,4-dichlorobenzene.

It appears that only the reported concentration for the sample collected from the 0 to 10 cm depth stratum at the Norfolk CSO channel station was not compromised by method blank contamination. The reported 1,4-dichlorobenzene concentration of 1.60 mg/Kg OC at this station may be viewed as a legitimate value. This concentration is 52% of the SQS chemical criterion of 3.1 mg/Kg OC.

1,4-Dichlorobenzene was also detected in both samples collected from the combined channel delta station. Other chlorobenzene compounds were not detected in any samples collected during this monitoring event. All chlorobenzene MDL values meet the SQS chemical criterion.

4.4.2.4 Phthalates
Three phthalates were detected in all six samples collected from the two depth strata at the Norfolk CSO channel, Boeing SD channel, and upriver reference stations; benzyl butyl phthalate, bis(2-ethylhexyl) phthalate, and di-N-butyl phthalate. Only bis(2-ethylhexyl) phthalate was detected in both samples collected at the combined channel delta station.

Benzyl butyl phthalate was detected at concentrations ranging from 2.23 to 3.75 mg/Kg OC, all less than the SQS chemical criterion of 4.9 mg/Kg OC. This compound, however, was also detected in the quality control method blank. Benzyl butyl phthalate concentrations in all six samples are less than five times the method blank concentration and, as such, should be considered compromised by laboratory contamination. Section 4.4.4.1 and Table 10 provide an evaluation of the impact to sample results from laboratory contamination.

Bis(2-ethylhexyl) phthalate was detected at concentrations ranging from 40.6 to 63.3 mg/Kg OC. Although this compound was also detected in the quality control method blank, these sample concentrations are all greater than ten times the method blank concentration and should be considered valid as reported. Section 4.4.4.1 and Table 10 provide an evaluation of the impact to sample results from laboratory contamination. The bis(2-ethylhexyl) phthalate concentration of 63.3 mg/Kg OC detected in the sample collected from the 0 to 2 cm depth stratum at the upriver reference station exceeds the SQS chemical criterion of 47 mg/Kg OC and is 81% of the CSL chemical criterion of 78 mg/Kg OC. The sample concentration detected in the 0 to 10 cm depth stratum at the upriver reference station was 47.0 mg/Kg OC, which equals the SQS. Bis(2-ethylhexyl) phthalate concentrations at the Norfolk CSO channel and Boeing SD channel stations range from 86 to 92% of the SQS.

Di-N-butyl phthalate was detected at concentrations ranging from 0.39 to 1.2 mg/Kg OC, all less than 0.6% of the SQS chemical criterion of 220 mg/Kg OC. This compound was not detected in the quality control method blank, therefore, di-N-butyl phthalate sample results should be considered valid as reported.

Due to problems with laboratory contamination, it is difficult to compare phthalate concentrations over time and these compounds have not been included in Tables 8 and 9.

4.4.2.5 Miscellaneous Compounds

Dibenzofuran, hexachlorobutadiene, and N-nitrosodiphenylamine were not detected in any samples collected during this monitoring event. MDL values for these compounds meet all associated SQS chemical criteria when sample data are normalized to organic carbon.

4.4.2.6 PCBs

PCBs (as total Aroclors®) were detected in all six samples collected during this monitoring event from the two depth strata at the Norfolk CSO channel, Boeing SD channel and upriver reference stations. PCBs were not detected in either sample collected from the combined channel delta station. Total PCB concentrations range from 3.61 to 30.4 mg/Kg OC. The highest reported PCB concentration was detected in the sample collected from the 0 to 10 cm depth stratum in the Boeing SD channel. The PCB concentration of 30.4 mg/Kg OC at this station exceeds the SQS chemical criterion of 12 mg/Kg OC and is 47% of the CSL chemical criterion of 65 mg/Kg OC. PCB concentrations in the other five samples are all below the SQS.

Total PCB concentrations, normalized to organic carbon, have remained relatively stable at the Norfolk CSO channel and upriver reference stations. All sample concentrations detected at these two stations have been less than the SQS. Total PCB concentrations detected at the Boeing SD channel station during the April 2002 monitoring event decreased dramatically from those detected during the April 2001 monitoring event. The concentration in the 0 to 2 cm depth stratum sample decreased from 677 to 9.95 mg/Kg OC, which is less than the SQS. The concentration in the 0 to 10 cm depth stratum decreased from 369 to 30.4 mg/Kg OC, which is greater than the SQS but less than the CSL.

4.4.3 Non-Ionic Organic Compounds Compared to LAET/2LAET Criteria

Due to the low organic carbon content (~0.1%) of samples collected from the combined channel delta station (NFK502), it is inappropriate to organic carbon-normalize non-ionic organic data. Table 7 compares dry weight-normalized data for this station to LAET and 2LAET chemical criteria as well as presenting dry weight-normalized data for the other three stations for comparative purposes.

Benzo(a)anthracene, benzo(a)pyrene, total benzofluoranthenes, pyrene, bis(2-ethylhexyl) phthalate, and 1,4-dichlorobenzene were the only non-ionic organic compounds detected in either sample collected at the combined channel delta station.

As stated in section 4.4.2, sample results for both bis(2-ethylhexyl) phthalate and 1,4-dichlorobenzene were impacted by laboratory contamination, indicated by positive results in the method blank. Table 10 shows that, when the MDL for both of these compounds is raised to five times the method blank concentration, results for both samples collected from the combined channel delta station are less than the MDL.

Total HPAH results for both samples collected from the combined channel delta station are less than 0.3% of the LAET.

4.4.4 Evaluation of Laboratory Contamination on Sample Results

The quality assurance review for this monitoring event (Appendix B) indicates that laboratory contamination impacted sample results for three compounds; benzyl butyl phthalate, bis(2-ethylhexyl) phthalate, and 1,4-dichlorobenzene. Positive results for these three compounds were reported in the quality control method blank. Table 10 summarizes the evaluation of impacts these method blank results have had on sample results.

4.4.4.1 Benzyl Butyl Phthalate

Benzyl butyl phthalate was detected in the quality control method blank at a concentration of 18 µg/Kg. This concentration may be considered either a wet weight or dry weight concentration because the method blank matrix (anhydrous sodium sulfate) is considered to be 100% solids.

Benzyl butyl phthalate was detected in six of eight samples collected during this monitoring event at concentrations ranging from 34.6 to 86.3 µg/Kg DW. The MDL values for the two samples in which this compound was not detected were 7.1 and 7.4 µg/Kg DW.

Subtracting the method blank concentration from the dry weight-normalized sample concentrations provides lower sample results that are all still greater than the sample-specific MDL values. Subtracting the method blank concentration from wet weight sample concentrations prior to dry weight-normalization again lowers the sample results and changes the organic carbon-normalized results for both samples collected from the upriver reference station (NFK504) to less than the MDL (0.86 and 0.74 µg/Kg OC).

Environmental Protection Agency (EPA) data validation guidance (EPA 1991) recommends raising the MDL by either five or ten times the method blank concentration for common laboratory contaminants such as phthalates. Raising the MDL for butyl benzyl phthalate to

90 µg/Kg DW (five times the method blank concentration) changes all sample results to less than the MDL. The resulting organic carbon-normalized MDL values for the samples collected from the upriver reference station (8.3 and 6.9 mg/Kg OC), however, exceed the SQS chemical criterion of 4.9 mg/Kg OC.

Based on this evaluation, it appears that all benzyl butyl phthalate sample results should be considered compromised by laboratory contamination.

4.4.4.2 Bis(2-ethylhexyl) Phthalate

Bis(2-ethylhexyl) phthalate was detected in the quality control method blank at a concentration of 53.4 µg/Kg. This compound was detected in all eight samples collected during this monitoring round at concentrations ranging from 31 to 1,130 µg/Kg DW.

Subtracting the method blank concentration from either dry weight-normalized or wet weight bis(2-ethylhexyl) phthalate sample results changes does not significantly lower reported concentrations for seven of eight samples. Bis(2-ethylhexyl) phthalate results for the sample collected from the 0 to 2 cm depth stratum at the combined channel delta station changes to less than the MDL (8.0 µg/Kg DW).

Raising the MDL to 270 µg/Kg DW (five times the method blank concentration) changes results for both samples collected from the combined channel delta station to less than the MDL. The resulting MDL value of 270 µg/Kg DW meets the LAET chemical criterion of 1,300 µg/Kg DW (the combined channel delta station has an organic carbon content of ~0.1%). Bis(2-ethylhexyl) phthalate results from the remaining three stations are all greater than ten times the method blank concentration and may be considered valid as reported.

Based on this evaluation, it appears that only bis(2-ethylhexyl) sample results from the combined channel delta station (NFK502) should be considered compromised by laboratory contamination.

4.4.4.3 1,4-Dichlorobenzene

1,4-Dichlorobenzene was detected in the quality control method blank at a concentration of 0.56 µg/Kg. This compound was detected in all eight samples collected during this monitoring round at concentrations ranging from 0.918 to 34.1 µg/Kg DW.

Subtracting the method blank concentration from the dry weight-normalized sample concentrations provides lower sample results that are all still greater than the sample-specific MDL values. Subtracting the method blank concentration from wet weight sample concentrations prior to dry weight-normalization again lowers the sample results and changes the organic carbon-normalized result for the sample collected from the 0 to 2 cm depth stratum at the Boeing SD channel station (NFK503) to less than the MDL (0.010 µg/Kg OC).

Raising the MDL to 2.8 µg/Kg DW (five times the method blank concentration) changes results for all samples collected from the combined channel delta, Boeing SD channel, and upriver reference stations to less than the MDL. The resulting MDL values of 2.8 µg/Kg DW and 0.011 to 0.026 mg/Kg OC meet both the LAET and SQS chemical criteria of 110 µg/Kg DW and 3.1 mg/Kg OC, respectively.

Raising the MDL to 5.6 µg/Kg DW (ten times the method blank concentration) changes the result for the sample collected from the 0 to 2 cm depth stratum at the Norfolk CSO channel station (NFK501) to less than the MDL. The resulting organic carbon-normalized MDL of 0.24 mg/Kg OC for this sample meets the SQS chemical criterion.

Based on this evaluation, it appears that seven of eight reported 1,4-dichlorobenzene sample concentrations should be considered compromised by laboratory contamination. Only the sample result from the 0 to 10 cm depth stratum at the Norfolk CSO channel station (NFK501) should be considered valid as reported.

5 FUTURE MONITORING

Sampling and analysis completed in April 2002 was performed to assess surface sediment conditions of the backfill material three years after its placement at the Norfolk remediation site. Future monitoring events will occur on an annual basis, with the next monitoring event scheduled for April 2003. Station locations will remain the same unless the CSO and SD discharge channels change significantly over the course of the monitoring period.

All subsequent monitoring events will include collection of two discrete samples from each of the four established locations. One sample will be collected from the top 2 cm of sediment and analyzed to evaluate the chemical characteristics of recently deposited material. Another sample will be collected from the top 10 cm to evaluate the chemical characteristics of the sediment over the entire biologically active zone. The remainder of the five-year monitoring schedule is shown below.

- April 2003 - Year four monitoring event.
- April 2004 - Year five (final) monitoring event.

If the concentration of bis(2-ethylhexyl) phthalate increases above the CSL, bioassay testing will be added to the monitoring program to further evaluate possible sediment toxicity to benthic organisms.

6 SUMMARY AND CONCLUSIONS

Eight estuarine sediment samples were collected in April 2002 from the Norfolk CSO sediment remediation site, three years after completion of remedial activities. Samples were collected from the surface of backfill material placed at the site and analytical results were compared to baseline chemical conditions of the backfill material to evaluate possible recontamination. Samples were collected from two depth strata at each of four stations: one sample collected from the 0 to 2 cm depth stratum to evaluate chemical concentrations in recently deposited sediment; and one sample collected from the 0 to 10 cm depth stratum to evaluate sediment chemical concentrations over the entire biologically active zone. Analytes included sediment conventionals along with metal and organic parameters required under SMS criteria. To allow comparison of analytical results from the five monitoring events completed to date, dry weight-normalized data from 0 to 10 cm depth stratum samples from the April 1999, October 1999, April 2000, April 2001, and April 2002 monitoring events are presented in Table 8. These analytical results show that, after three years, conditions of the backfill material **within the 0 to 10 cm depth stratum** can be characterized by:

- a significant increase in organic carbon content at the Norfolk CSO channel (NFK501) and the Boeing SD channel (NFK503) stations within the last monitoring year;
- a fluctuating organic carbon content at the combined channel delta station (NFK502) with all reported organic carbon concentrations less than 0.5%;
- a gradually increasing organic carbon content at the upriver reference station (NFK504);
- very little change in grain size distribution at the combined channel delta station (NFK502) but an increase in fine materials at the other three stations;
- very little change in metals concentrations at the combined channel delta station (NFK502);
- a gradual increase in concentrations of: arsenic, chromium, copper, lead, mercury, and zinc at the Norfolk CSO channel station (NFK501); arsenic, chromium, copper, mercury, and zinc at the Boeing SD channel station (NFK503); and copper and zinc at the upriver reference station (NFK504), however, concentrations of these metals are still well-below all SMS chemical criteria;
- gradually increasing concentrations of most HPAH compounds and the LPAH compound phenanthrene at the Norfolk CSO channel station (NFK501), the Boeing SD channel station (NFK503), and the upriver reference station (NFK504), however, concentrations of these PAH compounds are still well-below all SMS chemical criteria;
- the presence of 1,4-dichlorobenzene at the Norfolk CSO channel station (NFK501) at a concentration that is 52% of the SQS;
- the presence of bis(2-ethylhexyl) phthalate at the upriver reference station (NFK504) at a concentration that equals the SQS and at the Norfolk CSO channel (NFK501) and Boeing SD channel (NFK503) stations at concentrations that are 87 and 86% of the SQS, respectively;
- a decrease in the total PCB concentration at the Boeing SD channel station (NFK503) to a level that still exceeds the SQS but is 47% of the CSL;
- relatively stable total PCB concentrations at the Norfolk CSO channel (NFK501) and upriver reference (NFK504) stations that are 68 and 33% of the SQS, respectively; and

- a decrease in total PCB concentration at the combined channel delta station (NFK502) to an undetectable level.

A comparison of dry weight-normalized analytical results from the 0 to 2 cm depth stratum between the October 1999, April 2000, April 2001, and April 2002 monitoring events is presented in Table 9. These analytical results show that, after three years, conditions of the backfill material **within the 0 to 2 cm depth stratum** can be characterized by:

- a significant increase in organic carbon content at the Norfolk CSO channel (NFK501) and the Boeing SD channel (NFK503) stations within the last monitoring year;
- a steadily decreasing organic carbon content at the combined channel delta station (NFK502);
- a gradually increasing organic carbon content at the upriver reference station (NFK504);
- very little change in metals concentrations at the combined channel delta station (NFK502);
- gradually increasing concentrations of arsenic, copper, lead, mercury, and zinc at the Norfolk CSO channel station (NFK501), an increase of mercury and zinc concentrations at the Boeing SD channel station (NFK503), and a gradually increasing concentration of copper at the upriver reference station (NFK504), however, concentrations of all metals are still well below SMS chemical criteria;
- gradually increasing concentrations of most HPAH compounds and the LPAH compound phenanthrene at the Norfolk CSO channel station (NFK501), the Boeing SD channel station (NFK503), and the upriver reference station (NFK504), however, concentrations of these PAH compounds are still well-below all SMS chemical criteria;
- the presence of bis(2-ethylhexyl) phthalate at the upriver reference station (NFK504) at a concentration that exceeds the SQS and is 81% of the CSL;
- the presence of bis(2-ethylhexyl) phthalate at the Norfolk CSO channel (NFK501) and Boeing SD channel (NFK503) stations at concentrations that are 89 and 92% of the SQS, respectively;
- total PCB concentrations that are less than the SQS at the Norfolk CSO channel (NFK501), Boeing SD channel (NFK503), and upriver reference stations (NFK504); and
- total PCB concentrations that are undetectable at the combined channel delta station (NFK502).

Metals concentrations throughout the backfill material at the Norfolk sediment remediation site continue to be detected at concentrations indicative of regional background levels (Dexter et al, 1981), however, concentrations of some metals are increasing at the Norfolk CSO channel station (arsenic, copper, lead, mercury, and zinc), the Boeing SD channel station (arsenic, chromium, copper, mercury, and zinc), and the upriver reference station (copper and zinc). All metal concentrations are below associated SQS chemical criteria in samples collected during the April 2002 monitoring event.

While low levels of bis(2-ethylhexyl) phthalate have been detected in samples collected during previous monitoring events, the concentrations have not been statistically different from concentrations detected in associated QC method blanks until the April 2001 monitoring event (King County 2001). Bis(2-ethylhexyl) phthalate concentrations detected during the April 2002 monitoring event at the Norfolk CSO channel station, the Boeing SD

channel station, and the upriver reference station were not compromised by laboratory contamination. This compound was detected at the upriver reference station at concentrations equal to or greater than the SQS. The bis(2-ethylhexyl) phthalate concentration detected in the 0 to 2 cm depth stratum at the upriver reference station is 81% of the CSL. Bis(2-ethylhexyl) phthalate concentrations detected during the April 2002 monitoring event at the Norfolk CSO channel and Boeing SD channel stations range between 86 and 92% of the SQS.

Concentrations of most HPAH compounds and the LPAH compound phenanthrene show increases for the April 2002 monitoring event at the Norfolk CSO channel, Boeing SD channel, and upriver reference stations. These increases in PAH concentrations appear to be correlated with increasing organic carbon concentrations at all three stations. Although PAH concentrations are increasing, they are all still well-below SMS chemical criteria. The highest total HPAH concentration of 121 mg/Kg OC at the upriver reference station is less than 13% of the SQS.

Samples collected from three of four stations during the April 2002 monitoring event have detectable total PCB concentrations. PCBs were not detected in either sample collected from the combined channel delta station. The total PCB concentration in the sample collected from the 0 to 10 cm depth stratum at the Boeing SD outfall station exceeds the SQS but not the CSL. The total PCB concentration in the sample collected from the 0 to 2 cm depth stratum at this station does not exceed the SQS. These total PCB concentrations at the Boeing SD channel show a significant decrease from concentrations detected during the April 2001 monitoring event. Total PCB concentrations in both depth strata at the Norfolk CSO channel and upriver reference stations are all below the SQS. It is unclear why PCBs were not detected in either sample collected from the combined channel delta station. It is apparent that the concentrations of PAH compounds are also much lower than those detected at this station in 2001 as well as compared to PAH concentrations detected at the other three stations in 2002. The combined channel delta station also had greatly reduced levels of organic carbon in the 2002 monitoring event.

Boeing conducted a source control investigation of their storm drain and found PCB concentrations that exceed the CSL (on a dry weight-basis) in storm drain sediment (Boeing, 2001), however, Boeing still discounts the storm drain as a possible PCB source to the storm drain channel and backfill material. Boeing acknowledges the presence of high PCB concentrations in sediment in front of the storm drain outfall but states that this is not from their storm drain. Boeing also conducted a cleanout of the storm drain in August 2002. Analytical results showed very elevated total PCB concentrations in in-line sediments removed from the storm drain line (James Bet, personal communication 2002).

Ecology conducted an investigation of sediments inshore of the Norfolk CSO sediment remediation site to evaluate PCB concentrations in nearshore sediments in the vicinity of both the Norfolk CSO and Boeing SD outfalls. Ecology collected samples from 18 nearshore stations and two reference stations in June 2002. Preliminary data show elevated concentrations of total PCBs in the vicinity of the Boeing SD outfall, which corresponds to previous sampling results (Rick Huey, personal communication 2002). Ecology will publish findings from this study in early 2003.

Summary of Issues by Monitoring Station

Norfolk CSO Channel (Station NFK501) – Bis(2-ethylhexyl) phthalate concentrations detected in the 0 to 2 and 0 to 10 cm depth strata are 89 and 87% of the SQS, respectively. These concentrations are similar to those detected in the April 2001 monitoring event. The reported concentration of bis(2-ethylhexyl) phthalate does not appear to be compromised by laboratory contamination. Phthalates are present in both CSO and separated storm water but the greatest potential for recontamination at the Norfolk cleanup site was predicted to be from separated storm water discharged from the Norfolk CSO outfall (EBDRP, 1996). The 1,4-dichlorobenzene concentration detected in the 0 to 10 cm depth stratum is 52% of the SQS. The reported concentration of this compound also does not appear to have been compromised by laboratory contamination. 1,4-Dichlorobenzene is a common constituent of CSO effluent, indicating the presence of sanitary sewage. Total PCB concentrations detected in the 0 to 2 and 0 to 10 cm depth strata are 61 and 68% of the SQS, respectively.

Combined Channel Delta (Station NFK502) – No chemicals of concern at this time. Butyl benzyl phthalate and PCBs, detected during the April 2001 monitoring event at concentrations exceeding the SQS, were not detected during the April 2002 monitoring event. Dry weight-normalized MDLs for these compounds were well-below their respective LAET chemical criteria.

Boeing Storm Drain Channel (Station NFK503) – The total PCB concentration in the 0 to 10 cm depth stratum exceeds the SQS and is 47% of the CSL. The total PCB concentration in the 0 to 2 cm depth stratum is 83% of the SQS chemical criterion. This is a significant decrease from total PCB concentrations detected during the April 2001 monitoring event.

Upriver Reference (Station NFK504) – Bis(2-ethylhexyl) phthalate was detected in the sample collected from the 0 to 2 cm depth stratum at a concentration that exceeds the SQS and is 81% of the CSL. The bis(2-ethylhexyl) phthalate concentration detected in the sample collected from the 0 to 10 cm depth stratum is equal to the SQS chemical criterion. If the concentration of bis(2-ethylhexyl) phthalate increases above the CSL, bioassay testing will be added to the monitoring program to further evaluate possible sediment toxicity to benthic organisms.

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FIGURES

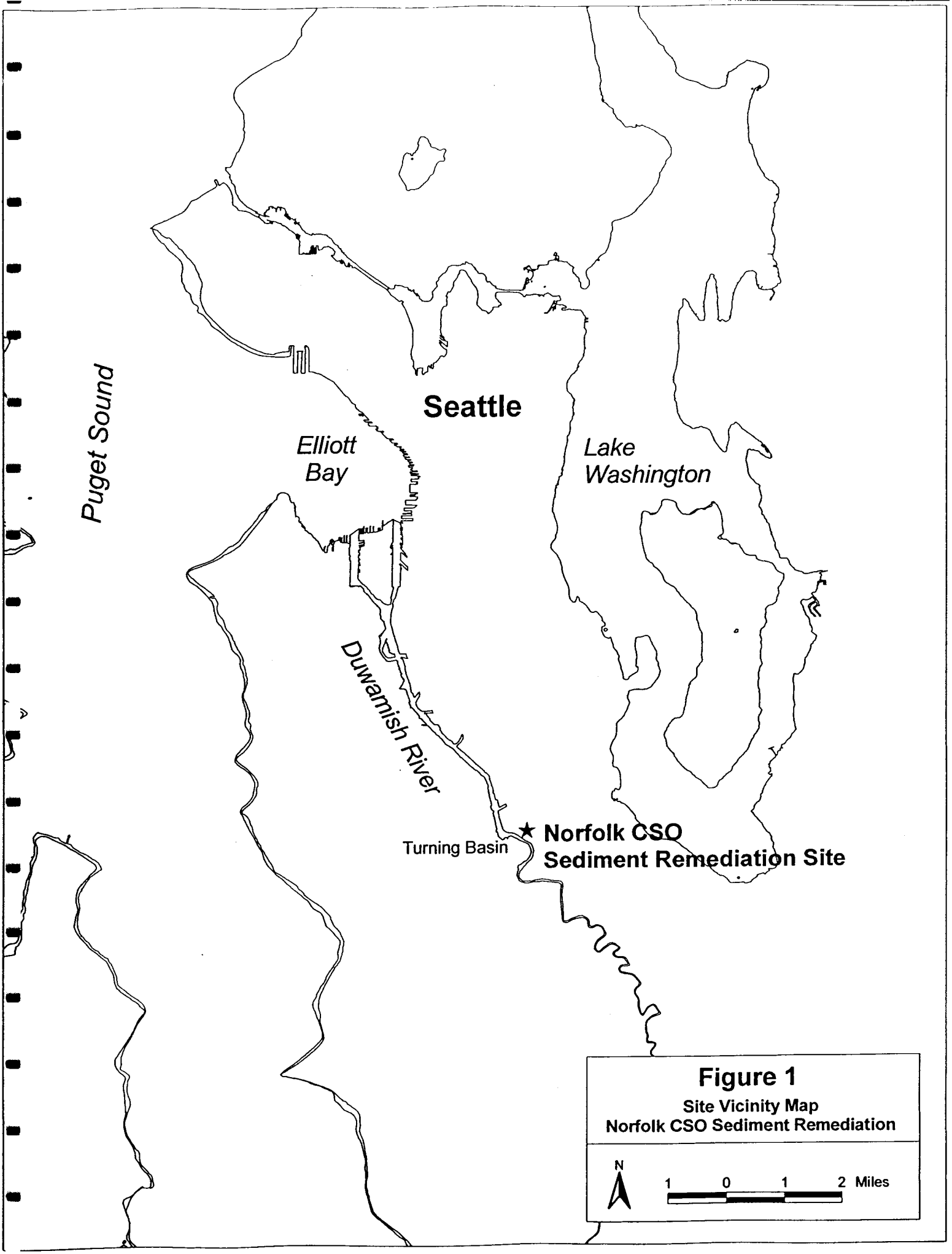

Figure 1
Site Vicinity Map
Norfolk CSO Sediment Remediation

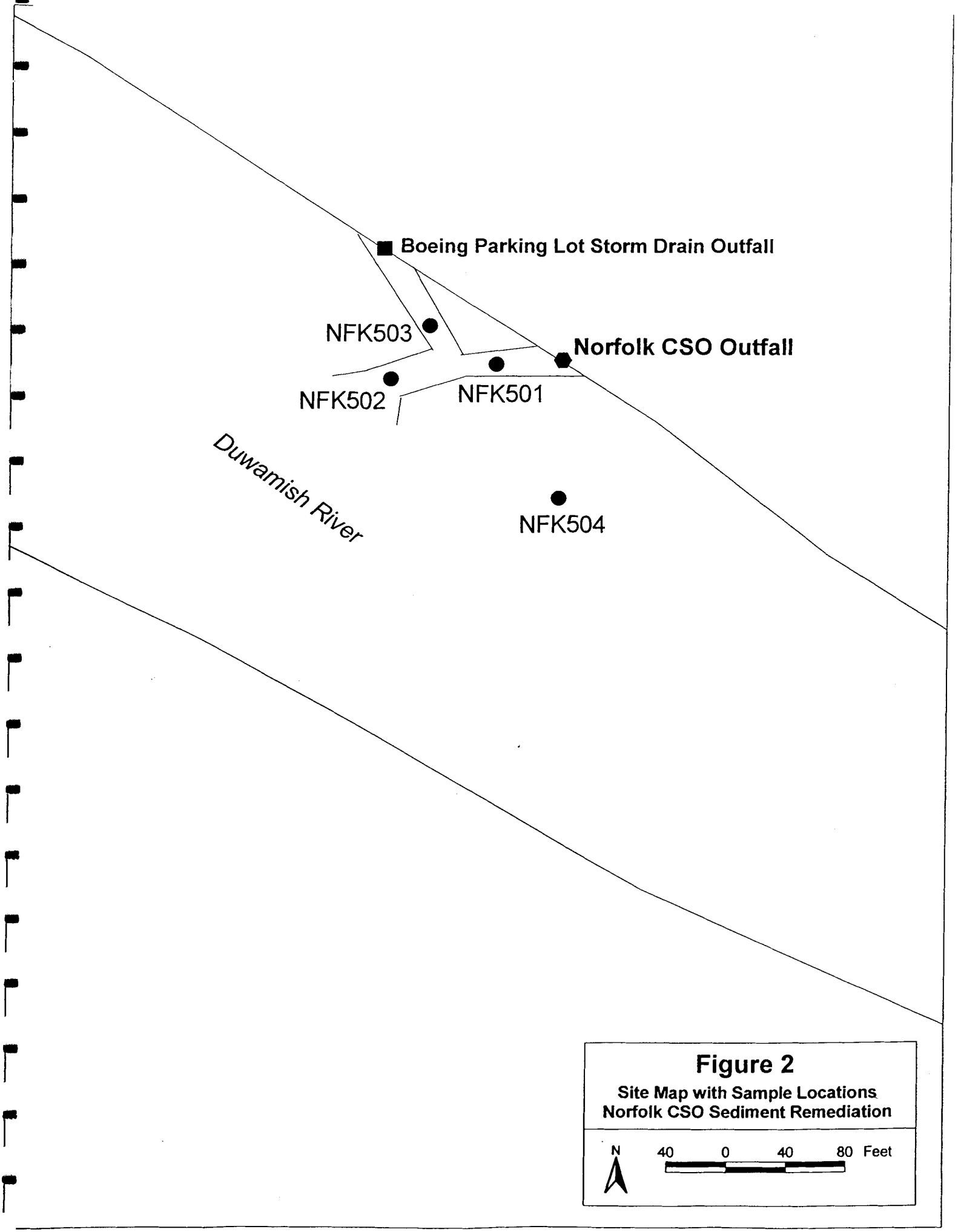

Figure 2

Site Map with Sample Locations
Norfolk CSO Sediment Remediation

TABLES

Table 1
Sample Location Coordinates
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program
Year Three - April 2002 Monitoring Data

Station Name	Northing (NAD83)		Easting (NAD83)	
NFK501 Prescribed Station	190170		1278584	
NFK501 Grab 1		190167		1278589
NFK501 Grab 2		190164		1278588
NFK501 Grab 3		190163		1278589
NFK502 Prescribed Station	190159		1278514	
NFK502 Grab 1		190153		1278510
NFK502 Grab 2		190158		1278511
NFK502 Grab 3		190157		1278519
NFK503 Prescribed Station	190195		1278544	
NFK503 Grab 1		190181		1278538
NFK503 Grab 2		190178		1278547
NFK503 Grab 3		190173		1278550
NFK504 Prescribed Station	190080		1278625	
NFK504 Grab 1		190072		1278624
NFK504 Grab 2		190075		1278622
NFK504 Grab 3		190075		1278620

Notes

NAD83 - North American Datum, 1983

Table 2
Particle Size Distribution
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program
Year Three - April 2002 Monitoring Data

		Percent Distribution			
Phi Size	**Class**	**NFK 501 0 - 2 cm**	**NFK501 0 - 10 cm**	**NFK502 0 - 2 cm**	**NFK502 0 - 10 cm**
>p-2.00	Gravel	<MDL (0.1)	<MDL (0.1)	<MDL (0.1)	<MDL (0.1)
p-2.00	Gravel	<MDL (0.1)	<MDL (0.1)	<MDL (0.1)	<MDL (0.1)
p-1.00	Gravel	0.2	0.9	0.8	0.9
	Total Gravel	**0.2**	**0.9**	**0.8**	**0.9**
p0.00	Sand	1.2	1.3	6.4	3.6
p+1.00	Sand	9.8	11.7	44.4	44.7
p+2.00	Sand	19.0	28.7	39.4	45.1
p+3.00	Sand	7.4	7.4	2.9	3.0
p+4.00	Sand	15.9	11.1	0.1	0.4
	Total Sand	**53.3**	**60.2**	**93.2**	**96.8**
p+5.00	Silt	18.5	12.5	5.5	1.6
p+6.00	Silt	9.9	9.7	<MDL (0.1)	<MDL (0.1)
p+7.00	Silt	8.4	8.3	<MDL (0.1)	<MDL (0.1)
p+8.00	Silt	2.7	2.0	<MDL (0.1)	<MDL (0.1)
	Total Silt	**39.5**	**32.5**	**5.5**	**1.6**
p+9.00	Clay	2.4	3.0	<MDL (0.1)	<MDL (0.1)
p+10.00	Clay	1.4	1.7	<MDL (0.1)	<MDL (0.1)
<p+10.00	Clay	3.3	1.9	0.6	0.6
	Total Clay	**7.1**	**6.6**	**0.6**	**0.6**

		Percent Distribution			
Phi Size	**Class**	**NFK503 0 - 2 cm**	**NFK503 0 - 10 cm**	**NFK504 0 - 2 cm**	**NFK504 0 - 10 cm**
>p-2.00	Gravel	<MDL (0.1)	<MDL (0.1)	0.4	0.3
p-2.00	Gravel	<MDL (0.1)	<MDL (0.1)	0.1	0.2
p-1.00	Gravel	0.2	0.2	0.9	0.6
	Total Gravel	**0.2**	**0.2**	**1.4**	**1.1**
p0.00	Sand	0.4	0.4	9.5	4.9
p+1.00	Sand	0.4	0.8	27.1	20.0
p+2.00	Sand	1.7	3.8	22.7	26.8
p+3.00	Sand	20.1	22.2	8.9	7.5
p+4.00	Sand	22.0	20.0	9.8	13.7
	Total Sand	**44.6**	**47.2**	**78.0**	**72.9**
p+5.00	Silt	25.2	22.2	7.8	9.0
p+6.00	Silt	9.7	10.7	3.3	4.5
p+7.00	Silt	9.5	8.3	3.9	4.4
p+8.00	Silt	2.3	4.6	2.6	4.6
	Total Silt	**46.7**	**45.8**	**17.6**	**22.5**
p+9.00	Clay	2.5	2.8	0.8	1.1
p+10.00	Clay	1.5	1.5	0.3	0.4
<p+10.00	Clay	4.5	2.5	2.0	2.2
	Total Clay	**8.5**	**6.8**	**3.1**	**3.7**

Notes

<MDL (#) - Analyte not detected above the *method detection limit*. Value is parentheses is the numeric MDL.

Table 3
Sediment Conventionals
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program
Year Three - April 2002 Monitoring Data

Conventionals	NFK 501 0 - 2 cm	NFK501 0 - 10 cm	NFK502 0 - 2 cm	NKF502 0 - 10 cm
Solids (%)	47.4	53.4	84.2	81.3
TOC (mg/Kg DW)	23,000	21,300	1,260	980

Conventionals	NFK503 0 - 2 cm	NFK503 0 - 10 cm	NFK504 0 - 2 cm	NFK504 0 - 10 cm
Solids (%)	47.4	49.8	64.5	62.0
TOC (mg/Kg DW)	26,200	25,500	10,800	13,100

Notes

TOC - Total organic carbon.

mg/Kg DW - Milligrams per kilogram dry weight, based on percent solids analysis.

Table 4
Sediment Metal Concentrations
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program
Year Three - April 2002 Monitoring Data

	Concentration (mg/Kg DW)					
Metal	**NFK501 0 - 2 cm**	**NFK501 0 - 10 cm**	**NFK502 0 - 2 cm**	**NFK502 0 - 10 cm**	**SQS**	**CSL**
Arsenic	7.4	5.4	4.6	3.3	57	93
Cadmium	<MDL (0.32)	<MDL (0.26)	<MDL (0.18)	<MDL (0.17)	5.1	6.7
Chromium	19.8	19.5	11.2	10.1	260	270
Copper	27.4	27.0	11.7	11.2	390	390
Lead	12	16.1	4.4	4.3	450	530
Mercury	0.076	0.064	<MDL (0.023)	<MDL (0.023)	0.41	0.59
Silver	<MDL (0.40)	<MDL (0.36)	<MDL (0.24)	<MDL (0.23)	6.1	6.1
Zinc	76.4	79.0	43.7	43.9	410	960

	Concentration (mg/Kg DW)					
Metal	**NFK503 0 - 2 cm**	**NFK503 0 - 10 cm**	**NFK504 0 - 2 cm**	**NFK504 0 - 10 cm**	**SQS**	**CSL**
Arsenic	5.7	11	5.9	4.8	57	93
Cadmium	<MDL (0.30)	<MDL (0.28)	<MDL (0.23)	<MDL (0.24)	5.1	6.7
Chromium	15.8	21.7	16.7	17.6	260	270
Copper	16.9	31.9	23.3	22.4	390	390
Lead	8.0	12	9.5	11	450	530
Mercury	0.095	0.074	0.040	0.068	0.41	0.59
Silver	<MDL (0.40)	<MDL (0.38)	<MDL (0.31)	<MDL (0.32)	6.1	6.1
Zinc	71.9	79.9	56.1	61.9	410	960

Notes

mg/Kg DW - Milligrams per kilogram dry weight, based on percent solids analysis.

<MDL (#) - Analyte not detected above the *method detection limit*. Value is parentheses is the numeric MDL.

Table 5
Sediment Ionic Organic Concentrations
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program
Year Three - April 2002 Monitoring Data

	Concentration (µg/Kg DW)					
Ionic Organics	**NFK501 0 - 2 cm**	**NFK501 0 - 10 cm**	**NFK502 0 - 2 cm**	**NFK502 0 - 10 cm**	**SQS**	**CSL**
Benzoic Acid	210	174	<MDL (7.1)	84.3	650	650
Benzyl Alcohol	<MDL (13)	<MDL (11)	<MDL (7.1)	<MDL (7.4)	57	73
2,4-Dimethylphenol	<MDL (15)	<MDL (13)	<MDL (8.3)	<MDL (8.6)	29	29
2-Methylphenol	<MDL (40)	<MDL (36)	<MDL (23)	<MDL (23)	63	63
4-Methylphenol	<MDL (34)	<MDL (30)	<MDL (19)	<MDL (20)	670	670
Pentachlorophenol	<MDL (11)	<MDL (9.4)	<MDL (5.9)	<MDL (6.2)	360	690
Phenol	<MDL (19)	<MDL (17)	<MDL (11)	<MDL (11)	420	1,200

	Concentration (µg/Kg DW)					
Ionic Organics	**NFK503 0 - 2 cm**	**NFK503 0 - 10 cm**	**NFK504 0 - 2 cm**	**NFK504 0 - 10 cm**	**SQS**	**CSL**
Benzoic Acid	192	178	129	130	650	650
Benzyl Alcohol	<MDL (13)	<MDL (12)	<MDL (9.3)	<MDL (9.7)	57	73
2,4-Dimethylphenol	<MDL (15)	<MDL (14)	<MDL (11)	<MDL (11)	29	29
2-Methylphenol	<MDL (40)	<MDL (38)	<MDL (29)	<MDL (31)	63	63
4-Methylphenol	<MDL (34)	<MDL (32)	<MDL (25)	<MDL (26)	670	670
Pentachlorophenol	<MDL (11)	<MDL (10)	<MDL (7.8)	<MDL (8.1)	360	690
Phenol	<MDL (19)	<MDL (18)	<MDL (14)	<MDL (15)	420	1,200

Notes

µg/Kg DW - Micrograms per kilogram dry weight, based on percent solids analysis.

<MDL (#) - Analyte not detected above the *method detection limit*. Value in parentheses is the numeric MDL.

Table 6

Sediment Non-Ionic Organic Concentrations (Organic Carbon Normalized)
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program
Year Three - April 2002 Monitoring Data

	Concentration (mg/Kg OC)					
Non-Ionic Organics	**NFK501 0 - 2 cm** TOC 2.30%	**NFK501 0 - 10 cm** TOC 2.13%	**NFK502 0 - 2 cm** TOC 0.13%	**NFK502 0 - 10 cm** TOC 0.10%	**SQS**	**CSL**
LPAHs						
Acenaphthene	<MDL (0.64)	<MDL (0.61)	<MDL (6.6)	<MDL (8.9)	16	57
Acenaphthylene	<MDL (1.4)	<MDL (1.3)	<MDL (14)	<MDL (19)	66	66
Anthracene	0.954	0.947	<MDL (3.8)	<MDL (5.0)	220	1,200
Fluorene	<MDL (1.2)	<MDL (1.1)	<MDL (12)	<MDL (16)	23	79
2-Methylnaphthalene	<MDL (1.3)	<MDL (1.2)	<MDL (13)	<MDL (18)	38	64
Naphthalene	<MDL (1.3)	<MDL (1.2)	<MDL (13)	<MDL (18)	99	170
Phenanthrene	7.94	6.32	<MDL (3.8)	<MDL (5.0)	100	480
Total LPAH	8.90	7.27	<MDL (3.8 - 14)	<MDL (5.0 - 19)	370	780
HPAHs						
Benzo(a)anthracene	5.24	4.45	5.76	8.90	110	270
Benzo(a)pyrene	6.66	5.48	[illegible]	[illegible]	99	210
Benzofluoranthenes (Total)	15.6	12.4	[illegible]	[illegible]	230	450
Benzo(g,h,i)perylene	4.20	3.50	[illegible]	[illegible]	31	78
Chrysene	9.27	7.35	[illegible]	[illegible]	110	460
Dibenzo(a,h)anthracene	1.1	0.96	[illegible]	[illegible]	12	33
Fluoranthene	15.8	13.4	[illegible]	[illegible]	160	1,200
Indeno(1,2,3-c,d)pyrene	4.54	3.53	[illegible]	[illegible]	34	88
Pyrene	15.0	12.2	[illegible]	[illegible]	1,000	1,400
Total HPAH	77	63	[illegible]	[illegible]	960	5,300
Chlorobenzenes						
1,2-Dichlorobenzene	<MDL (0.024)	<MDL (0.023)	[illegible]	[illegible]	2.3	2.3
1,4-Dichlorobenzene	0.137, B10	1.60, B	[illegible]	[illegible]	3.1	9
Hexachlorobenzene	<MDL (0.061)	<MDL (0.058)	[illegible]	[illegible]	0.38	2.3
1,2,4-Trichlorobenzene	<MDL (0.024)	<MDL (0.023)	[illegible]	[illegible]	0.81	1.8
Phthalates						
Bis(2-ethylhexyl) Phthalate	41.7, B	40.8, B	24.6, B5	255, B5	47	78
Butyl Benzyl Phthalate	3.75, B5	2.23, B5	<MDL (2.7)	<MDL (7.5)	4.9	64
Di-N-butyl Phthalate	0.927	0.68	<MDL (4.7)	<MDL (6.3)	220	1,700
Di-N-octyl Phthalate	<MDL (0.73)	<MDL (0.70)	<MDL (7.5)	<MDL (10)	58	4,500
Diethyl Phthalate	<MDL (0.55)	<MDL (0.53)	<MDL (5.7)	<MDL (7.5)	61	110
Dimethyl Phthalate	<MDL (1.0)	<MDL (0.96)	<MDL (10)	<MDL (14)	53	53
Miscellaneous Compounds						
Dibenzofuran	<MDL (1.3)	<MDL (1.2)	<MDL (13)	<MDL (18)	15	58
Hexachlorobutadiene	<MDL (0.069)	<MDL (0.066	<MDL (0.71)	<MDL (0.94)	3.9	6.2
N-Nitrosodiphenylamine	<MDL (1.8)	<MDL (1.8)	<MDL (19)	<MDL (25)	11	11
PCBs						
Total PCBs	7.29	8.15	<MDL (1.9 - 3.8)	<MDL (2.5 - 5.0)	12	65

Notes

mg/Kg OC - Milligrams per kilogram organic carbon, based on total organic carbon analysis.

<MDL (#) - Analyte not detected above the *method dection limit*. Value in parentheses is the numeric MDL.

TOC % - Percent total organic carbon on a dry weight basis, based on total solids analysis.

Station NFK502 - TOC < 0.2%, see Table 7 for dry weight-normalized data compared to LAET/2LAET.

B5, B10, B - Compound detected in laboratory method blank. Sample concentration is less than 5 times the method blank concentration (B5), greater than 5 times but less than 10 times the method blank concentration (B10), or greater than 10 times the method blank concentration (B).

Table 6 (cont.)
Sediment Non-Ionic Organic Concentrations (Organic Carbon Normalized)
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program
Year Three - April 2002 Monitoring Data

	Concentration (mg/Kg OC)					
Non-Ionic Organics	**NFK503 0 - 2 cm TOC 2.62%**	**NFK503 0 - 10 cm TOC 2.55%**	**NFK504 0 - 2 cm TOC 1.08%**	**NFK504 0 - 10 cm TOC 1.31%**	**SQS**	**CSL**
LPAHs						
Acenaphthene	<MDL (0.56)	<MDL (0.55)	<MDL (1.0)	<MDL (0.86)	16	57
Acenaphthylene	<MDL (1.2)	<MDL (1.2)	<MDL (2.2)	<MDL (1.8)	66	66
Anthracene	0.669	0.55	3.70	0.91	220	1,200
Fluorene	<MDL (1.0)	<MDL (1.0)	<MDL (1.9)	<MDL (1.6)	23	79
2-Methylnaphthalene	<MDL (1.1)	<MDL (1.1)	<MDL (2.0)	<MDL (1.7)	38	64
Naphthalene	<MDL (1.1)	<MDL (1.1)	<MDL (2.0)	<MDL (1.7)	99	170
Phenanthrene	4.36	3.67	7.96	4.48	100	480
Total LPAH	5.03	4.2	11.7	5.4	370	780
HPAHs						
Benzo(a)anthracene	3.53	3.02	15.8	4.55	110	270
Benzo(a)pyrene	4.20	3.50	5.73	5.54	99	210
Benzofluoranthenes (Total)	8.16	7.52	13.4	12.0	230	450
Benzo(g,h,i)perylene	2.01	1.50	1.34	1.2	31	78
Chrysene	5.60	4.54	35.7	6.87	110	460
Dibenzo(a,h)anthracene	0.67	<MDL (0.55)	<MDL (1.0)	<MDL (0.86)	12	33
Fluoranthene	9.52	7.87	24.0	12.3	160	1,200
Indeno(1,2,3-c,d)pyrene	2.25	2.05	2.45	2.82	34	88
Pyrene	8.95	7.50	22.3	10.5	1,000	1,400
Total HPAH	45	37.5	121	56	960	5,300
Chlorobenzenes						
1,2-Dichlorobenzene	<MDL (0.021)	<MDL (0.020)	<MDL (0.037)	<MDL (0.032)	2.3	2.3
1,4-Dichlorobenzene	0.0452, B5	0.0567, B5	0.104, B5	0.0921, B5	3.1	9
Hexachlorobenzene	<MDL (0.053)	<MDL (0.052)	<MDL (0.095)	<MDL (0.081)	0.38	2.3
1,2,4-Trichlorobenzene	<MDL (0.021)	<MDL (0.020)	<MDL (0.037)	<MDL (0.032)	0.81	1.8
Phthalates						
Bis(2-ethylhexyl) Phthalate	43.1, B	40.6, B	**63.3, B**	47.0, B	47	78
Butyl Benzyl Phthalate	2.59, B5	2.65, B5	3.21, B5	2.84, B5	4.9	64
Di-N-butyl Phthalate	0.60	0.39	0.88	1.2	220	1,700
Di-N-octyl Phthalate	<MDL (0.65)	<MDL (0.63)	<MDL (1.2)	<MDL (0.99)	58	4,500
Diethyl Phthalate	<MDL (0.48)	<MDL (0.47)	<MDL (0.86)	<MDL (0.74)	61	110
Dimethyl Phthalate	<MDL (0.89)	<MDL (0.87)	<MDL (1.6)	<MDL (1.4)	53	53
Miscellaneous Compounds						
Dibenzofuran	<MDL (1.1)	<MDL (1.1)	<MDL (2.0)	<MDL (1.7)	15	58
Hexachlorobutadiene	<MDL (0.060)	<MDL (0.059)	<MDL (0.11)	<MDL (0.092)	3.9	6.2
N-Nitrosodiphenylamine	<MDL (1.6)	<MDL (1.6)	<MDL (2.9)	<MDL (2.5)	11	11
PCBs						
Total PCBs	9.95	**30.4**	3.61	3.94	12	65

Notes

mg/Kg OC - Milligrams per kilogram organic carbon, based on total organic carbon analysis.

<MDL (#) - Analyte not detected above the *method dection limit*. Value in parentheses is the numeric MDL.

TOC % - Percent total organic carbon on a dry weight basis, based on total solids analysis.

Shaded Cell with Double Border - Detected concentration exceeds the SQS and/or CSL.

B5, B10, B - Compound detected in laboratory method blank. Sample concentration is less than 5 times the method blank concentration (B5), greater than 5 times but less than 10 times the method blank concentration (B10), or greater than 10 times the method blank concentration (B).

Table 7

Sediment Non-Ionic Organic Concentrations (Dry Weight Normalized)
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program
Year Three - April 2002 Monitoring Data

	Concentration (µg/Kg DW)					
Non-Ionic Organics	**NFK501 0 - 2 cm**	**NFK501 0 - 10 cm**	**NFK502 0 - 2 cm**	**NFK502 0 - 10 cm**	**LAET* SQS**	**2LAET* CSL**
LPAHs						
Acenaphthene	<MDL (15)	<MDL (13)	<MDL (8.3)	<MDL (8.6)	500	730
Acenaphthylene	<MDL (32)	<MDL (28)	<MDL (18)	<MDL (18)	1,300	1,300
Anthracene	21.9	20.2	<MDL (4.8)	<MDL (4.9)	960	4,400
Fluorene	<MDL (27)	<MDL (24)	<MDL (15)	<MDL (16)	540	1,000
2-Methylnaphthalene	<MDL (30)	<MDL (26)	<MDL (17)	<MDL (17)	670	1,400
Naphthalene	<MDL (30)	<MDL (26)	<MDL (17)	<MDL (17)	2,100	2,400
Phenanthrene	183	135	<MDL (4.8)	<MDL (4.9)	1,500	5,400
Total LPAH	205	155	<MDL (4.8 - 18)	<MDL (4.9 - 18)	5,200	13,000
HPAHs						
Benzo(a)anthracene	120	94.9	7.26	8.76	1,300	1,600
Benzo(a)pyrene	150	117	12.1	13.7	1,600	3,000
Benzofluoranthenes (Total)	359	265	9.31	11.8	3,200	3,600
Benzo(g,h,i)perylene	96.6	74.7	<MDL (9.5)	<MDL (9.8)	670	720
Chrysene	213	157	<MDL (4.8)	<MDL (4.9)	1,400	2,800
Dibenzo(a,h)anthracene	25	21	<MDL (8.3)	<MDL (8.6)	230	540
Fluoranthene	363	287	<MDL (9.5)	<MDL (9.8)	1,700	2,500
Indeno(1,2,3-c,d)pyrene	104	75.3	<MDL (11)	<MDL (11)	600	690
Pyrene	346	260	<MDL (4.8)	6.6	2,600	3,300
Total HPAH	1,780	1,350	28.7	41	12,000	17,000
Chlorobenzenes						
1,2-Dichlorobenzene	<MDL (0.55)	<MDL (0.49)	<MDL (0.31)	<MDL (0.32)	35	50
1,4-Dichlorobenzene	3.14, B10	34.1, B	0.918, B5	1.32, B5	110	120
Hexachlorobenzene	<MDL (1.4)	<MDL (1.2)	<MDL (0.78)	<MDL (0.81)	22	70
1,2,4-Trichlorobenzene	<MDL (0.55)	<MDL (0.49)	<MDL (0.31)	<MDL (0.32)	31	51
Phthalates						
Bis(2-ethylhexyl) Phthalate	958, B	871, B	31, B5	248, B5	1,300	1,900
Butyl Benzyl Phthalate	86.3, B5	47.6, B5	<MDL (7.1)	<MDL (7.4)	63	470
Di-N-butyl Phthalate	21.3	15	<MDL (5.9)	<MDL (6.2)	1,400	5,100
Di-N-octyl Phthalate	<MDL (17)	<MDL (15)	<MDL (9.5)	<MDL (9.8)	420	2,100
Diethyl Phthalate	<MDL (13)	<MDL (11)	<MDL (7.1)	<MDL (7.4)	48	73
Dimethyl Phthalate	<MDL (23)	<MDL (21)	<MDL (13)	<MDL (14)	71	160
Miscellaneous Compounds						
Dibenzofuran	<MDL (30)	<MDL (26)	<MDL (17)	<MDL (17)	540	700
Hexachlorobutadiene	<MDL (1.6)	<MDL (1.4)	<MDL (0.89)	<MDL (0.92)	11	120
N-Nitrosodiphenylamine	<MDL (42)	<MDL (37)	<MDL (24)	<MDL (25)	28	40
PCBs						
Total PCBs	168	174	<MDL (2.4 - 4.8)	<MDL (2.5 - 4.9)	130	1,000

Notes

µg/Kg DW - Micrograms per kilogram dry weight, based on percent solids analysis.

<MDL (#) - Analyte not detected above the *method dection limit*. Value in parentheses is the numeric MDL.

Shaded Cell - MDL exceeds the LAET and/or 2LAET.

Shaded Cell with Double Border - Detected concentration exceeds the LAET and/or 2LAET.

* - LAET/2LAET equivalent to SQS/CSL criteria, respectively.

B5, B10, B - Compound detected in laboratory method blank. Sample concentration is less than 5 times the method blank concentration (B5), greater than 5 times but less than 10 times the method blank concentration (B10), or greater than 10 times the method blank concentration (B).

Table 7 (cont.)
Sediment Non-Ionic Organic Concentrations (Dry Weight Normalized)
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program
Year Three - April 2002 Monitoring Data

	Concentration (µg/Kg DW)					
Non-Ionic Organics	**NFK503 0 - 2 cm**	**NFK503 0 - 10 cm**	**NFK504 0 - 2 cm**	**NFK504 0 - 10 cm**	**LAET**	**2LAET**
LPAHs						
Acenaphthene	<MDL (15)	<MDL (14)	<MDL (11)	<MDL (11)	500	730
Acenaphthylene	<MDL (32)	<MDL (30)	<MDL (23)	<MDL (24)	1,300	1,300
Anthracene	17.5	14	39.8	12	960	4,400
Fluorene	<MDL (27)	<MDL (26)	<MDL (20)	<MDL (21)	540	1,000
2-Methylnaphthalene	<MDL (30)	<MDL (28)	<MDL (22)	<MDL (23)	670	1,400
Naphthalene	<MDL (30)	<MDL (28)	<MDL (22)	<MDL (23)	2,100	2,400
Phenanthrene	114	93.6	85.7	58.5	1,500	5,400
Total LPAH	132	108	126	71	5,200	13,000
HPAHs						
Benzo(a)anthracene	92.4	77.1	171	59.5	1,300	1,600
Benzo(a)pyrene	110	89.2	61.7	72.4	1,600	3,000
Benzofluoranthenes (Total)	213	191	145	157	3,200	3,600
Benzo(g,h,i)perylene	52.5	38.2	14	15	670	720
Chrysene	146	116	384	89.8	1,400	2,800
Dibenzo(a,h)anthracene	18	<MDL (14)	<MDL (11)	<MDL (11)	230	540
Fluoranthene	249	201	259	160	1,700	2,500
Indeno(1,2,3-c,d)pyrene	58.9	52.2	26	36.9	600	690
Pyrene	234	191	240	137	2,600	3,300
Total HPAH	1,170	956	1,300	728	12,000	17,000
Chlorobenzenes						
1,2-Dichlorobenzene	<MDL (0.55)	<MDL (0.52)	<MDL (0.40)	<MDL (0.42)	35	50
1,4-Dichlorobenzene	1.18, B5	1.45, B5	1.12, B5	1.20, B5	110	120
Hexachlorobenzene	<MDL (1.4)	<MDL (1.3)	<MDL (1.0)	<MDL (1.1)	22	70
1,2,4-Trichlorobenzene	<MDL (0.55)	<MDL (0.52)	<MDL (0.40)	<MDL (0.42)	31	51
Phthalates						
Bis(2-ethylhexyl) Phthalate	1,130, B	1,030, B	682, B	615, B	1,300	1,900
Butyl Benzyl Phthalate	67.7, B5	67.7, B5	34.6, B5	37.1, B5	63	470
Di-N-butyl Phthalate	16	10	9.5	15	1,400	5,100
Di-N-octyl Phthalate	<MDL (17)	<MDL (16)	<MDL (12)	<MDL (13)	420	2,100
Diethyl Phthalate	<MDL (13)	<MDL (12)	<MDL (9.3)	<MDL (9.7)	48	73
Dimethyl Phthalate	<MDL (23)	<MDL (22)	<MDL (17)	<MDL (18)	71	160
Miscellaneous Compounds						
Dibenzofuran	<MDL (30)	<MDL (28)	<MDL (22)	<MDL (23)	540	700
Hexachlorobutadiene	<MDL (1.6)	<MDL (1.5)	<MDL (1.2)	<MDL (1.2)	11	120
N-Nitrosodiphenylamine	<MDL (42)	<MDL (40)	<MDL (31)	<MDL (32)	28	40
PCBs						
Total PCBs	260	777	38.9	51.5	130	1,000

Notes

µg/Kg DW - Micrograms per kilogram dry weight, based on percent solids analysis.

<MDL (#) - Analyte not detected above the *method dection limit*. Value in parentheses is the numeric MDL.

Shaded Cell - MDL exceeds the LAET and/or 2LAET.

Shaded Cell with Double Border - Detected concentration exceeds the LAET and/or 2LAET.

* - LAET/2LAET equivalent to SQS/CSL criteria, respectively.

B5, B10, B - Compound detected in laboratory method blank. Sample concentration is less than 5 times the method blank concentration (B5), greater than 5 times but less than 10 times the method blank concentration (B10), or greater than 10 times the method blank concentration (B).

Table 8

Dry Weight Comparison of Detected Sediment Constituents (0 - 10 cm Depth Stratum)
April 1999, October 1999, April 2000, April 2001, and April 2002 Monitoring Events
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program (Year Three)

	Norfolk CSO Channel (NFK501)					Combined Channel Delta (NFK502)					Boeing Storm Drain Channel (NFK503)				
Constituent	**Apr-99**	**Oct-99**	**Apr-00**	**Apr-01**	**Apr-02**	**Apr-99**	**Oct-99**	**Apr-00**	**Apr-01**	**Apr-02**	**Apr-99**	**Oct-99**	**Apr-00**	**Apr-01**	**Apr-02**
Total Organic Carbon (mg/Kg dry weight)	1,760	3,240	2,350	8,670	21,300	1,210	3,730	1,440	4,990	980	3,180	3,070	2,010	3,600	25,500
Grain Size (% wet weight)															
Gravel	0.8	0.1	0.3	1.5	0.9	0.4	0.5	1.1	0	0.9	0.4	1.1	0.8	1.0	0.2
Sand	98.6	95.6	94.3	78.8	60.2	95.5	89.9	92.6	90.7	96.8	94.3	92.5	96.1	97.0	47.2
Silt	1.0	3.4	4.9	16.6	32.5	4.7	9.3	5.8	6.8	1.6	5.4	6.2	3.5	1.5	45.8
Clay	0	0.7	0.1	3.7	6.4	0	0.9	0	2.4	0.6	0	0.7	0	0.6	6.8
Metals (mg/Kg dry weight)															
Arsenic	<MDL (3.3)	3.5	4.1	<MDL (3.8)	5.4	3.7	3.5	4.6	<MDL (3.6)	3.3	<MDL (3.2)	4.3	4.4	<MDL (3.2)	11
Cadmium	0.20	< MDL (0.20)	< MDL (0.21)	< MDL (0.23)	<MDL (0.26)	0.21	< MDL (0.19)	< MDL (0.20)	< MDL (0.23)	<MDL (0.17)	<MDL (0.19)	< MDL (0.21)	< MDL (0.21)	< MDL (0.20)	<MDL (0.28)
Chromium	12.9	17.1	14.1	17.4	19.5	13.0	13.9	12.5	13.3	10.1	14.7	14.1	12.2	12.0	21.7
Copper	11.4	13.4	12.0	18.5	27.0	12.2	13.8	11.2	13.1	11.2	10.5	14.5	11.2	12.9	31.9
Lead	4.2	5.2	5.7	7.36	12	5.0	5.7	5.4	7.83	4.3	4.4	5.5	6.5	18.0	12
Mercury	0.055	< MDL (0.027)	< MDL (0.026)	0.043	0.064	0.089	0.043	< MDL (0.027)	<MDL (0.030)	<MDL (0.023)	0.066	0.052	< MDL (0.028)	0.10	0.074
Zinc	46.0	51.3	43.7	59.0	79.0	43.2	52.5	46.8	46.5	43.9	42.1	53.7	44.5	46.4	79.9
Organics (µg/Kg dry weight)															
Anthracene	<MDL (21)	<MDL (21)	<MDL (22)	11	20.2	<MDL (21)	<MDL (22)	<MDL (22)	7.2	<MDL (4.9)	<MDL (21)	<MDL (22)	<MDL (22)	<MDL (5.4)	14
Benzo(a)anthracene	< MDL (21)	< MDL (21)	< MDL (22)	40.8	94.9	< MDL (21)	28	< MDL (22)	38.0	8.76	< MDL (21)	28	< MDL (22)	3.0	77.1
Benzo(a)pyrene	<MDL (35)	<MDL (36)	<MDL (37)	61.4	117	<MDL (35)	<MDL (38)	<MDL (37)	24.5	13.7	<MDL (35)	<MDL (37)	<MDL (37)	<MDL (4.0)	89.2
Benzofluoranthenes (total)	<MDL (56)	<MDL (58)	<MDL (59)	174	265	<MDL (56)	<MDL (60)	<MDL (58)	118	11.8	<MDL (56)	<MDL (59)	<MDL (59)	<MDL (4.0)	191
Benzo(g,h,i)perylene	< MDL (35)	< MDL (36)	< MDL (37)	18	74.7	75.7	< MDL (38)	< MDL (37)	<MDL (12)	<MDL (9.8)	70.5	< MDL (37)	< MDL (37)	<MDL (11)	38.2
Benzoic Acid	< MDL (140)	< MDL (150)	210	122	174	< MDL (140)	< MDL (150)	150	152	84.3	< MDL (140)	< MDL (150)	< MDL (150)	67.6	178
Chrysene	< MDL (21)	< MDL (21)	< MDL (22)	62.1	157	< MDL (21)	29	< MDL (22)	42.0	<MDL (4.9)	< MDL (21)	43	< MDL (22)	<MDL (5.4)	116
Dibenzo(a,h)anthracene	<MDL (56)	<MDL (58)	<MDL (59)	<MDL (11)	21	<MDL (56)	<MDL (60)	<MDL (58)	<MDL (11)	<MDL (8.6)	<MDL (56)	<MDL (59)	<MDL (59)	<MDL (9.4)	<MDL (14)
Fluoranthene	< MDL (21)	32	26	124	287	< MDL (21)	56.7	< MDL (22)	100	<MDL (9.8)	< MDL (21)	66.9	26	<MDL (11)	201
Indeno(1,2,3-c,d)pyrene	<MDL (35)	<MDL (36)	<MDL (37)	21	75.3	<MDL (35)	<MDL (38)	<MDL (37)	<MDL (14)	<MDL (11)	<MDL (35)	<MDL (37)	<MDL (37)	<MDL (12)	52.2
Phenanthrene	21	< MDL (21)	< MDL (22)	46.8	135	< MDL (21)	29	< MDL (22)	31.6	<MDL (4.9)	< MDL (21)	40.3	< MDL (22)	<MDL (5.4)	93.6
Pyrene	< MDL (21)	29	< MDL (22)	95.7	260	< MDL (21)	47.9	< MDL (22)	50.7	6.6	< MDL (21)	64.6	< MDL (22)	<MDL (5.4)	191
Total PCBs	< MDL (22)	20.9	< MDL (5.8)	35.5	174	< MDL (22)	71.6	10	94.1	<MDL (2.5 - 4.9)	< MDL (22)	182	179	1,330	777

Notes

mg/Kg dry weight - Milligrams per kilogram normalized to dry weight based on percent solids analysis.
µg/Kg dry weight - Micrograms per kilogram normalized to dry weight based on percent solids analysis.
< MDL (#) - Analyte not detected above the *method detection limit*. Value in parentheses is the numeric MDL.

Table 8 (cont.)
Dry Weight Comparison of Detected Sediment Constituents (0 - 10 cm Depth Stratum)
April 1999, October 1999, April 2000, April 2001, and April 2002 Monitoring Events
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program (Year Three)

	Upriver Reference (NFK504)				
Constituent	**Apr-99**	**Oct-99**	**Apr-00**	**Apr-01**	**Apr-02**
Total Organic Carbon (mg/Kg dry weight)	1,260	1,890	3,090	9,080	13,100
Grain Size (% wet weight)					
Gravel	0.4	0.9	0.6	0.5	1.1
Sand	96.7	96.4	90.0	65.4	72.9
Silt	2.9	1.8	9.1	27.7	22.5
Clay	0	0.7	0.1	6.6	3.7
Metals (mg/Kg dry weight)					
Arsenic	3.5	5.7	6.0	<MDL (0.42)	4.8
Cadmium	0.21	< MDL (0.19)	< MDL (0.20)	<MDL (0.25)	<MDL (0.24)
Chromium	12.2	16.4	14.0	17.8	17.6
Copper	11.2	13.7	15.1	18.8	22.4
Lead	4.6	5.5	6.7	13.8	11
Mercury	0.072	< MDL (0.026)	< MDL (0.027)	0.038	0.068
Zinc	44.2	52.9	46.8	60.6	61.9
Organics (µg/Kg dry weight)					
Anthracene	<MDL (21)	<MDL (22)	<MDL (21)	<MDL (6.7)	12
Benzo(a)anthracene	< MDL (21)	< MDL (22)	< MDL (21)	18.0	59.5
Benzo(a)pyrene	<MDL (35)	<MDL (37)	<MDL (36)	<MDL (5.0)	72.4
Benzofluoranthenes (total)	<MDL (56)	<MDL (58)	<MDL (57)	<MDL (25)	157
Benzo(g,h,i)perylene	< MDL (35)	< MDL (37)	< MDL (36)	<MDL (13)	15
Benzoic Acid	< MDL (140)	< MDL (150)	150	168	130
Chrysene	< MDL (21)	< MDL (22)	35	8.2	89.8
Dibenzo(a,h)anthracene	<MDL (55)	<MDL (58)	<MDL (57)	<MDL (12)	<MDL (11)
Fluoranthene	< MDL (21)	< MDL (22)	63.6	27.5	160
Indeno(1,2,3-c,d)pyrene	<MDL (35)	<MDL (37)	<MDL (36)	<MDL (15)	36.9
Phenanthrene	< MDL (21)	< MDL (22)	< MDL (21)	10	58.5
Pyrene	< MDL (21)	< MDL (22)	47.9	<MDL (6.7)	137
Total PCBs	< MDL (22)	< MDL (5.7)	13.2	31	51.5

Notes

mg/Kg dry weight - Milligrams per kilogram normalized to dry weight based on percent solids analysis.
µg/Kg dry weight - Micrograms per kilogram normalized to dry weight based on percent solids analysis.
< MDL (#) - Analyte not detected above the *method detection limit*. Value in parentheses is the numeric MDL.

Table 9

Dry Weight Comparison of Detected Sediment Constituents (0 - 2 cm Depth Stratum)
October 1999, April 2000, April 2001, and April 2002 Monitoring Events
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program (Year Three)

	Norfolk CSO Channel (NFK501)				Combined Channel Delta (NFK502)				Boeing Storm Drtain Channel (NFK503)				Upriver Reference (NFK504)			
Constituent	**Oct-99**	**Apr-00**	**Apr-01**	**Apr-02**	**Oct-99**	**Apr-00**	**Apr-01**	**Apr-02**	**Oct-99**	**Apr-00**	**Apr-01**	**Apr-02**	**Oct-99**	**Apr-00**	**Apr-01**	**Apr-02**
Total Organic Carbon (mg/Kg dry weight)	4,170	5,530	8,180	23,000	7,030	3,390	6,510	1,260	6,490	4,930	2,770	26,200	5,610	7,900	15,600	10,800
Grain Size (% wet weight)																
Gravel	0.5	0.1	0.2	0.2	0.6	0.8	0	0.8	1.3	0.5	1.0	0.2	1.7	1.0	0.5	1.4
Sand	91.0	83.6	81.5	53.3	83.6	86.9	89.1	93.2	90.8	93.7	95.9	44.6	82.3	74.1	80.7	78.0
Silt	6.8	14.8	14.5	39.5	13.2	12.7	7.7	5.5	6.8	5.9	2.6	46.7	13.6	23.8	14.4	17.6
Clay	1.6	0.9	3.8	7.1	3.4	0.1	3.1	0.6	1.5	0.1	0.6	8.5	3.0	0.9	4.6	3.1
Metals (mg/Kg dry weight)																
Arsenic	4.6	5.1	<MDL (3.6)	7.4	6.2	5.3	<MDL (3.6)	4.6	4.0	5.0	<MDL (3.3)	5.7	6.3	7.3	<MDL (4.7)	5.9
Chromium	15.6	17.1	16.1	19.8	14.7	15.2	16.7	11.2	15.4	13.0	13.9	15.8	18.2	22.1	21.1	16.7
Copper	15.5	14.1	17.2	27.4	18.6	13.3	15.5	11.7	17.1	13.4	11.4	16.9	17.1	18.4	24.9	23.3
Lead	6.2	6.4	11.6	12	9.0	7.0	9.39	4.4	6.3	6.5	7.36	8.0	8.2	8.7	18.0	9.5
Mercury	0.039	0.043	0.069	0.076	0.042	0.063	0.031	<MDL (0.023)	0.029	0.028	<MDL (0.025)	0.095	0.028	0.049	0.072	0.040
Zinc	52.4	48.4	56.6	76.4	62.2	49.4	51.6	43.7	52.6	46.0	43.4	71.9	56.6	56.1	68.3	56.1
Organics (µg/Kg dry weight)																
Anthracene	<MDL (22)	<MDL (21)	8.0	21.9	<MDL (25)	<MDL (22)	7.3	<MDL (4.8)	<MDL (22)	<MDL (22)	<MDL (5.4)	17.5	<MDL (23)	<MDL (24)	<MDL (7.6)	39.8
Benzo(a)anthracene	26	37.5	60.4	120	56.7	< MDL (22)	37.9	7.26	48.8	< MDL (22)	8.14	92.4	36	66.0	24.9	171
Benzo(a)pyrene	< MDL (36)	41	92.6	153	59	< MDL (37)	56.8	12.1	53	< MDL (37)	<MDL (4.0)	110	< MDL (39)	59	<MDL (5.7)	61.7
Benzofluoranthenes (Total)	< MDL (58)	57	198	359	< MDL (67)	< MDL (59)	128	9.31	76	< MDL (59)	16	213	64	110	33.6	145
Benzo(g,h,i)perylene	76.2	< MDL (35)	24.8	96.6	< MDL (42)	< MDL (37)	<MDL (12)	<MDL (9.5)	< MDL (38)	< MDL (37)	<MDL (11)	52.5	< MDL (39)	44	<MDL (15)	14
Benzoic Acid	170	258	299	210	250	227	162	<MDL (7.1)	< MDL (150)	226	80.9	192	190	380	268	129
Chrysene	32	58.2	81.9	213	84.7	29	49.0	<MDL (4.8)	72.4	34	7.9	146	53.1	94.7	17.2	384
Dibenzo(a,h)anthracene	<MDL (58)	<MDL (57)	<MDL (10)	25	<MDL (67)	<MDL (59)	<MDL (10)	<MDL (8.3)	<MDL (60)	<MDL (59)	<MDL (9.4)	18	<MDL (63)	<MDL (66)	<MDL (13)	<MDL (11)
Fluoranthene	60.2	101	162	363	132	54.0	110	<MDL (9.5)	119	52.2	24.5	249	76.1	178	50.3	259
Indeno(1,2,3-c,d)pyrene	< MDL (36)	< MDL (35)	33.6	104	46	< MDL (37)	22	<MDL (11)	< MDL (38)	< MDL (37)	<MDL (12)	58.9	< MDL (39)	52	<MDL (17)	26
Phenanthrene	28	44.7	65.3	183	62.4	25	39.0	<MDL (4.8)	80.1	25	8.4	114	38	76.5	15.6	85.7
Pyrene	59.1	79.0	125	346	126	37.8	79.1	<MDL (4.8)	125	38.4	5.9	234	75.9	159	<MDL (7.6)	240
Total PCBs	45.9	6.8	60.9	168	61.8	70.6	161	<MDL (2.4 - 4.8)	306	271	1,880	260	25	6.6	42.2	38.9

Notes

mg/Kg dry weight - Milligrams per kilogram normalized to dry weight based on percent solids analysis.
µg/Kg dry weight - Micrograms per kilogram normalized to dry weight based on percent solids analysis.
< MDL (#) - Analyte not detected above the *method detection limit*. Value in parentheses is the numeric MDL.

Table 10
Summary of Data Analysis for "B" Flagged Compounds
Benzyl Butyl Phthalate, Bis(2-ethylhexyl) Phthalate, and 1,4-Dichlorobenzene
Norfolk CSO Sediment Remediation Project
Five-Year Monitoring Program (Year Three)

Benzyl Butyl Phthalate (method blank concentration of 18 µg/Kg)

	Concentration µg/Kg DW							Concentration mg/Kg OC						
	A	B	C	D	E	LAET	2LAET	A	B	C	D	E	SQS	CSL
NFK501 (2 cm)	86.3	68.3	48.3	<MDL (90)	<MDL (180)	**	**	3.75	2.97	2.10	<MDL (3.9)	<MDL (7.8)	4.9	64
NFK501 (10 cm)	47.6	29.6	14.0	<MDL (90)	<MDL (180)	**	**	2.23	1.39	0.657	<MDL (4.2)	<MDL (8.4)	4.9	64
NFK502 (2 cm)	<MDL (7.1)	<MDL (7.1)	<MDL (7.1)	<MDL (90)	<MDL (180)	63	470	<MDL (5.7)	<MDL (5.7)	<MDL (5.7)	<MDL (71)	<MDL (140)	**	**
NFK502 (10 cm)	<MDL (7.4)	<MDL (7.4)	<MDL (7.4)	<MDL (90)	<MDL (180)	63	470	<MDL (7.5)	<MDL (7.5)	<MDL (7.5)	<MDL (92)	<MDL (180)	**	**
NFK503 (2 cm)	67.7	49.7	29.7	<MDL (90)	<MDL (180)	**	**	2.58	1.90	1.13	<MDL (3.4)	<MDL (6.8)	4.9	64
NFK503 (10 cm)	67.7	49.7	31.5	<MDL (90)	<MDL (180)	**	**	2.65	1.95	1.24	<MDL (3.5)	<MDL (7.0)	4.9	64
NFK504 (2 cm)	34.6	16.6	<MDL (9.3)	<MDL (90)	<MDL (180)	**	**	3.20	1.54	<MDL (0.86)	<MDL (8.3)	<MDL (17)	4.9	64
NFK504 (10 cm)	37.1	19.1	<MDL (9.7)	<MDL (90)	<MDL (180)	**	**	2.83	1.46	<MDL (0.74)	<MDL (6.9)	<MDL (14)	4.9	64

Bis(2-ethylhexyl) Phthalate (method blank concentration of 53.4 µg/Kg)

	Concentration µg/Kg DW							Concentration mg/Kg OC						
	A	B	C	D	E	LAET	2LAET	A	B	C	D	E	SQS	CSL
NFK501 (2 cm)	958	905	845	958	958	**	**	41.7	39.3	36.7	41.7	41.7	47	78
NFK501 (10 cm)	871	818	771	871	871	**	**	40.9	38.4	36.2	40.9	40.9	47	78
NFK502 (2 cm)	31	<MDL (8.0)	<MDL (8.0)	<MDL (270)	<MDL (530)	1,300	1,900	25	<MDL (6.3)	<MDL (6.3)	<MDL (210)	<MDL (420)	**	**
NFK502 (10 cm)	248	195	183	<MDL (270)	<MDL (530)	1,300	1,900	253	199	187	<MDL (280)	<MDL (560)	**	**
NFK503 (2 cm)	1,130	1,080	1,010	1,130	1,130	**	**	43.1	41.2	38.5	43.1	43.1	47	78
NFK503 (10 cm)	1,030	977	927	1,030	1,030	**	**	40.4	38.3	36.4	40.4	40.4	47	78
NFK504 (2 cm)	682	629	599	682	682	**	**	63.1	58.2	55.5	63.1	63.1	47	78
NFK504 (10 cm)	615	562	528	615	615	**	**	46.9	42.9	40.3	46.9	46.9	47	78

1,4-Dichlorobenzene (method blank concentration of 0.56 µg/Kg)

	Concentration µg/Kg DW							Concentration mg/Kg OC						
	A	B	C	D	E	LAET	2LAET	A	B	C	D	E	SQS	CSL
NFK501 (2 cm)	3.14	2.58	1.96	3.14	<MDL (5.6)	**	**	0.137	0.112	0.0852	0.137	<MDL (0.24)	3.1	9
NFK501 (10 cm)	34.1	33.5	33.0	34.1	34.1	**	**	1.60	1.57	1.55	1.60	1.60	3.1	9
NFK502 (2 cm)	0.918	0.358	0.25	<MDL (2.8)	<MDL (5.6)	110	120	0.729	0.284	0.20	<MDL (0.22)	<MDL (0.44)	**	**
NFK502 (10 cm)	1.32	0.760	0.627	<MDL (2.8)	<MDL (5.6)	110	120	1.35	0.776	0.640	<MDL (0.29)	<MDL (0.58)	**	**
NFK503 (2 cm)	1.18	0.620	<MDL (0.27)	<MDL (2.8)	<MDL (5.6)	**	**	0.0450	0.0237	<MDL (0.010)	<MDL (0.011)	<MDL (0.022)	3.1	9
NFK503 (10 cm)	1.45	0.890	0.32	<MDL (2.8)	<MDL (5.6)	**	**	0.0569	0.0349	0.013	<MDL (0.011)	<MDL (0.022)	3.1	9
NFK504 (2 cm)	1.12	0.560	0.25	<MDL (2.8)	<MDL (5.6)	**	**	.0.104	0.0519	0.023	<MDL (0.026)	<MDL (0.052)	3.1	9
NFK504 (10 cm)	1.20	0.640	0.30	<MDL (2.8)	<MDL (5.6)	**	**	0.0916	0.0489	0.023	<MDL (0.021)	<MDL(0.042)	3.1	9

Notes

A - Concentration as reported with no correction for method blank concentration.
B - Method blank concentration subtracted from dry weight sample concentration (after normalization to dry weight).
C - Method blank concentration subtracted from wet weight sample concentration (prior to normalization to dry weight).
D - Method detection limit raised to five times the method blank concentration.
E - Method detection limit raised to ten times the method blank concentration.
µg/Kg DW - Micrograms per kilogram, based on percent solids analysis.
mg/Kg OC - Milligrams per kilogram organic carbon, based on total organic carbon analysis.

** - Sediment quality chemical criterion not applicable.
2 cm - Sample collected from the 0 to 2 centimeter depth stratum.
10 cm - Sample collected from the 0 to 10 centimeter depth stratum.
<MDL (#) - Analyte not detected above the *method detection limit.* Value in parentheses is the numeric MDL.
Shaded Cell - Normalized MDL exceeds a sediment chemical criterion.
Shaded Cell with Border - Normalized concentration value exceeds a sediment chemical criterion.

APPENDIX A
COMPREHENSIVE ANALYTICAL RESULTS

King County Environmental Lab Analytical Report

Norfolk CSO Sediment Remediation
Five-Year Monitoring Program
Year Three Sampling Event
April 2002

	NFK501 (L23995-1)	NFK501 (L23995-2)	NFK502 (L23995-3)	NFK502 (L23995-4)
Locator:	NFK501	NFK501	NFK502	NFK502
Descrip:	Norfolk CSO Channel	Norfolk CSO Channel	Combined Channel Delta	Combined Channel Delta
Client Loc:	0 to 2 cm Depth Stratum	0 to 10 cm Depth Stratum	0 to 2 cm Depth Stratum	0 to 10 cm Depth Stratum
Sampled:	Apr 30, 2002	Apr 30, 2002	Apr 30, 2002	Apr 30, 2002
Lab ID:	L23995-1	L23995-2	L23995-3	L23995-4
Matrix:	SALTWTRSED	SALTWTRSED	SALTWTRSED	SALTWTRSED
% Solids:	47.4	53.4	84.2	81.3

Locator: NFK501 — Lab ID: L23995-1 (- Dry Weight Basis)

Parameters	Value	Qual	MDL	RDL	Units
COMBINED LABS					
M=CV ASTM D422					
Clay *	7.1	E	0.1	0.1	%
Silt *	39.5		0.1	0.1	%
Sand *	53.3		0.1	0.1	%
Gravel *	0.2	E	0.1	0.1	%
p-2.00(less than) *		<MDL	0.1	0.1	%
p-2.00 *		<MDL	0.1	0.1	%
p-1.00 *	0.2		0.1	0.1	%
p+0.00 *	1.2		0.1	0.1	%
p+1.00 *	9.8		0.1	0.1	%
p+10.0 *	1.4		0.1	0.1	%
p+10.0(more than) *	3.3		0.1	0.1	%
p+2.00 *	19		0.1	0.1	%
p+3.00 *	7.4		0.1	0.1	%
p+4.00 *	15.9		0.1	0.1	%
p+5.00 *	18.5		0.1	0.1	%
p+6.00 *	9.9		0.1	0.1	%
p+7.00 *	8.4		0.1	0.1	%
p+8.00 *	2.7		0.1	0.1	%
p+9.00 *	2.4		0.1	0.1	%
M=CV EPA9060-PSEP96 (03-04-002-001)					
Total Organic Carbon	23000		1900	3800	mg/Kg
M=CV SM2540-G (03-01-007-001)					
Total Solids *	47.4		0.005	0.01	%
M=ES NONE					
Sampcoordx1 *	1278589				ft
Sampcoordx2 *	1278588				ft
Sampcoordx3 *	1278589				ft
Sampcoordy1 *	190167				ft
Sampcoordy2 *	190164				ft
Sampcoordy3 *	190163				ft
Sample Depth *	1				m
Sample Start Time *	1127				hr
Sediment Sampling Depth *	13				cm
Sediment Sampling Range *	0-2 cm				none
Tidal Condition	E				none
Tide Height *	2				ft

Locator: NFK501 — Lab ID: L23995-2 (- Dry Weight Basis)

Parameters	Value	Qual	MDL	RDL	Units
COMBINED LABS					
M=CV ASTM D422					
Clay *	6.4	E	0.1	0.1	%
Silt *	32.5		0.1	0.1	%
Sand *	60.2		0.1	0.1	%
Gravel *	0.9	E	0.1	0.1	%
p-2.00(less than) *		<MDL	0.1	0.1	%
p-2.00 *		<MDL	0.1	0.1	%
p-1.00 *	0.9		0.1	0.1	%
p+0.00 *	1.3		0.1	0.1	%
p+1.00 *	11.7		0.1	0.1	%
p+10.0 *	1.7		0.1	0.1	%
p+10.0(more than) *	1.9		0.1	0.1	%
p+2.00 *	28.7		0.1	0.1	%
p+3.00 *	7.4		0.1	0.1	%
p+4.00 *	11.1		0.1	0.1	%
p+5.00 *	12.5		0.1	0.1	%
p+6.00 *	9.7		0.1	0.1	%
p+7.00 *	8.3		0.1	0.1	%
p+8.00 *	2		0.1	0.1	%
p+9.00 *	3		0.1	0.1	%
M=CV EPA9060-PSEP96 (03-04-002-001)					
Total Organic Carbon	21300		1900	3750	mg/Kg
M=CV SM2540-G (03-01-007-001)					
Total Solids *	53.4		0.005	0.01	%
M=ES NONE					
Sampcoordx1 *					
Sampcoordx2 *					
Sampcoordx3 *					
Sampcoordy1 *					
Sampcoordy2 *					
Sampcoordy3 *					
Sample Depth *	1				m
Sample Start Time *	1127				hr
Sediment Sampling Depth *	13				cm
Sediment Sampling Range *	0-10 cm				none
Tidal Condition	E				none
Tide Height *	2				ft

Locator: NFK502 — Lab ID: L23995-3 (- Dry Weight Basis)

Parameters	Value	Qual	MDL	RDL	Units
COMBINED LABS					
M=CV ASTM D422					
Clay *	0.6	E	0.1	0.1	%
Silt *	5.5		0.1	0.1	%
Sand *	93.2		0.1	0.1	%
Gravel *	0.8	E	0.1	0.1	%
p-2.00(less than) *		<MDL	0.1	0.1	%
p-2.00 *		<MDL	0.1	0.1	%
p-1.00 *	0.8		0.1	0.1	%
p+0.00 *	6.4		0.1	0.1	%
p+1.00 *	44.4		0.1	0.1	%
p+10.0 *		<MDL	0.1	0.1	%
p+10.0(more than) *	0.6		0.1	0.1	%
p+2.00 *	39.4		0.1	0.1	%
p+3.00 *	2.9		0.1	0.1	%
p+4.00 *	0.1	RDL	0.1	0.1	%
p+5.00 *	5.5		0.1	0.1	%
p+6.00 *		<MDL	0.1	0.1	%
p+7.00 *		<MDL	0.1	0.1	%
p+8.00 *		<MDL	0.1	0.1	%
p+9.00 *		<MDL	0.1	0.1	%
M=CV EPA9060-PSEP96 (03-04-002-001)					
Total Organic Carbon	1260		590	1190	mg/Kg
M=CV SM2540-G (03-01-007-001)					
Total Solids *	84.2		0.005	0.01	%
M=ES NONE					
Sampcoordx1 *	1278510				ft
Sampcoordx2 *	1278511				ft
Sampcoordx3 *	1278519				ft
Sampcoordy1 *	190153				ft
Sampcoordy2 *	190158				ft
Sampcoordy3 *	190157				ft
Sample Depth *	2				m
Sample Start Time *	1244				hr
Sediment Sampling Depth *	13				cm
Sediment Sampling Range *	0-2 cm				none
Tidal Condition	E				none
Tide Height *	0				ft

Locator: NFK502 — Lab ID: L23995-4 (- Dry Weight Basis)

Parameters	Value	Qual	MDL	RDL	Units
COMBINED LABS					
M=CV ASTM D422					
Clay *	0.6	E	0.1	0.1	%
Silt *	1.6		0.1	0.1	%
Sand *	96.8		0.1	0.1	%
Gravel *	0.9	E	0.1	0.1	%
p-2.00(less than) *		<MDL	0.1	0.1	%
p-2.00 *		<MDL	0.1	0.1	%
p-1.00 *	0.9		0.1	0.1	%
p+0.00 *	3.6		0.1	0.1	%
p+1.00 *	44.7		0.1	0.1	%
p+10.0 *		<MDL	0.1	0.1	%
p+10.0(more than) *	0.6		0.1	0.1	%
p+2.00 *	45.1		0.1	0.1	%
p+3.00 *	3		0.1	0.1	%
p+4.00 *	0.4		0.1	0.1	%
p+5.00 *	1.6		0.1	0.1	%
p+6.00 *		<MDL	0.1	0.1	%
p+7.00 *		<MDL	0.1	0.1	%
p+8.00 *		<MDL	0.1	0.1	%
p+9.00 *		<MDL	0.1	0.1	%
M=CV EPA9060-PSEP96 (03-04-002-001)					
Total Organic Carbon	980	<RDL	620	1230	mg/Kg
M=CV SM2540-G (03-01-007-001)					
Total Solids *	81.3		0.005	0.01	%
M=ES NONE					
Sampcoordx1 *					
Sampcoordx2 *					
Sampcoordx3 *					
Sampcoordy1 *					
Sampcoordy2 *					
Sampcoordy3 *					
Sample Depth *	2				m
Sample Start Time *	1244				hr
Sediment Sampling Depth *	13				cm
Sediment Sampling Range *	0-10 cm				none
Tidal Condition	E				none
Tide Height *	0				ft

King County Environmental Lab Analytical Report

Norfolk CSO Sediment Remediation
Five-Year Monitoring Program
Year Three Sampling Event
April 2002

Locator:	NFK501	Locator:	NFK501	Locator:	NFK502	Locator:	NFK502
Descrip:	Norfolk CSO Channel	Descrip:	Norfolk CSO Channel	Descrip:	Combined Channel Delta	Descrip:	Combined Channel Delta
Client Loc:	0 to 2 cm Depth Stratum	Client Loc:	0 to 10 cm Depth Stratum	Client Loc:	0 to 2 cm Depth Stratum	Client Loc:	0 to 10 cm Depth Stratum
Sampled:	Apr 30, 2002	Sampled:	Apr 30, 2002	Sampled:	Apr 30, 2002	Sampled:	Apr 30, 2002
Lab ID:	L23995-1	Lab ID:	L23995-2	Lab ID:	L23995-3	Lab ID:	L23995-4
Matrix:	SALTWTRSED	Matrix:	SALTWTRSED	Matrix:	SALTWTRSED	Matrix:	SALTWTRSED
% Solids:	47.4	% Solids:	53.4	% Solids:	84.2	% Solids:	81.3

Parameters	Value	Qual	MDL - Dry Weight Basis	RDL	Units	Value	Qual	MDL - Dry Weight Basis	RDL	Units	Value	Qual	MDL - Dry Weight Basis	RDL	Units	Value	Qual	MDL - Dry Weight Basis	RDL	Units
COMBINED LABS																				
M=MT EPA 245.5 (06-01-004-003)																				
Mercury, Total, CVAA	0.076	<RDL	0.042	0.414	mg/Kg	0.064	<RDL	0.037	0.373	mg/Kg		<MDL	0.023	0.229	mg/Kg		<MDL	0.023	0.229	mg/Kg
M=MT EPA3050A/6010B (06-02-004-002)																				
Aluminum, Total, ICP	15600	L	10	51.1	mg/Kg	15300	L	9	44.8	mg/Kg	8520	L	5.9	29.9	mg/Kg	8710	L	5.9	29.6	mg/Kg
Arsenic, Total, ICP	7.4	<RDL	5.1	25.5	mg/Kg	5.4	<RDL	4.5	22.5	mg/Kg	4.6	<RDL	3	15	mg/Kg	3.3	<RDL	3	14.9	mg/Kg
Beryllium, Total, ICP	0.32	<RDL	0.1	0.511	mg/Kg	0.32	<RDL	0.09	0.448	mg/Kg	0.17	<RDL	0.059	0.299	mg/Kg	0.16	<RDL	0.059	0.296	mg/Kg
Cadmium, Total, ICP		<MDL	0.32	1.53	mg/Kg		<MDL	0.26	1.34	mg/Kg		<MDL	0.18	0.899	mg/Kg		<MDL	0.17	0.889	mg/Kg
Chromium, Total, ICP	19.8		0.51	2.55	mg/Kg	19.5		0.45	2.25	mg/Kg	11.2		0.3	1.5	mg/Kg	10.1		0.3	1.49	mg/Kg
Copper, Total, ICP	27.4		0.4	2.04	mg/Kg	27		0.36	1.79	mg/Kg	11.7		0.24	1.2	mg/Kg	11.2		0.23	1.19	mg/Kg
Iron, Total, ICP	24300	G	5.1	25.5	mg/Kg	24000	G	4.5	22.5	mg/Kg	19200	G	3	15	mg/Kg	18300	G	3	14.9	mg/Kg
Lead, Total, ICP	12	<RDL	3.2	15.3	mg/Kg	16.1		2.6	13.4	mg/Kg	4.4	<RDL	1.8	8.99	mg/Kg	4.3	<RDL	1.7	8.89	mg/Kg
Manganese, Total, ICP	411		0.2	1.02	mg/Kg	375		0.18	0.897	mg/Kg	220		0.12	0.6	mg/Kg	220		0.12	0.593	mg/Kg
Nickel, Total, ICP	17.7		2	10.2	mg/Kg	17.4		1.8	8.97	mg/Kg	12.1		1.2	6	mg/Kg	12.1		1.2	5.93	mg/Kg
Selenium, Total, ICP		<MDL	5.1	25.5	mg/Kg		<MDL	4.5	22.5	mg/Kg		<MDL	3	15	mg/Kg		<MDL	3	14.9	mg/Kg
Silver, Total, ICP		<MDL	0.4	2.04	mg/Kg		<MDL	0.36	1.79	mg/Kg		<MDL	0.24	1.2	mg/Kg		<MDL	0.23	1.19	mg/Kg
Thallium, Total, ICP		<MDL	20	102	mg/Kg		<MDL	18	89.7	mg/Kg		<MDL	12	60	mg/Kg		<MDL	12	59.3	mg/Kg
Zinc, Total, ICP	76.4		0.51	2.55	mg/Kg	79		0.45	2.25	mg/Kg	43.7		0.3	1.5	mg/Kg	43.9		0.3	1.49	mg/Kg
M=OR EPA 3550B/8270C (7-3-01-004)																				
1,2,4-Trichlorobenzene		<MDL	0.55	1.12	ug/Kg		<MDL	0.49	0.993	ug/Kg		<MDL	0.31	0.629	ug/Kg		<MDL	0.32	0.652	ug/Kg
1,2-Dichlorobenzene		<MDL	0.55	1.12	ug/Kg		<MDL	0.49	0.993	ug/Kg		<MDL	0.31	0.629	ug/Kg		<MDL	0.32	0.652	ug/Kg
1,2-Diphenylhydrazine		<MDL	21	42.2	ug/Kg		<MDL	19	37.5	ug/Kg		<MDL	12	23.8	ug/Kg		<MDL	12	24.6	ug/Kg
1,3-Dichlorobenzene		<MDL	0.55	1.12	ug/Kg		<MDL	0.49	0.993	ug/Kg		<MDL	0.31	0.629	ug/Kg		<MDL	0.32	0.652	ug/Kg
1,4-Dichlorobenzene	3.14	B	0.27	0.557	ug/Kg	34.1	B	0.24	0.494	ug/Kg	0.918	B	0.15	0.314	ug/Kg	1.32	B	0.16	0.325	ug/Kg
2,4,5-Trichlorophenol		<MDL	25	50.6	ug/Kg		<MDL	22	44.9	ug/Kg		<MDL	14	28.5	ug/Kg		<MDL	15	29.5	ug/Kg
2,4,6-Trichlorophenol		<MDL	27	54.9	ug/Kg		<MDL	24	48.7	ug/Kg		<MDL	15	30.9	ug/Kg		<MDL	16	32	ug/Kg
2,4-Dichlorophenol		<MDL	34	67.5	ug/Kg		<MDL	30	59.9	ug/Kg		<MDL	19	38	ug/Kg		<MDL	20	39.4	ug/Kg
2,4-Dimethylphenol		<MDL,G	15	29.5	ug/Kg		<MDL,G	13	26.2	ug/Kg		<MDL,G	8.3	16.6	ug/Kg		<MDL,G	8.6	17.2	ug/Kg
2,4-Dinitrotoluene		<MDL	6.3	12.7	ug/Kg		<MDL	5.6	11.2	ug/Kg		<MDL	3.6	7.13	ug/Kg		<MDL	3.7	7.38	ug/Kg
2,6-Dinitrotoluene		<MDL	21	42.2	ug/Kg		<MDL	19	37.5	ug/Kg		<MDL	12	23.8	ug/Kg		<MDL	12	24.6	ug/Kg
2-Chloronaphthalene		<MDL	34	67.5	ug/Kg		<MDL	30	59.9	ug/Kg		<MDL	19	38	ug/Kg		<MDL	20	39.4	ug/Kg
2-Chlorophenol		<MDL	17	33.8	ug/Kg		<MDL	15	30	ug/Kg		<MDL	9.5	19	ug/Kg		<MDL	9.8	19.7	ug/Kg
2-Methylnaphthalene		<MDL	30	59.1	ug/Kg		<MDL	26	52.4	ug/Kg		<MDL	17	33.3	ug/Kg		<MDL	17	34.4	ug/Kg
2-Methylphenol		<MDL	40	80.2	ug/Kg		<MDL	36	71.2	ug/Kg		<MDL	23	45.1	ug/Kg		<MDL	23	46.7	ug/Kg
2-Nitrophenol		<MDL	32	63.3	ug/Kg		<MDL	28	56.2	ug/Kg		<MDL	18	35.6	ug/Kg		<MDL	18	36.9	ug/Kg
4-Bromophenyl Phenyl Ether		<MDL	19	38	ug/Kg		<MDL	17	33.7	ug/Kg		<MDL	11	21.4	ug/Kg		<MDL	11	22.1	ug/Kg
4-Chlorophenyl Phenyl Ether		<MDL	27	54.9	ug/Kg		<MDL	24	48.7	ug/Kg		<MDL	15	30.9	ug/Kg		<MDL	16	32	ug/Kg
4-Methylphenol		<MDL	34	67.5	ug/Kg		<MDL	30	59.9	ug/Kg		<MDL	19	38	ug/Kg		<MDL	20	39.4	ug/Kg

King County Environmental Lab Analytical Report

Norfolk CSO Sediment Remediation	Locator: NFK501	Locator: NFK501	Locator: NFK502	Locator: NFK502
Five-Year Monitoring Program	Descrip: Norfolk CSO Channel	Descrip: Norfolk CSO Channel	Descrip: Combined Channel Delta	Descrip: Combined Channel Delta
Year Three Sampling Event	Client Loc: 0 to 2 cm Depth Stratum	Client Loc: 0 to 10 cm Depth Stratum	Client Loc: 0 to 2 cm Depth Stratum	Client Loc: 0 to 10 cm Depth Stratum
April 2002	Sampled: Apr 30, 2002	Sampled: Apr 30, 2002	Sampled: Apr 30, 2002	Sampled: Apr 30, 2002
	Lab ID: L23995-1	Lab ID: L23995-2	Lab ID: L23995-3	Lab ID: L23995-4
	Matrix: SALTWTRSED	Matrix: SALTWTRSED	Matrix: SALTWTRSED	Matrix: SALTWTRSED
	% Solids: 47.4	% Solids: 53.4	% Solids: 84.2	% Solids: 81.3

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis			
COMBINED LABS																				
Acenaphthene		<MDL	15	29.5	ug/Kg		<MDL	13	26.2	ug/Kg		<MDL	8.3	16.6	ug/Kg		<MDL	8.6	17.2	ug/Kg
Acenaphthylene		<MDL	32	63.3	ug/Kg		<MDL	28	56.2	ug/Kg		<MDL	18	35.6	ug/Kg		<MDL	18	36.9	ug/Kg
Aniline		<MDL,G	40	80.2	ug/Kg		<MDL,G	36	71.2	ug/Kg		<MDL,G	23	45.1	ug/Kg		<MDL,G	23	46.7	ug/Kg
Anthracene	21.9	G	8.4	16.9	ug/Kg	20.2	G	7.5	15	ug/Kg		<MDL,G	4.8	9.5	ug/Kg		<MDL,G	4.9	9.84	ug/Kg
Benzo(a)anthracene	120		4.2	8.44	ug/Kg	94.9		3.7	7.49	ug/Kg	7.26		2.4	4.75	ug/Kg	8.76		2.5	4.92	ug/Kg
Benzo(a)pyrene	153		6.3	12.7	ug/Kg	117		5.6	11.2	ug/Kg	12.1		3.6	7.13	ug/Kg	13.7		3.7	7.38	ug/Kg
Benzo(b)fluoranthene	199		6.3	12.7	ug/Kg	151		5.6	11.2	ug/Kg	9.31		3.6	7.13	ug/Kg	11.8		3.7	7.38	ug/Kg
Benzo(g,h,i)perylene	96.6	G	17	33.8	ug/Kg	74.7	G	15	30	ug/Kg		<MDL,G	9.5	19	ug/Kg		<MDL,G	9.8	19.7	ug/Kg
Benzo(k)fluoranthene	160		6.3	12.7	ug/Kg	114		5.6	11.2	ug/Kg		<MDL	3.6	7.13	ug/Kg		<MDL	3.7	7.38	ug/Kg
Benzoic Acid	210		13	25.3	ug/Kg	174		11	22.5	ug/Kg		<MDL	7.1	14.3	ug/Kg	84.3		7.4	14.8	ug/Kg
Benzyl Alcohol		<MDL	13	25.3	ug/Kg		<MDL	11	22.5	ug/Kg		<MDL	7.1	14.3	ug/Kg		<MDL	7.4	14.8	ug/Kg
Benzyl Butyl Phthalate	86.3	B	13	25.3	ug/Kg	47.6	B	11	22.5	ug/Kg		<MDL,B	7.1	14.3	ug/Kg		<MDL,B	7.4	14.8	ug/Kg
Bis(2-Chloroethoxy)Methane		<MDL	36	71.7	ug/Kg		<MDL	32	63.7	ug/Kg		<MDL	20	40.4	ug/Kg		<MDL	21	41.8	ug/Kg
Bis(2-Chloroethyl)Ether		<MDL	32	63.3	ug/Kg		<MDL	28	56.2	ug/Kg		<MDL	18	35.6	ug/Kg		<MDL	18	36.9	ug/Kg
Bis(2-Chloroisopropyl)Ether		<MDL	32	63.3	ug/Kg		<MDL	28	56.2	ug/Kg		<MDL	18	35.6	ug/Kg		<MDL	18	36.9	ug/Kg
Bis(2-Ethylhexyl)Phthalate	958	B	14	29.5	ug/Kg	871	B	13	26.2	ug/Kg	31	B	8	16.6	ug/Kg	248	B	8.2	17.2	ug/Kg
Caffeine		<MDL	13	25.3	ug/Kg		<MDL	11	22.5	ug/Kg		<MDL	7.1	14.3	ug/Kg		<MDL	7.4	14.8	ug/Kg
Carbazole	48.3		15	29.5	ug/Kg	37.5		13	26.2	ug/Kg		<MDL	8.3	16.6	ug/Kg		<MDL	8.6	17.2	ug/Kg
Chrysene	213		8.4	16.9	ug/Kg	157		7.5	15	ug/Kg		<MDL	4.8	9.5	ug/Kg		<MDL	4.9	9.84	ug/Kg
Coprostanol	502	G	30	59.1	ug/Kg	330	G	26	52.4	ug/Kg		<MDL,G	17	33.3	ug/Kg		<MDL,G	17	34.4	ug/Kg
Dibenzo(a,h)anthracene	25	<RDL	15	29.5	ug/Kg	21	<RDL	13	26.2	ug/Kg		<MDL	8.3	16.6	ug/Kg		<MDL	8.6	17.2	ug/Kg
Dibenzofuran		<MDL	30	59.1	ug/Kg		<MDL	26	52.4	ug/Kg		<MDL	17	33.3	ug/Kg		<MDL	17	34.4	ug/Kg
Diethyl Phthalate		<MDL	13	25.3	ug/Kg		<MDL	11	22.5	ug/Kg		<MDL	7.1	14.3	ug/Kg		<MDL	7.4	14.8	ug/Kg
Dimethyl Phthalate		<MDL	23	46.4	ug/Kg		<MDL	21	41.2	ug/Kg		<MDL	13	26.1	ug/Kg		<MDL	14	27.1	ug/Kg
Di-N-Butyl Phthalate	21.3		11	21.1	ug/Kg	15	<RDL	9.4	18.7	ug/Kg		<MDL	5.9	11.9	ug/Kg		<MDL	6.2	12.3	ug/Kg
Di-N-Octyl Phthalate		<MDL	17	33.8	ug/Kg		<MDL	15	30	ug/Kg		<MDL	9.5	19	ug/Kg		<MDL	9.8	19.7	ug/Kg
Fluoranthene	363		17	33.8	ug/Kg	287		15	30	ug/Kg		<MDL	9.5	19	ug/Kg		<MDL	9.8	19.7	ug/Kg
Fluorene		<MDL	27	54.9	ug/Kg		<MDL	24	48.7	ug/Kg		<MDL	15	30.9	ug/Kg		<MDL	16	32	ug/Kg
Hexachlorobenzene		<MDL	1.4	2.81	ug/Kg		<MDL	1.2	2.49	ug/Kg		<MDL	0.78	1.58	ug/Kg		<MDL	0.81	1.64	ug/Kg
Hexachlorobutadiene		<MDL	1.6	3.16	ug/Kg		<MDL	1.4	2.81	ug/Kg		<MDL	0.89	1.78	ug/Kg		<MDL	0.92	1.85	ug/Kg
Hexachloroethane		<MDL	32	63.3	ug/Kg		<MDL	28	56.2	ug/Kg		<MDL	18	35.6	ug/Kg		<MDL	18	36.9	ug/Kg
Indeno(1,2,3-Cd)Pyrene	104	G	19	38	ug/Kg	75.3	G	17	33.7	ug/Kg		<MDL,G	11	21.4	ug/Kg		<MDL,G	11	22.1	ug/Kg
Isophorone		<MDL	40	80.2	ug/Kg		<MDL	36	71.2	ug/Kg		<MDL	23	45.1	ug/Kg		<MDL	23	46.7	ug/Kg
Naphthalene		<MDL,G	30	59.1	ug/Kg		<MDL,G	26	52.4	ug/Kg		<MDL,G	17	33.3	ug/Kg		<MDL,G	17	34.4	ug/Kg
Nitrobenzene		<MDL	34	67.5	ug/Kg		<MDL	30	59.9	ug/Kg		<MDL	19	38	ug/Kg		<MDL	20	39.4	ug/Kg
N-Nitrosodimethylamine		<MDL	42	84.4	ug/Kg		<MDL	37	74.9	ug/Kg		<MDL	24	47.5	ug/Kg		<MDL	25	49.2	ug/Kg
N-Nitrosodi-N-Propylamine		<MDL	19	38	ug/Kg		<MDL	17	33.7	ug/Kg		<MDL	11	21.4	ug/Kg		<MDL	11	22.1	ug/Kg

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Norfolk CSO Sediment Remediation
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Locator: NFK501
Descrip: Norfolk CSO Channel
Client Loc: 0 to 2 cm Depth Stratum
Sampled: Apr 30, 2002
Lab ID: L23995-1
Matrix: SALTWTRSED
% Solids: 47.4

Parameters	Value	Qual	MDL	RDL	Units
		- Dry Weight Basis			
COMBINED LABS					
N-Nitrosodiphenylamine		<MDL	42	84.4	ug/Kg
Pentachlorophenol		<MDL	11	21.1	ug/Kg
Phenanthrene	183		8.4	16.9	ug/Kg
Phenol		<MDL	19	38	ug/Kg
Pyrene	346		8.4	16.9	ug/Kg
M=OR EPA 8081A/8082 (7-3-03-002)					
Aroclor 1016		<MDL	4.2	8.44	ug/Kg
Aroclor 1221		<MDL	8.4	16.9	ug/Kg
Aroclor 1232		<MDL	8.4	16.9	ug/Kg
Aroclor 1242		<MDL	4.2	8.44	ug/Kg
Aroclor 1248	43.5		4.2	8.44	ug/Kg
Aroclor 1254	49.8		4.2	8.44	ug/Kg
Aroclor 1260	74.5	E	4.2	8.44	ug/Kg

Locator: NFK501
Descrip: Norfolk CSO Channel
Client Loc: 0 to 10 cm Depth Stratum
Sampled: Apr 30, 2002
Lab ID: L23995-2
Matrix: SALTWTRSED
% Solids: 53.4

Parameters	Value	Qual	MDL	RDL	Units
		- Dry Weight Basis			
COMBINED LABS					
N-Nitrosodiphenylamine		<MDL	37	74.9	ug/Kg
Pentachlorophenol		<MDL	9.4	18.7	ug/Kg
Phenanthrene	135		7.5	15	ug/Kg
Phenol		<MDL	17	33.7	ug/Kg
Pyrene	260		7.5	15	ug/Kg
M=OR EPA 8081A/8082 (7-3-03-002)					
Aroclor 1016		<MDL	3.7	7.49	ug/Kg
Aroclor 1221		<MDL	7.5	15	ug/Kg
Aroclor 1232		<MDL	7.5	15	ug/Kg
Aroclor 1242		<MDL	3.7	7.49	ug/Kg
Aroclor 1248	50.2		3.7	7.49	ug/Kg
Aroclor 1254	101		3.7	7.49	ug/Kg
Aroclor 1260	22.7	E	3.7	7.49	ug/Kg

Locator: NFK502
Descrip: Combined Channel Delta
Client Loc: 0 to 2 cm Depth Stratum
Sampled: Apr 30, 2002
Lab ID: L23995-3
Matrix: SALTWTRSED
% Solids: 84.2

Parameters	Value	Qual	MDL	RDL	Units
		- Dry Weight Basis			
COMBINED LABS					
N-Nitrosodiphenylamine		<MDL	24	47.5	ug/Kg
Pentachlorophenol		<MDL	5.9	11.9	ug/Kg
Phenanthrene		<MDL	4.8	9.5	ug/Kg
Phenol		<MDL	11	21.4	ug/Kg
Pyrene		<MDL	4.8	9.5	ug/Kg
M=OR EPA 8081A/8082 (7-3-03-002)					
Aroclor 1016		<MDL	2.4	4.75	ug/Kg
Aroclor 1221		<MDL	4.8	9.5	ug/Kg
Aroclor 1232		<MDL	4.8	9.5	ug/Kg
Aroclor 1242		<MDL	2.4	4.75	ug/Kg
Aroclor 1248		<MDL	2.4	4.75	ug/Kg
Aroclor 1254		<MDL	2.4	4.75	ug/Kg
Aroclor 1260		<MDL,E	2.4	4.75	ug/Kg

Locator: NFK502
Descrip: Combined Channel Delta
Client Loc: 0 to 10 cm Depth Stratum
Sampled: Apr 30, 2002
Lab ID: L23995-4
Matrix: SALTWTRSED
% Solids: 81.3

Parameters	Value	Qual	MDL	RDL	Units
		- Dry Weight Basis			
COMBINED LABS					
N-Nitrosodiphenylamine		<MDL	25	49.2	ug/Kg
Pentachlorophenol		<MDL	6.2	12.3	ug/Kg
Phenanthrene		<MDL	4.9	9.84	ug/Kg
Phenol		<MDL	11	22.1	ug/Kg
Pyrene	6.6	<RDL	4.9	9.84	ug/Kg
M=OR EPA 8081A/8082 (7-3-03-002)					
Aroclor 1016		<MDL	2.5	4.92	ug/Kg
Aroclor 1221		<MDL	4.9	9.84	ug/Kg
Aroclor 1232		<MDL	4.9	9.84	ug/Kg
Aroclor 1242		<MDL	2.5	4.92	ug/Kg
Aroclor 1248		<MDL	2.5	4.92	ug/Kg
Aroclor 1254		<MDL	2.5	4.92	ug/Kg
Aroclor 1260		<MDL,E	2.5	4.92	ug/Kg

* Not converted to dry weight basis for this parameter

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	NFK503	NFK503	NFK504	NFK504
Locator:	NFK503	NFK503	NFK504	NFK504
Descrip:	Boeing SD Channel	Boeing SD Channel	Upriver Reference	Upriver Reference
Client Loc:	0 to 2 cm Depth Stratum	0 to 10 cm Depth Stratum	0 to 2 cm Depth Stratum	0 to 10 cm Depth Stratum
Sampled:	Apr 30, 2002	Apr 30, 2002	Apr 30, 2002	Apr 30, 2002
Lab ID:	L23995-5	L23995-6	L23995-7	L23995-8
Matrix:	SALTWTRSED	SALTWTRSED	SALTWTRSED	SALTWTRSED
% Solids:	47.4	49.8	64.5	62

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis			
COMBINED LABS																				
M=CV ASTM D422																				
Clay *	8.5	E	0.1	0.1	%	6.8	E	0.1	0.1	%	3.1	E	0.1	0.1	%	3.7	E	0.1	0.1	%
Silt *	46.7		0.1	0.1	%	45.8		0.1	0.1	%	17.6		0.1	0.1	%	22.5		0.1	0.1	%
Sand *	44.6		0.1	0.1	%	47.2		0.1	0.1	%	78		0.1	0.1	%	72.9		0.1	0.1	%
Gravel *	0.2	E	0.1	0.1	%	0.2	E	0.1	0.1	%	1.4	E	0.1	0.1	%	1.1	E	0.1	0.1	%
p-2.00(less than) *		<MDL	0.1	0.1	%		<MDL	0.1	0.1	%	0.4		0.1	0.1	%	0.3		0.1	0.1	%
p-2.00 *		<MDL	0.1	0.1	%		<MDL	0.1	0.1	%	0.1	RDL	0.1	0.1	%	0.2		0.1	0.1	%
p-1.00 *	0.2		0.1	0.1	%	0.2		0.1	0.1	%	0.9		0.1	0.1	%	0.6		0.1	0.1	%
p+0.00 *	0.4		0.1	0.1	%	0.4		0.1	0.1	%	9.5		0.1	0.1	%	4.9		0.1	0.1	%
p+1.00 *	0.4		0.1	0.1	%	0.8		0.1	0.1	%	27.1		0.1	0.1	%	20		0.1	0.1	%
p+10.0 *	1.5		0.1	0.1	%	1.5		0.1	0.1	%	0.3		0.1	0.1	%	0.4		0.1	0.1	%
p+10.0(more than) *	4.5		0.1	0.1	%	2.5		0.1	0.1	%	2		0.1	0.1	%	2.2		0.1	0.1	%
p+2.00 *	1.7		0.1	0.1	%	3.8		0.1	0.1	%	22.7		0.1	0.1	%	26.8		0.1	0.1	%
p+3.00 *	20.1		0.1	0.1	%	22.2		0.1	0.1	%	8.9		0.1	0.1	%	7.5		0.1	0.1	%
p+4.00 *	22		0.1	0.1	%	20		0.1	0.1	%	9.8		0.1	0.1	%	13.7		0.1	0.1	%
p+5.00 *	25.2		0.1	0.1	%	22.2		0.1	0.1	%	7.8		0.1	0.1	%	9		0.1	0.1	%
p+6.00 *	9.7		0.1	0.1	%	10.7		0.1	0.1	%	3.3		0.1	0.1	%	4.5		0.1	0.1	%
p+7.00 *	9.5		0.1	0.1	%	8.3		0.1	0.1	%	3.9		0.1	0.1	%	4.4		0.1	0.1	%
p+8.00 *	2.3		0.1	0.1	%	4.6		0.1	0.1	%	2.6		0.1	0.1	%	4.6		0.1	0.1	%
p+9.00 *	2.5		0.1	0.1	%	2.8		0.1	0.1	%	0.8		0.1	0.1	%	1.1		0.1	0.1	%
M=CV EPA9060-PSEP96 (03-04-002-001)																				
Total Organic Carbon	26200		2100	4220	mg/Kg	25500		2000	4020	mg/Kg	10800		2000	3880	mg/Kg	13100		970	1940	mg/Kg
M=CV SM2540-G (03-01-007-001)																				
Total Solids *	47.4		0.005	0.01	%	49.8		0.005	0.01	%	64.5		0.005	0.01	%	62		0.005	0.01	%
M=ES NONE																				
Sampcoordx1 *	1278538				ft						1278624				ft					
Sampcoordx2 *	1278547				ft						1278622				ft					
Sampcoordx3 *	1278550				ft						1278620				ft					
Sampcoordy1 *	190181				ft						190072				ft					
Sampcoordy2 *	190178				ft						190075				ft					
Sampcoordy3 *	190173				ft						190075				ft					
Sample Depth *	0				m	0				m	1				m	1				m
Sample Start Time *	1215				hr	1215				hr	1313				hr	1313				hr
Sediment Sampling Depth *	11				cm	11				cm	11				cm	11				cm
Sediment Sampling Range *	0-2 cm				none	0-10 cm				none	0-2 cm				none	0-10 cm				none
Tidal Condition	E				none	E				none	S				none	S				none
Tide Height *	1.5				ft	1.5				ft	-1				ft	-1				ft

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	Sample 1	Sample 2	Sample 3	Sample 4
Locator:	NFK503	NFK503	NFK504	NFK504
Descrip:	Boeing SD Channel	Boeing SD Channel	Upriver Reference	Upriver Reference
Client Loc:	0 to 2 cm Depth Stratum	0 to 10 cm Depth Stratum	0 to 2 cm Depth Stratum	0 to 10 cm Depth Stratum
Sampled:	Apr 30, 2002	Apr 30, 2002	Apr 30, 2002	Apr 30, 2002
Lab ID:	L23995-5	L23995-6	L23995-7	L23995-8
Matrix:	SALTWTRSED	SALTWTRSED	SALTWTRSED	SALTWTRSED
% Solids:	47.4	49.8	64.5	62

MDL, RDL - Dry Weight Basis

Parameters	Value (L23995-5)	Qual	MDL	RDL	Units	Value (L23995-6)	Qual	MDL	RDL	Units
COMBINED LABS										
M=MT EPA 245.5 (06-01-004-003)										
Mercury, Total, CVAA	0.095	<RDL	0.042	0.416	mg/Kg	0.074	<RDL	0.04	0.4	mg/Kg
M=MT EPA3050A/6010B (06-02-004-002)										
Aluminum, Total, ICP	13900	L	10	50.8	mg/Kg	17600	L	9.6	48.2	mg/Kg
Arsenic, Total, ICP	5.7	<RDL	5.1	25.3	mg/Kg	11	<RDL	4.8	24.1	mg/Kg
Beryllium, Total, ICP	0.25	<RDL	0.1	0.508	mg/Kg	0.44	<RDL	0.096	0.482	mg/Kg
Cadmium, Total, ICP		<MDL	0.3	1.52	mg/Kg		<MDL	0.28	1.44	mg/Kg
Chromium, Total, ICP	15.8		0.51	2.53	mg/Kg	21.7		0.48	2.41	mg/Kg
Copper, Total, ICP	16.9		0.4	2.03	mg/Kg	31.9		0.38	1.93	mg/Kg
Iron, Total, ICP	29300	G	5.1	25.3	mg/Kg	27300	G	4.8	24.1	mg/Kg
Lead, Total, ICP	8	<RDL	3	15.2	mg/Kg	12	<RDL	2.8	14.4	mg/Kg
Manganese, Total, ICP	342		0.2	1.01	mg/Kg	446		0.19	0.964	mg/Kg
Nickel, Total, ICP	18.4		2	10.1	mg/Kg	20.3		1.9	9.64	mg/Kg
Selenium, Total, ICP		<MDL	5.1	25.3	mg/Kg		<MDL	4.8	24.1	mg/Kg
Silver, Total, ICP		<MDL	0.4	2.03	mg/Kg		<MDL	0.38	1.93	mg/Kg
Thallium, Total, ICP		<MDL	20	101	mg/Kg		<MDL	19	96.4	mg/Kg
Zinc, Total, ICP	71.9		0.51	2.53	mg/Kg	79.9		0.48	2.41	mg/Kg
M=OR EPA 3550B/8270C (7-3-01-004)										
1,2,4-Trichlorobenzene		<MDL	0.55	1.12	ug/Kg		<MDL	0.52	1.06	ug/Kg
1,2-Dichlorobenzene		<MDL	0.55	1.12	ug/Kg		<MDL	0.52	1.06	ug/Kg
1,2-Diphenylhydrazine		<MDL	21	42.2	ug/Kg		<MDL	20	40.2	ug/Kg
1,3-Dichlorobenzene		<MDL	0.55	1.12	ug/Kg		<MDL	0.52	1.06	ug/Kg
1,4-Dichlorobenzene	1.18	B	0.27	0.557	ug/Kg	1.45	B	0.26	0.53	ug/Kg
2,4,5-Trichlorophenol		<MDL	25	50.6	ug/Kg		<MDL	24	48.2	ug/Kg
2,4,6-Trichlorophenol		<MDL	27	54.9	ug/Kg		<MDL	26	52.2	ug/Kg
2,4-Dichlorophenol		<MDL	34	67.5	ug/Kg		<MDL	32	64.3	ug/Kg
2,4-Dimethylphenol		<MDL,G	15	29.5	ug/Kg		<MDL,G	14	28.1	ug/Kg
2,4-Dinitrotoluene		<MDL	6.3	12.7	ug/Kg		<MDL	6	12	ug/Kg
2,6-Dinitrotoluene		<MDL	21	42.2	ug/Kg		<MDL	20	40.2	ug/Kg
2-Chloronaphthalene		<MDL	34	67.5	ug/Kg		<MDL	32	64.3	ug/Kg
2-Chlorophenol		<MDL	17	33.8	ug/Kg		<MDL	16	32.1	ug/Kg
2-Methylnaphthalene		<MDL	30	59.1	ug/Kg		<MDL	28	56.2	ug/Kg
2-Methylphenol		<MDL	40	80.2	ug/Kg		<MDL	38	76.3	ug/Kg
2-Nitrophenol		<MDL	32	63.3	ug/Kg		<MDL	30	60.2	ug/Kg
4-Bromophenyl Phenyl Ether		<MDL	19	38	ug/Kg		<MDL	18	36.1	ug/Kg
4-Chlorophenyl Phenyl Ether		<MDL	27	54.9	ug/Kg		<MDL	26	52.2	ug/Kg
4-Methylphenol		<MDL	34	67.5	ug/Kg		<MDL	32	64.3	ug/Kg

Parameters	Value (L23995-7)	Qual	MDL	RDL	Units	Value (L23995-8)	Qual	MDL	RDL	Units
COMBINED LABS										
M=MT EPA 245.5 (06-01-004-003)										
Mercury, Total, CVAA	0.04	<RDL	0.031	0.305	mg/Kg	0.068	<RDL	0.031	0.3	mg/Kg
M=MT EPA3050A/6010B (06-02-004-002)										
Aluminum, Total, ICP	14200	L	7.8	38.9	mg/Kg	11700	L	7.9	39.4	mg/Kg
Arsenic, Total, ICP	5.9	<RDL	3.9	19.4	mg/Kg	4.8	<RDL	3.9	19.7	mg/Kg
Beryllium, Total, ICP	0.29	<RDL	0.078	0.389	mg/Kg	0.26	<RDL	0.079	0.394	mg/Kg
Cadmium, Total, ICP		<MDL	0.23	1.17	mg/Kg		<MDL	0.24	1.18	mg/Kg
Chromium, Total, ICP	16.7		0.39	1.94	mg/Kg	17.6		0.39	1.97	mg/Kg
Copper, Total, ICP	23.3		0.31	1.55	mg/Kg	22.4		0.32	1.58	mg/Kg
Iron, Total, ICP	20900	G	3.9	19.4	mg/Kg	21000	G	3.9	19.7	mg/Kg
Lead, Total, ICP	9.5	<RDL	2.3	11.7	mg/Kg	11	<RDL	2.4	11.8	mg/Kg
Manganese, Total, ICP	450		0.16	0.777	mg/Kg	258		0.16	0.789	mg/Kg
Nickel, Total, ICP	15.8		1.6	7.77	mg/Kg	16.1		1.6	7.89	mg/Kg
Selenium, Total, ICP		<MDL	3.9	19.4	mg/Kg		<MDL	3.9	19.7	mg/Kg
Silver, Total, ICP		<MDL	0.31	1.55	mg/Kg		<MDL	0.32	1.58	mg/Kg
Thallium, Total, ICP		<MDL	16	77.7	mg/Kg		<MDL	16	78.9	mg/Kg
Zinc, Total, ICP	56.1		0.39	1.94	mg/Kg	61.9		0.39	1.97	mg/Kg
M=OR EPA 3550B/8270C (7-3-01-004)										
1,2,4-Trichlorobenzene		<MDL	0.4	0.822	ug/Kg		<MDL	0.42	0.855	ug/Kg
1,2-Dichlorobenzene		<MDL	0.4	0.822	ug/Kg		<MDL	0.42	0.855	ug/Kg
1,2-Diphenylhydrazine		<MDL	16	31	ug/Kg		<MDL	16	32.3	ug/Kg
1,3-Dichlorobenzene		<MDL	0.4	0.822	ug/Kg		<MDL	0.42	0.855	ug/Kg
1,4-Dichlorobenzene	1.12	B	0.2	0.409	ug/Kg	1.2	B	0.21	0.426	ug/Kg
2,4,5-Trichlorophenol		<MDL	19	37.2	ug/Kg		<MDL	19	38.7	ug/Kg
2,4,6-Trichlorophenol		<MDL	20	40.3	ug/Kg		<MDL	21	41.9	ug/Kg
2,4-Dichlorophenol		<MDL	25	49.6	ug/Kg		<MDL	26	51.6	ug/Kg
2,4-Dimethylphenol		<MDL,G	11	21.7	ug/Kg		<MDL,G	11	22.6	ug/Kg
2,4-Dinitrotoluene		<MDL	4.7	9.3	ug/Kg		<MDL	4.8	9.68	ug/Kg
2,6-Dinitrotoluene		<MDL	16	31	ug/Kg		<MDL	16	32.3	ug/Kg
2-Chloronaphthalene		<MDL	25	49.6	ug/Kg		<MDL	26	51.6	ug/Kg
2-Chlorophenol		<MDL	12	24.8	ug/Kg		<MDL	13	25.8	ug/Kg
2-Methylnaphthalene		<MDL	22	43.4	ug/Kg		<MDL	23	45.2	ug/Kg
2-Methylphenol		<MDL	29	58.9	ug/Kg		<MDL	31	61.3	ug/Kg
2-Nitrophenol		<MDL	23	46.5	ug/Kg		<MDL	24	48.4	ug/Kg
4-Bromophenyl Phenyl Ether		<MDL	14	27.9	ug/Kg		<MDL	15	29	ug/Kg
4-Chlorophenyl Phenyl Ether		<MDL	20	40.3	ug/Kg		<MDL	21	41.9	ug/Kg
4-Methylphenol		<MDL	25	49.6	ug/Kg		<MDL	26	51.6	ug/Kg

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	NFK503	NFK503	NFK504	NFK504
Locator:	NFK503	NFK503	NFK504	NFK504
Descrip:	Boeing SD Channel	Boeing SD Channel	Upriver Reference	Upriver Reference
Client Loc:	0 to 2 cm Depth Stratum	0 to 10 cm Depth Stratum	0 to 2 cm Depth Stratum	0 to 10 cm Depth Stratum
Sampled:	Apr 30, 2002	Apr 30, 2002	Apr 30, 2002	Apr 30, 2002
Lab ID:	L23995-5	L23995-6	L23995-7	L23995-8
Matrix:	SALTWTRSED	SALTWTRSED	SALTWTRSED	SALTWTRSED
% Solids:	47.4	49.8	64.5	62

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
		- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis			
COMBINED LABS																				
Acenaphthene		<MDL	15	29.5	ug/Kg		<MDL	14	28.1	ug/Kg		<MDL	11	21.7	ug/Kg		<MDL	11	22.6	ug/Kg
Acenaphthylene		<MDL	32	63.3	ug/Kg		<MDL	30	60.2	ug/Kg		<MDL	23	46.5	ug/Kg		<MDL	24	48.4	ug/Kg
Aniline		<MDL,G	40	80.2	ug/Kg		<MDL,G	38	76.3	ug/Kg		<MDL,G	29	58.9	ug/Kg		<MDL,G	31	61.3	ug/Kg
Anthracene	17.5	G	8.4	16.9	ug/Kg	14	<RDL,G	8	16.1	ug/Kg	39.8	G	6.2	12.4	ug/Kg	12	<RDL,G	6.5	12.9	ug/Kg
Benzo(a)anthracene	92.4		4.2	8.44	ug/Kg	77.1		4	8.03	ug/Kg	171		3.1	6.2	ug/Kg	59.5		3.2	6.45	ug/Kg
Benzo(a)pyrene	110		6.3	12.7	ug/Kg	89.2		6	12	ug/Kg	61.7		4.7	9.3	ug/Kg	72.4		4.8	9.68	ug/Kg
Benzo(b)fluoranthene	119		6.3	12.7	ug/Kg	112		6	12	ug/Kg	66.5		4.7	9.3	ug/Kg	82.3		4.8	9.68	ug/Kg
Benzo(g,h,i)perylene	52.5	G	17	33.8	ug/Kg	38.2	G	16	32.1	ug/Kg	14	<RDL,G	12	24.8	ug/Kg	15	<RDL,G	13	25.8	ug/Kg
Benzo(k)fluoranthene	94.3		6.3	12.7	ug/Kg	79.3		6	12	ug/Kg	78.1		4.7	9.3	ug/Kg	74.7		4.8	9.68	ug/Kg
Benzoic Acid	192		13	25.3	ug/Kg	178		12	24.1	ug/Kg	129		9.3	18.6	ug/Kg	130		9.7	19.4	ug/Kg
Benzyl Alcohol		<MDL	13	25.3	ug/Kg		<MDL	12	24.1	ug/Kg		<MDL	9.3	18.6	ug/Kg		<MDL	9.7	19.4	ug/Kg
Benzyl Butyl Phthalate	67.7	B	13	25.3	ug/Kg	67.7	B	12	24.1	ug/Kg	34.6	B	9.3	18.6	ug/Kg	37.1	B	9.7	19.4	ug/Kg
Bis(2-Chloroethoxy)Methane		<MDL	36	71.7	ug/Kg		<MDL	34	68.3	ug/Kg		<MDL	26	52.7	ug/Kg		<MDL	27	54.8	ug/Kg
Bis(2-Chloroethyl)Ether		<MDL	32	63.3	ug/Kg		<MDL	30	60.2	ug/Kg		<MDL	23	46.5	ug/Kg		<MDL	24	48.4	ug/Kg
Bis(2-Chloroisopropyl)Ether		<MDL	32	63.3	ug/Kg		<MDL	30	60.2	ug/Kg		<MDL	23	46.5	ug/Kg		<MDL	24	48.4	ug/Kg
Bis(2-Ethylhexyl)Phthalate	1130	B	14	29.5	ug/Kg	1030	B	13	28.1	ug/Kg	682	B	10	21.7	ug/Kg	615	B	11	22.6	ug/Kg
Caffeine		<MDL	13	25.3	ug/Kg		<MDL	12	24.1	ug/Kg		<MDL	9.3	18.6	ug/Kg		<MDL	9.7	19.4	ug/Kg
Carbazole	31		15	29.5	ug/Kg	24	<RDL	14	28.1	ug/Kg	15	<RDL	11	21.7	ug/Kg	15	<RDL	11	22.6	ug/Kg
Chrysene	146		8.4	16.9	ug/Kg	116		8	16.1	ug/Kg	384		6.2	12.4	ug/Kg	89.8		6.5	12.9	ug/Kg
Coprostanol	369	G	30	59.1	ug/Kg	367	G	28	56.2	ug/Kg		<MDL,G	22	43.4	ug/Kg		<MDL,G	23	45.2	ug/Kg
Dibenzo(a,h)anthracene	18	<RDL	15	29.5	ug/Kg		<MDL	14	28.1	ug/Kg		<MDL	11	21.7	ug/Kg		<MDL	11	22.6	ug/Kg
Dibenzofuran		<MDL	30	59.1	ug/Kg		<MDL	28	56.2	ug/Kg		<MDL	22	43.4	ug/Kg		<MDL	23	45.2	ug/Kg
Diethyl Phthalate		<MDL	13	25.3	ug/Kg		<MDL	12	24.1	ug/Kg		<MDL	9.3	18.6	ug/Kg		<MDL	9.7	19.4	ug/Kg
Dimethyl Phthalate		<MDL	23	46.4	ug/Kg		<MDL	22	44.2	ug/Kg		<MDL	17	34.1	ug/Kg		<MDL	18	35.5	ug/Kg
Di-N-Butyl Phthalate	16	<RDL	11	21.1	ug/Kg	10	<RDL	10	20.1	ug/Kg	9.5	<RDL	7.8	15.5	ug/Kg	15	<RDL	8.1	16.1	ug/Kg
Di-N-Octyl Phthalate		<MDL	17	33.8	ug/Kg		<MDL	16	32.1	ug/Kg		<MDL	12	24.8	ug/Kg		<MDL	13	25.8	ug/Kg
Fluoranthene	249		17	33.8	ug/Kg	201		16	32.1	ug/Kg	259		12	24.8	ug/Kg	160		13	25.8	ug/Kg
Fluorene		<MDL	27	54.9	ug/Kg		<MDL	26	52.2	ug/Kg		<MDL	20	40.3	ug/Kg		<MDL	21	41.9	ug/Kg
Hexachlorobenzene		<MDL	1.4	2.81	ug/Kg		<MDL	1.3	2.67	ug/Kg		<MDL	1	2.06	ug/Kg		<MDL	1.1	2.15	ug/Kg
Hexachlorobutadiene		<MDL	1.6	3.16	ug/Kg		<MDL	1.5	3.01	ug/Kg		<MDL	1.2	2.33	ug/Kg		<MDL	1.2	2.42	ug/Kg
Hexachloroethane		<MDL	32	63.3	ug/Kg		<MDL	30	60.2	ug/Kg		<MDL	23	46.5	ug/Kg		<MDL	24	48.4	ug/Kg
Indeno(1,2,3-Cd)Pyrene	58.9	G	19	38	ug/Kg	52.2	G	18	36.1	ug/Kg	26	<RDL,G	14	27.9	ug/Kg	36.9	G	15	29	ug/Kg
Isophorone		<MDL	40	80.2	ug/Kg		<MDL	38	76.3	ug/Kg		<MDL	29	58.9	ug/Kg		<MDL	31	61.3	ug/Kg
Naphthalene		<MDL,G	30	59.1	ug/Kg		<MDL,G	28	56.2	ug/Kg		<MDL,G	22	43.4	ug/Kg		<MDL,G	23	45.2	ug/Kg
Nitrobenzene		<MDL	34	67.5	ug/Kg		<MDL	32	64.3	ug/Kg		<MDL	25	49.6	ug/Kg		<MDL	26	51.6	ug/Kg
N-Nitrosodimethylamine		<MDL	42	84.4	ug/Kg		<MDL	40	80.3	ug/Kg		<MDL	31	62	ug/Kg		<MDL	32	64.5	ug/Kg
N-Nitrosodi-N-Propylamine		<MDL	19	38	ug/Kg		<MDL	18	36.1	ug/Kg		<MDL	14	27.9	ug/Kg		<MDL	15	29	ug/Kg

King County Environmental Lab Analytical Report

Norfolk CSO Sediment Remediation
Five-Year Monitoring Program
Year Three Sampling Event
April 2002

Locator:	NFK503					Locator:	NFK503					Locator:	NFK504					Locator:	NFK504				
Descrip:	Boeing SD Channel					Descrip:	Boeing SD Channel					Descrip:	Upriver Reference					Descrip:	Upriver Reference				
Client Loc:	0 to 2 cm Depth Stratum					Client Loc:	0 to 10 cm Depth Stratum					Client Loc:	0 to 2 cm Depth Stratum					Client Loc:	0 to 10 cm Depth Stratum				
Sampled:	Apr 30, 2002					Sampled:	Apr 30, 2002					Sampled:	Apr 30, 2002					Sampled:	Apr 30, 2002				
Lab ID:	L23995-5					Lab ID:	L23995-6					Lab ID:	L23995-7					Lab ID:	L23995-8				
Matrix:	SALTWTRSED					Matrix:	SALTWTRSED					Matrix:	SALTWTRSED					Matrix:	SALTWTRSED				
% Solids:	47.4					% Solids:	49.8					% Solids:	64.5					% Solids:	62				
Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
	- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis					- Dry Weight Basis				
COMBINED LABS																				
N-Nitrosodiphenylamine		<MDL	42	84.4	ug/Kg		<MDL	40	80.3	ug/Kg		<MDL	31	62	ug/Kg		<MDL	32	64.5	ug/Kg
Pentachlorophenol		<MDL	11	21.1	ug/Kg		<MDL	10	20.1	ug/Kg		<MDL	7.8	15.5	ug/Kg		<MDL	8.1	16.1	ug/Kg
Phenanthrene	114		8.4	16.9	ug/Kg	93.6		8	16.1	ug/Kg	85.7		6.2	12.4	ug/Kg	58.5		6.5	12.9	ug/Kg
Phenol		<MDL	19	38	ug/Kg		<MDL	18	36.1	ug/Kg		<MDL	14	27.9	ug/Kg		<MDL	15	29	ug/Kg
Pyrene	234		8.4	16.9	ug/Kg	191		8	16.1	ug/Kg	240		6.2	12.4	ug/Kg	137		6.5	12.9	ug/Kg
M=OR EPA 8081A/8082 (7-3-03-002)																				
Aroclor 1016		<MDL	4.2	8.44	ug/Kg		<MDL	4	8.03	ug/Kg		<MDL	3.1	6.2	ug/Kg		<MDL	3.2	6.45	ug/Kg
Aroclor 1221		<MDL	8.4	16.9	ug/Kg		<MDL	8	16.1	ug/Kg		<MDL	6.2	12.4	ug/Kg		<MDL	6.5	12.9	ug/Kg
Aroclor 1232		<MDL	8.4	16.9	ug/Kg		<MDL	8	16.1	ug/Kg		<MDL	6.2	12.4	ug/Kg		<MDL	6.5	12.9	ug/Kg
Aroclor 1242		<MDL	4.2	8.44	ug/Kg		<MDL	4	8.03	ug/Kg		<MDL	3.1	6.2	ug/Kg		<MDL	3.2	6.45	ug/Kg
Aroclor 1248	179		4.2	8.44	ug/Kg	532		4	8.03	ug/Kg	11.3		3.1	6.2	ug/Kg	15.6		3.2	6.45	ug/Kg
Aroclor 1254	71.9		4.2	8.44	ug/Kg	223		4	8.03	ug/Kg	20.6		3.1	6.2	ug/Kg	26.9		3.2	6.45	ug/Kg
Aroclor 1260	9.58	E	4.2	8.44	ug/Kg	21.5	E	4	8.03	ug/Kg	6.96	E	3.1	6.2	ug/Kg	9	E	3.2	6.45	ug/Kg

* Not converted to dry weight basis for this parameter

APPENDIX B
QUALITY ASSURANCE REVIEW

KING COUNTY ENVIRONMENTAL LABORATORY
QUALITY ASSURANCE REVIEW

for

ESTUARINE SEDIMENT ANALYTICAL DATA

NORFOLK CSO SEDIMENT REMEDIATION PROJECT
FIVE-YEAR MONITORING PROGRAM
APRIL 2002 SAMPLING EVENT

Prepared by:

Fritz Grothkopp
Laboratory Project Manager
Environmental Laboratory Section

Reviewed by:

Colin Elliot
Quality Assurance Officer
Environmental Laboratory Section

July 16, 2002

King County Environmental Laboratory
322 West Ewing Street
Seattle, Washington 98119-1507
(206) 684-2300

INTRODUCTION

This quality assurance (QA) narrative is intended to document the QA review conducted on the chemistry analyses performed for the Norfolk CSO Sediment Remediation Study. The QA narrative is organized into the five sections listed below.

- General Comments
- Sample Collection
- Conventional Analyses
- Metal Chemistry
- Organic Chemistry

An overview of the approach used for the QA review is detailed in the *General Comments* section. Additional information specific to each analysis is included in the appropriate analytical section.

This QA review and narrative (specifically defined as QA1) have been conducted in accordance with guidelines established through the Puget Sound Dredged Disposal Analysis (PSDDA) program and the Sediment Management Standards (WAC 173-204-610). Other approaches incorporated in the QA review have been established through collaboration between the King County Environmental Laboratory (KC Laboratory) and the Washington State Department of Ecology (Ecology) Sediment Management Unit.

GENERAL COMMENTS

Scope of Samples Submitted
This QA review is associated with estuarine sediment samples collected in April 30, 2002 as part of the Norfolk CSO Sediment Remediation Study.

Except where noted in the subcontracting sections of this QA review, all analyses have been conducted by the King County Environmental Laboratory (KCEL). Sediment analytical data are reported with associated data qualifiers and have undergone QA1 review, as summarized in this narrative report.

Completeness
Completeness has been evaluated for this data submission and QA review by considering the following criteria:

- Comparing reported data to the planned project analyses summarized in Table 1.
- Compliance with storage conditions and holding times.
- Frequency of analysis of the complete set of quality control (QC) samples outlined in Table 2.

Subcontracted Analyses
Analyses that have been subcontracted and the issues associated with these subcontracted analyses are noted in this narrative.

Methods
Analytical methods are noted in the applicable analytical sections of this QA review.

Target Lists
The reported target lists have been compared to the target analytes listed in *Table 1 - Marine Sediment Quality Standards Chemical Criteria* and *Table 3 - Puget Sound Marine Sediment Cleanup Screening Levels Chemical Criteria* contained in Chapter 173-204 WAC.

Detection Limits
The KC Laboratory distinguishes between the reporting detection limit (RDL) and the method detection limit (MDL).

- The RDL is defined as *the minimum concentration of a chemical constituent that can be reliably quantified.*
- The MDL is defined as *the minimum concentration of a chemical constituent that can be detected.*

Some subcontracted laboratory data are available with an MDL only, in accordance with the subcontracting laboratory policies. All analytical parameters are reported with detection limit(s). For some methods the detection limits reported may vary from sample to sample depending on the amount of sample analyzed and any additional dilutions required.

Storage Conditions and Holding Times
Storage conditions and holding times have been evaluated using guidelines established during the Third Annual PSDDA Review Meeting. The approach used to evaluate Total Organic Carbon for holding time has been established between the KC Laboratory and Ecology during previous QA1 review efforts. Extraction and analysis holding times for each method are summarized in each analytical section.

Method Blanks
Method blank results have been used to evaluate the possible laboratory contamination of samples. Method blank results have been reviewed for the presence of analytes detected at or greater than the MDL.

Standard Reference Materials
Standard reference material (SRM) recoveries have been used to evaluate possible low or high analytical bias on a batch-specific basis. SRM analysis is included with metals and selected organic and conventional parameters (see Table 2). SRMs are purchased from the National Institute of Standards and Technology (NIST) or National Research Council of Canada (NRCC) and have certified analyte values. Lab Control Samples (or spiked blanks) may also be analyzed by the analytical laboratory as part of overall quality control but the results are not used to qualify the sample data.

Matrix Spikes
Matrix spike recoveries have been used to evaluate possible low or high analytical bias on a matrix and batch-specific basis. Matrix spikes are analyzed with metals, organics and selected conventionals parameters (see Table 2).

Laboratory Replicate Samples
Replicate analysis (laboratory duplicates or triplicates) is used as an indicator of method precision and is used to qualify data on an analyte and batch-specific basis. Not all replicate data are used, however, as an indicator for data qualification. Only sets of replicate results which include at least one result greater than the RDL are considered for data qualification. These guidelines have been used to account for the fact that precision obtained near the detection limit is not representative of precision obtained throughout the entire analytical range.

Surrogates
Surrogate recoveries have been used to evaluate possible low or high analytical bias on a sample-specific basis. Surrogates are only analyzed for organic parameters.

Data Qualifiers
The data qualification system used for this data submission is presented in Table 3. These data qualifiers address situations that require qualification and generally conform to QA1 guidance. Changes made to SRM data qualification have been discussed with and approved by the Sediment Management Unit of Ecology. The qualifiers shown in Table 3 are also used for the Sedqual electronic data format (except for <MDL and <RDL).

Units and Significant Figures
Data have been reported in accordance with laboratory policy at the time of data generation. Data generally have been reported to three significant figures if above the RDL and two significant figures if equal to or below the RDL.

SAMPLE COLLECTION

This section describes sampling activities associated with the collection of 8 composite sediment samples on April 30, 2002. All sampling activities were conducted following guidance suggested in the Puget Sound Estuarine Protocols (PSEP, 1996 and 1998).

Sampling Locations and Station Positioning

Sampling locations (stations) were selected and the prescribed coordinates determined prior to field activities. Stations were selected to match the historical sampling locations for this on-going monitoring project. The prescribed station coordinates are presented in the following table. Also presented in the table are the actual coordinates recorded during sampling activities. All station coordinates are recorded in state plane coordinate system North American Datum 1983 (NAD83).

Lab ID #	Station Name	Prescribed Northing	Field Northing	Prescribed Easting	Field Easting
L23995-1, -2	NFK501	190170	190167	1278584	1278589
			190164		1278588
			190163		1278589
L23995-3, -4	NFK502	190159	190153	1278514	1278510
			190158		1278511
			190157		1278519
L23995-5, -6	NFK503	190195	190181	1278544	1278538
			190178		1278547
			190173		1278550
L23995-7, -8	NFK504	190080	190072	1278625	1278624
			190075		1278622
			190075		1278620

Sediment grab samples were collected from the King County research vessel *Chinook*, which is equipped with a differential global positioning system (DGPS). Field coordinates were recorded using DGPS for each acceptable deployment of the grab sampler as it contacted the sediment. Coordinates for each grab sampler deployment are included in the previous table.

The average coordinates for the sampler deployments are within 6 meters (19 feet) of the prescribed coordinates. Sampling at Stations NFK501 and NFK503 were slightly offset to the north due to low water levels.

Sample Description Table

Lab Sample #	Locator	Sample Collection	Sediment Depth used for Composite (from surface)	Sample Usage
L23995-1	NFK501	Surface Grabs	2 cm	Chemistry
L23995-2	NFK501	Surface Grabs	10 cm	Chemistry
L23995-3	NFK502	Surface Grabs	2 cm	Chemistry
L23995-4	NFK502	Surface Grabs	10 cm	Chemistry
L23995-5	NFK503	Surface Grabs	2 cm	Chemistry
L23995-6	NFK503	Surface Grabs	10 cm	Chemistry
L23995-7	NFK504	Surface Grabs	2 cm	Chemistry
L23995-8	NFK504	Surface Grabs	10 cm	Chemistry

Sample Collection and Handling

Eight composite samples in total were collected April 30, 2002 from the Norfolk Sediment Cap Monitoring Project site using a stainless steel, modified, 0.1 m^2 dual Van Veen grab sampler deployed from the *Chinook* via hydrowire. For each deployment, samples were collected from both the top 2 cm and top 10 cm of sediment, each from separate Van Veen samplers. Water depth at the four stations ranged between 1 to 2 meters (not corrected for tide). The depth of the grab deployments from the sediment surface ranged from 11 to 14 cm.

Samples were comprised of sediment aliquots collected from three individual grabs at each station with approximately an equal amount of material collected from each grab. The top 2cm samples were collected using a 200 cm2 "cookie cutter" and stainless steel spatula. The 10cm samples were collected using a stainless steel spoon. Both 2cm and 10cm aliquots were taken from each Van Veen cast by sampling each fraction (2cm or 10cm) from a different side of the Van Veen sampler. Each of the aliquots were placed into a separate stainless-steel bowl, covered with foil between grab deployments. After collecting aliquots from three grabs, the sediment sample was thoroughly homogenized and sample aliquots split out into pre-labeled containers. Sample containers were supplied by the King County Environmental Laboratory and were pre-cleaned according to analytical specifications.

Individual sets of sample compositing equipment were dedicated to each station precluding the need for decontamination of the field gear. The Van Veen grab sampler was decontaminated between stations by scrubbing with a brush and ambient water followed by a thorough *in situ* rinsing.

Samples were stored in ice-filled coolers from the time of collection until delivery to the King County Environmental Laboratory. Samples were delivered under chain-of-custody and were maintained as such throughout the analytical process. Samples were stored frozen (-18°C) by the laboratory until analysis with the exception of samples for particle size distribution (PSD) analysis. PSD samples were stored refrigerated at approximately 4°C. A more complete description of sample handling and storage can be found in each analytical chemistry section of this narrative.

CONVENTIONAL ANALYSES

Completeness
Conventional data are reported for all samples and parameters summarized in Table 1. These samples were analyzed in association with the complete set of QC samples outlined in Table 2.

Subcontracted Analyses
Analysis for PSD was subcontracted to AmTest, Inc. in Redmond, Washington.

Methods
PSD analysis was performed in accordance with ASTM and Puget Sound Protocols methodologies (*Recommended Protocols for Measuring Conventional Sediment Variables in Puget Sound* - page 9 - PSEP, 1986). TOC analysis was performed in accordance with SM5310-B. Total solids analysis were performed in accordance with SM2540-B.

Detection Limits, Units and Significant Figures
For analyses performed at the KC Laboratory, data are reported in accordance with laboratory policy at the time the data were generated. Data are reported to three significant figures for results greater than the RDL and two significant figures for results equal to or less than the RDL. For results reported with less than two or three significant figures, significant zeroes are implied. This may not apply to subcontracted data.

Storage Conditions and Holding Times
Sample storage conditions and holding times have been evaluated using guidelines established during the Third Annual PSDDA Review Meeting. The dates and holding time criteria for the actual storage conditions used for conventional analyses are listed in the table below.

Parameter	Lab ID#	Date Collected	Date Extracted	Date Analyzed	Sample Holding Time	Extract Holding Time
Particle Size Distribution	L23995-1,2,3,4,5,6,7,8	30-Apr-02	NA	06-May-02	6 Months at 4°C	NA
Total Solids	L23995-1,2,3,4,6,7,8 L23995-5	30-Apr-02	NA	07-May-02 08-May-02	6 months at -18°C	NA
Total Organic Carbon	L23995-1,2,3,4,6,7,8 L23995-5	30-Apr-02 30-Apr-02	01-May-02* 01-May-02*	03-May-02 06-May-02	6 months at -18°C	6 months at -18°C

* Sample preparation start date for TOC

Sample storage conditions and holding times were met for all samples in this data submission.

Method Blanks
Method blanks were analyzed in connection with solids and total organic carbon analyses. All method blanks results were less than the MDL.

Standard Reference Materials
An SRM (Buffalo River Sediment) was analyzed in connection with TOC analysis. The percent recovery for the SRM analysis was within the 80 to 120% QC limits.

Matrix Spikes
The selected analytical methods run on these samples do not require matrix spikes.

Laboratory Replicate Samples

Laboratory triplicate samples were analyzed for all conventional parameters. The percent relative standard deviations (%RSD) for all triplicate analyses were less than or equal to the 20% QC limit with the exception of PSD.

The %RSD for the gravel and clay portion of the PSD measurement is greater than 20%. These categories represent less than 10% of the total particle distribution of the sample. Higher variability is expected for categories that represent 10% of less of the total mass. The results have been flagged with an "E" qualifier.

METALS CHEMISTRY

Completeness
Metal chemistry data are reported for all samples and parameters summarized in Table 1. These samples were analyzed for mercury and other metals in association with the complete set of QC samples outlined in Table 2.

Subcontracted Analyses
There were no subcontracted metals analyses for these samples.

Methods
Mercury analysis was performed in accordance with EPA Method 7471. Analysis for other metals was performed in accordance with EPA Methods 3050/6010.

Target List
The reported target list includes all metals specified in Table 1.

Detection Limits, Units and Significant Figures
For analyses performed at the KC Laboratory, data are reported in accordance with laboratory policy at the time the data were generated. Data are reported to three significant figures for results greater than the RDL and two significant figures for results equal to or less than the RDL. For results reported with less than two or three significant figures, significant zeroes are implied. This may not apply to subcontracted data.

Storage Conditions and Holding Times
Sample storage conditions and holding times have been evaluated using guidelines established during the Third Annual PSDDA Review Meeting. The dates and holding time criteria for the actual storage conditions used for metals analyses are listed in the table below.

Parameter	Lab ID#	Date Collected	Date Digested/ Extracted	Date Analyzed	Sample Holding Time	Digestate/Extract Holding Time
Total Metals	L23995-1 to –8	4/30/02	6/04/02	6/05/02, 6/14/02	2 Years at -18°C	6 months
Total Mercury	L23995-1 to –8	4/30/02	5/14/02	5/17/02	28 days at -18°C	NA

Sample storage conditions and holding times were met for all samples in this data submission.

Method Blanks
All metals method blanks results were less than the MDL

Standard Reference Materials
The SRM analyzed in association with samples included in this data submission is Buffalo River Sediment. This SRM is not certified for Silver, Aluminum, Beryllium, Iron or Thallium. An SRM recovery less than the QC limit of 80% for ICP metals has not been used to qualify data because the digestion technique used for ICP analysis is different from the technique used during analysis to determine the SRM values. Only SRM recoveries greater than 120% will be used to qualify ICP data.

All total ICP metals SRM recoveries were less than the QC limit of 120%. All total mercury SRM recoveries were within the QC limits of 80-120%.

Matrix Spikes

The reported matrix spike recovery of 242% for aluminum is greater than the 125% upper QC limit. Aluminum results for all samples in this data submission have been qualified with the *L* flag. The reported matrix spike recovery of 64% for iron is less than the 75% lower QC limit. Iron results for all samples in this data submission have been qualified with the *G* flag. For the matrix spike, the background concentrations were significantly higher than the spike levels. Variability in the background levels may be responsible for the unacceptable recoveries rather than a true bias.

Laboratory Replicate Samples

The relative percent differences (RPDs) for laboratory duplicate results for all metals were less than or equal to the QC limit of 20%.

ORGANIC CHEMISTRY

Completeness

Organics data are reported for all samples and parameters summarized in Table 1. These samples were analyzed in association with the complete set of QC samples outlined in Table 2.

Methods

BNA analysis was performed in accordance with EPA method 8270. PCB analysis was performed in accordance with EPA methods 8082.

Target List

The reported BNA target list includes all compounds specified in *Table 1 - Marine Sediment Quality Standards Chemical Criteria* and *Table 3 - Puget Sound Marine Sediment Cleanup Screening Levels Chemical Criteria* contained in Chapter 173-204 WAC with the exception of benzo(j)fluoranthene. The KC Laboratory has verified that analytical conditions are sufficient to calculate a total benzofluoranthene result using the reported *b* and *k* isomers.

Reported PCB data include Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260.

Detection Limits, Units and Significant Figures

For analyses performed at the KC Laboratory, data are reported in accordance with laboratory policy at the time the data were generated. Data are reported to three significant figures for results greater than the RDL and two significant figures for results equal to or less than the RDL. For results reported with less than two or three significant figures, significant zeroes are implied.

Storage Conditions and Holding Times

Sample storage conditions and holding times have been evaluated using guidelines established during the Third Annual PSDDA Review Meeting. The dates and holding time criteria for the actual storage conditions used for conventional analyses are listed in the table below.

Parameter	Lab ID#	Date Collected	Date Extracted	Date Analyzed	Sample Holding Time	Extract Holding Time
BNAs	L23995-1 to -8	4/30/02	5/10/02	5/14/02	1 year at -18°C	40 days at 4°C
PCBs	L23995-1 to -8	4/30/02	5/1/02	5/6/02	1 year at -18°C	40 days at 4°C

Sample storage conditions and holding times were met for all samples in this data submission.

Method Blanks

1. BNAs

The method blank analyzed with BNAs for L23995 had results above the MDL for 1,4-Dichlorobenzene, Bis(2-Ethylhexyl) Phthalate and Di-N-butyl Phthalate. Sample results for 1,4-Dichlorobenzene, Bis(2-Ethylhexyl) Phthalate and Di-N- Butyl Phthalate for that batch (L23995) have been qualified with the B flag. All 1,4-Dichlorobenzene, Bis(2-Ethylhexyl) Phthalate and Di-N-Butyl Phthalate results for these samples must be treated as estimated values.

All other method blank results (PCBs) were less than the MDL.

Surrogate Recoveries

1. BNA
BNA sample data are qualified when the average surrogate recovery for either or both the acid and base/neutral fractions are outside the 50 to 150% QC limits. All average surrogate recoveries (acid and base neutral) were within the acceptable recovery range for all surrogate compounds.

2. PCB
PCB sample data are qualified when both surrogate recoveries are outside QC limits. At least one PCB surrogate recovery was within the 50 to 150% QC limits for all samples in this data submission.

Standard Reference Materials

1. BNA
The sediment SRM analyzed in association with the reported BNA results is SRM 1944a, certified by the National Institute of Standards and Technology (NIST). Only a partial list of BNA parameters have certified values in SRM 1944a and therefore only those are used to qualify the data. Results for this partial list of compounds for the one batch of samples have been qualified based on the SRM recoveries outside the 80 to 120% QC limits. The recoveries and flags are summarized in the following table.

	L23995-1 to 8	
Compound	**% Recovery**	**Flag**
Naphthalene	17	G
Phenanthrene	82	
Anthracene	51	G
Fluoranthene	87	
Pyrene	81	
Benzo(a)anthracene	84	
Chrysene	103	
Benzo(b)fluoranthene	102	
Benzo(k)fluoranthene	114	
Benzo(a)pyrene	93	
Indeno(1,2,3-c,d)pyrene	75	G
Dibenzo(a,h)anthracene	104	
Benzo(g,h,i)perylene	62	G

2. PCB
The sediment SRM analyzed in association with the reported PCB results is HS-2, certified by the National Research Council of Canada. SRM HS-2 has a certified value for Aroclor 1254. The recovery of the certified parameters must be within 80 to 120% or the appropriate data are flagged. The SRM results for the batch of analyses is summarized below:

	L23995-1 to 8	
Compound	**% Recovery**	**Flag**
Aroclor 1254	118	

Matrix Spikes

1. BNA

The matrix spike recoveries for each BNA compound must be within the 50 to 150% QC limits. If not, all results for those particular compounds within the batch of samples must be flagged as follows. A G flag is applied if the recovery is between 10 and 50%, an X flag is applied if less than 10% recovery and an L flag is applied if greater than 150% recovery. The following table summarizes the matrix spike recoveries for specific compounds that are outside the QC limits and the appropriate flag.

	L23995-1 to 8	
Compound	**% Recovery**	*Flag*
2,4-Dimethyl phenol	47	G
Aniline	33	G

2. PCB

The matrix spike recoveries for PCB compounds must be within the 50 to 150% QC limits. A G flag is applied if the recovery is between 10 and 50%, an X flag is applied if less than 10% recovery and an L flag is applied if greater than 150% recovery. Aroclor 1260 and 1016 only are used as the spiking compounds for PCB analysis.

All PCB matrix spike recoveries are within the QC limits.

Laboratory Replicate Samples

Lab Replicate (duplicate) samples for Organics have a target acceptance limit 100% for the Relative Percent Difference (RPD). All duplicate analyses showed acceptable RPD values except for the following:

1. BNAs
   No RPD limits were exceeded for the compounds reported.

2. PCBs
   The RPD for Aroclor 1260 was 147%. The sample was difficult to mix and very non-homogeneous. All Aroclor 1260 results were flagged "E" for estimated concentrations.

TABLE 1
SEDIMENT SAMPLE INVENTORY

Sample	Locator / Description (see SAP)	PSD	Solids	TOC	Metals[1]	BNA[2]	PCB	Comments
L23995-1	NFK501/Norfolk CSO channel, 0-2 cm	X	X	X	X	X	X	
L23995-2	NFK501/Norfolk CSO channel, 0-10 cm	X	X	X	X	X	X	
L23995-3	NFK502/Delta of CSO channel, 0-2 cm	X	X	X	X	X	X	
L23995-4	NFK502/Delta of CSO channel, o0-10 cm	X	X	X	X	X	X	
L23995-5	NFK503/Boeing SD channel, 0-2 cm	X	X	X	X	X	X	
L23995-6	NFK503/Boeing SD channel, 0-10 cm	X	X	X	X	X	X	
L23995-7	NFK504/Upriver of CSO, 0-2 cm	X	X	X	X	X	X	
L23995-8	NFK504/Upriver of CSO, 0-10 cm	X	X	X	X	X	X	

1 Metals = Hg, Al, As, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, Tl, Zn, Fe
2 BNA = includes Chlorobenzenes

TABLE 2
QC SAMPLE FREQUENCY FOR SEDIMENT CHEMICAL AND PHYSICAL PARAMETERS

Parameter	Method Blank	Duplicate	Triplicate	Matrix Spike	SRM	Surrogates
PSD	No	10% of samples	10% of samples	No	No	No
Total Solids	1 per QC batch	5% minimum, 1 per QC batch	5% minimum, 1 per QC batch	No	No	No
TOC	1 per QC batch	5% minimum, 1 per QC batch	5% minimum, 1 per QC batch	No	1 per QC batch	No
Metals	1 per QC batch	5% minimum, 1 per QC batch	No	5% minimum, 1 per QC batch	1 per QC batch	No
BNA (w/ Chlorobenzenes)	1 per QC batch	5% minimum, 1 per QC batch	No	5% minimum, 1 per QC batch	1 per QC batch	Yes
PCB	1 per QC batch	5% minimum, 1 per QC batch	No	5% minimum, 1 per QC batch	1 per QC batch	Yes

TABLE 3 - SUMMARY OF SEDIMENT DATA QUALIFIERS

Condition to Qualify	Flag	Organic QC Limits	Metal QC Limits	Conventional QC Limits	Comment
Very low matrix spike recovery	X	< 10 %	< 10 %	< 10 %	
low matrix spike recovery	G	< 50%	< 75%	< 75% *	
High matrix spike recovery	L	> 150%	>125%	>125% *	
low standard reference material recovery	G	< 80%	NA	< 80%	
High standard reference material recovery	L	>120%	>120%	>120%	
High duplicate relative percent difference	E	>100 %	>20%	NA	for organics and metals
High triplicate relative standard deviation	E	NA	NA	> 20 %	for conventionals
less than the reporting detection limit	<RDL **	NA	NA	NA	
less than the method detection limit	<MDL **	NA	NA	NA	
Contamination reported in blank	B	>MDL	>MDL	>MDL	
Biased data based on very low surrogate recoveries	X	all fraction surrogates <10%	NA	NA	average surrogate recovery for BNA
Biased data based on low surrogate recoveries	G	all fraction surrogates <50%	NA	NA	average surrogate recovery for BNA
Biased data based on high surrogate recoveries	L	all fraction surrogates >150%	NA	NA	average surrogate recovery for BNA
Rejected - unusable for all purposes	R	NA	NA	NA	
a sample handling criteria has not been met	H	NA	NA	NA	container, hold time, preservation

65% to 135% for Total Sulfides.

** For Sedqual files, <MDL uses a "U" flag, <RDL is not flagged.

CONVENTIONAL ANALYSES QC DATA

METRO Environmental Laboratory

WORK GROUP REPORT (wk02)

Jul 03 2002, 02:25 pm

Work Group: WG61919 (TOTS for NORFOLK) for Department: 3 - Conventionals

Created: 06-MAY-02 Due: Operator: SVM

Sample	Project Number	Project Description	PKey	C	Product	Matrix	Stat	UA	Workdate	Duedate
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	TOTS	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	TOTS	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	TOTS	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	TOTS	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	TOTS	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	TOTS	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	TOTS	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	TOTS	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
WG61919-1	MB			S	TOTS	OTHR SOLID	DONE	U	06-MAY-02	
WG61919-2	LD		SED	S	TOTS	SALTWTRSED	DONE	U	06-MAY-02	
WG61919-3	LT		SED	S	TOTS	SALTWTRSED	DONE	U	06-MAY-02	
WG61919-4	MB			S	TOTS	OTHR SOLID	DONE	U	09-MAY-02	

Comments:

L23995-1	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-2	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-3	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-4	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-5	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-6	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-7	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-8	3 - 1/2 Grab Composite, 0 - 10 cm
WG61919-1	MB 020506
WG61919-2	L23995-1
WG61919-3	WG61919-2 L23995-1
WG61919-4	MB 020509

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 07/03/02 02:27
Run ID: R80474 Workgroup: WG61919 (TOTS for NORFOLK)

MB:WG61919-1 Matrix: OTHR SOLID Listtype: CVTOTS Method: SM2540-G (03-01-007-001) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Total Solids	.005	.01	%	<MDL	

LD:WG61919-2 LT:WG61919-3 L23995-1 Matrix: SALTWTRSED Listtype: CVTOTS Method: SM2540-G (03-01-007-001) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	LD Value	% Rec.	Qual	Limits	Truevalue	LT Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Total Solids	.005	.01	%	47.4		47.6					46.8				1		20

MB:WG61919-4 Matrix: OTHR SOLID Listtype: CVTOTS Method: SM2540-G (03-01-007-001) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Total Solids	.005	.01	%	<MDL	

METRO Environmental Laboratory

WORK GROUP REPORT (wk02)

Jul 03 2002, 02:26 pm

Work Group: WG61856 (toc) for Department: 3 - Conventionals

Created: 01-MAY-02 Due: Operator: casey

Sample	Project Number	Project Description	PKey	C	Product	Matrix	Stat	UA	Workdate	Duedate
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	TOC	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	TOC	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	TOC	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	TOC	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	TOC	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	TOC	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	TOC	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	TOC	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
WG61856-1	MB			S	TOC	OTHR SOLID	DONE	U	07-MAY-02	
WG61856-10	MS		SED	S	TOC	SALTWTRSED	DONE	U	07-MAY-02	
WG61856-2	SRM			S	TOC	OTHR SOLID	DONE	U	07-MAY-02	
WG61856-4	LD		SED	S	TOC	SALTWTRSED	DONE	U	07-MAY-02	
WG61856-5	LT		SED	S	TOC	SALTWTRSED	DONE	U	07-MAY-02	
WG61856-7	MB			S	TOC	OTHR SOLID	DONE	U	07-MAY-02	
WG61856-8	SRM			S	TOC	OTHR SOLID	DONE	U	07-MAY-02	

Comments:

L23995-1	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-2	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-3	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-4	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-5	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-6	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-7	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-8	3 - 1/2 Grab Composite, 0 - 10 cm
WG61856-10	L23995-5
WG61856-2	HICONC
WG61856-4	L23995-2
WG61856-5	WG61856-4 L23995-2
WG61856-8	HICONC

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 07/03/02 02:27
Run ID: R80356 Workgroup: WG61856 (toc)

MB:WG61856-1 Matrix: OTHR SOLID Listtype: CVTOC Method: EPA9060-PSEP96 (03-04-002-001) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Total Organic Carbon	500	1000	mg/Kg	<MDL	

SRM:WG61856-2 Matrix: OTHR SOLID Listtype: CVTOC Method: EPA9060-PSEP96 (03-04-002-001) Project: PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	SRM Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Total Organic Carbon	2500	5000	mg/Kg		33480	35300	105		80-120			

LD:WG61856-4 LT:WG61856-5 L23995-2 Matrix: SALTWTRSED Listtype: CVTOC Method: EPA9060-PSEP96 (03-04-002-001) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	LD Value	% Rec.	Qual	Limits	Truevalue	LT Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Total Organic Carbon	1000	2000	mg/Kg	11400		10900					12000				4		20

MB:WG61856-7 Matrix: OTHR SOLID Listtype: CVTOC Method: EPA9060-PSEP96 (03-04-002-001) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Total Organic Carbon	500	1000	mg/Kg	<MDL	

SRM:WG61856-8 Matrix: OTHR SOLID Listtype: CVTOC Method: EPA9060-PSEP96 (03-04-002-001) Project: PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	SRM Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Total Organic Carbon	2500	5000	mg/Kg		33480	36100	108		80-120			

MS:WG61856-10 L23995-5 Matrix: SALTWTRSED Listtype: CVTOC Method: EPA9060-PSEP96 (03-04-002-001) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	MS Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Total Organic Carbon	1000	2000	mg/Kg	12400	4605	16300	85		75-125			

METRO Environmental Laboratory

WORK GROUP REPORT (wk02)

Jul 03 2002, 02:26 pm

Work Group: WG62211 (psd(amtest)) for Department: 3 - Conventionals

Created: 22-MAY-02 Due: Operator: kr

Sample	Project Number	Project Description	PKey	C	Product	Matrix	Stat	UA	Workdate	Duedate
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	PSD	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	PSD	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	PSD	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	PSD	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	PSD	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	PSD	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	PSD	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	PSD	SALTWTRSED	DONE	I	30-APR-02	14-JUN-02

Comments:

L23995-1	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-2	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-3	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-4	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-5	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-6	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-7	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-8	3 - 1/2 Grab Composite, 0 - 10 cm

PSD Lab Triplicate Summary

phi size	Enter Sample Data as phi size											Flag
	L23995-4	L23995-4 dup	L23995-4 trip			L23995-4	L23995-4 dup	L23995-4 trip				
<-2	0	0	0.1						Average	STD DEV	%RSD	
-2	0	0	0		% gravel	0.9	0.5	0.4	0.6	0.3	44.1	E
-1	0.9	0.5	0.3		% sand	96.8	98.2	98.3	97.8	0.8	0.9	
0	3.6	4.3	4.3		% silt	1.6	1.4	1.2	1.4	0.2	14.3	
1	44.7	47.4	46.9		% clay	0.6	0	0	0.2	0.3	173.2	E
2	45.1	44	44.8									
3	3	2.4	2.2		total =	99.9	100.1	99.9				
4	0.4	0.1	0.1									
5	1.6	0.7	0.5									
6	0	0	0									
7	0	0.7	0.7									
8	0	0	0									
9	0	0	0									
10	0	0	0									
>10	0.6	0	0									
% gravel = <-2 to -1												
% sand = 0 to +4												
% silt = +5 to +8												
% clay = +9 to >10												
Note: If the RSD is > 20% for a category, the data for that category should be flagged with E.												

AMTEST

Lab I.D.			02-A005343	02-A05343dup	02-A05343trip	
Client I.D.						RPD%
phi/screen/open						
		4.75	0.0	0.0	0.1	0.00
-2	5	4.0	0.0	0.0	0.0	0.00
-1	10	1.7	0.9	0.5	0.3	57.56
0	16	1.0	3.6	4.3	4.3	9.75
+1	35	0.5	44.7	47.4	46.9	3.03
+2	60	.25	45.1	44.0	44.8	1.36
+3	120	.125	3.0	2.4	2.2	16.06
+4	230	.063	0.4	0.1	0.1	68.67
phi/hydrmtr/dia						
+5		.032	1.6	0.7	0.5	61.66
+6		.016	0.0	0.0	0.0	0.00
+7		.008	0.0	0.7	0.7	86.60
+8		.004	0.0	0.0	0.0	0.00
+9		.002	0.0	0.0	0.0	0.00
+10		.001	0.0	0.0	0.0	0.00
pass			0.6	0.0	0.0	173.21
% SUM			100.0	100.0	100.0	0.00
Total Solids:			77.10%	76.20%	76.50%	0.60

AMTEST LABORATORIES

AmTest Inc.

14603 N.E. 87th St.
Redmond, WA
98052

Tel: 425 885 1664

Fax: 425 883 3495

METHODOLOGY REPORT

AM TEST ID 02-A005340
CLIENT ID L23995-1

MATRIX : Biosolids
SAMPLED: 4/30/02

ANALYTE	UNITS	METHOD NUMBER	METHOD REFERENCE	DETECTION LIMIT *	DATE OF ANALYSIS
Grain Size	% Retained	D422	ASTM	0.10	5/ 6/02
Total Solids	%	2540B	SM	0.10	5/ 7/02
Grain Size	% Retained	D422	ASTM	0.10	5/ 6/02
Total Solids	%	2540B	SM	0.10	5/ 7/02
Grain Size	% Retained	D422	ASTM	0.10	5/ 6/02
Total Solids	%	2540B	SM	0.10	5/ 7/02
Grain Size	% Retained	D422	ASTM	0.10	5/ 6/02
Total Solids	%	2540B	SM	0.10	5/ 7/02
Grain Size	% Retained	D422	ASTM	0.10	5/ 6/02
Total Solids	%	2540B	SM	0.10	5/ 7/02
Grain Size	% Retained	D422	ASTM	0.10	5/ 6/02
Total Solids	%	2540B	SM	0.10	5/ 7/02
Grain Size	% Retained	D422	ASTM	0.10	5/ 6/02
Total Solids	%	2540B	SM	0.10	5/ 7/02

SM = Standard Methods for the Examination of Water and Wastewater 18th ed.
SW-846 = Test Methods for Evaluating Solid Waste Physical/Chemical Methods
EPA = Methods for Chemical Analysis of Water and Wastes 1983
* Instrument Detection Limit

METAL CHEMISTRY QC DATA

METRO Environmental Laboratory

WORK GROUP REPORT (wk02)

Jul 03 2002, 02:26 pm

Work Group: WG62440 (Norfolk - 6/4/02) for Department: 6 - Metals, Trace

Created: 05-JUN-02 Due: Operator: ST

Sample	Project Number	Project Description	PKey	C	Product	Matrix	Stat	UA	Workdate	Duedate
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	AG-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	AL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	AS-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	CD-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	FE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	NI-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	PB-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	CU-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	CR-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	ZN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	TL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	SE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	BE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	MN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	AG-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	CR-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	FE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	NI-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	SE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	PB-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	ZN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	TL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	MN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	CU-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	AS-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	BE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	AL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	CD-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	AG-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	BE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	CD-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	CU-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	MN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	PB-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	TL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	ZN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	SE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	NI-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	FE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	CR-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	AL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	AS-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	ZN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	MN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	FE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	CU-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	CR-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	CD-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	BE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	AS-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	AL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	TL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	SE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	PB-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	NI-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	AG-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	AG-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	CD-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	CU-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	MN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	PB-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02

METRO Environmental Laboratory

WORK GROUP REPORT (wk02)

Jul 03 2002, 02:26 pm

Work Group: WG62440 (Norfolk - 6/4/02) for Department: 6 - Metals, Trace

Created: 05-JUN-02 Due: Operator: ST

Sample	Project Number	Project Description	PKey	C	Product	Matrix	Stat	UA	Workdate	Duedate
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	TL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	SE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	ZN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	NI-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	FE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	CR-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	BE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	AL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	AS-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	SE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	MN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	FE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	CU-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	CR-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	CD-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	BE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	AS-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	AL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	PB-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	NI-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	AG-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	TL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	ZN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	AG-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	AL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	AS-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	BE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	CD-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	CR-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	CU-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	FE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	MN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	NI-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	PB-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	SE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	TL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	ZN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	AG-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	AL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	TL-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	CR-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	FE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	NI-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	SE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	PB-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	MN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	CU-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	ZN-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	AS-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	BE-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	CD-ICP	SALTWTRSED	DONE	I	14-JUN-02	14-JUN-02
WG62440-1	SB			S	ROUTINE ICP	BLANK WTR	DONE	U	05-JUN-02	
WG62440-2	MB			S	ROUTINE ICP	BLANK WTR	DONE	U	05-JUN-02	
WG62440-3	LCS			S	ROUTINE ICP	SOIL	DONE	U	05-JUN-02	
WG62440-4	SRM		SED	S	ROUTINE ICP	SALTWTRSED	DONE	U	05-JUN-02	
WG62440-5	LD		SED	S	ROUTINE ICP	SALTWTRSED	DONE	U	05-JUN-02	
WG62440-6	MS		SED	S	ROUTINE ICP	SALTWTRSED	DONE	U	05-JUN-02	
WG62440-7	SDIL		SED	S	ROUTINE ICP	SALTWTRSED	DONE	U	05-JUN-02	

Comments:

METRO Environmental Laboratory

WORK GROUP REPORT (wk02)

Jul 03 2002, 02:26 pm

Work Group: WG62440 (Norfolk - 6/4/02) for Department: 6 - Metals, Trace

Created: 05-JUN-02 Due: Operator: ST

Sample	Project Number Project Description	PKey	C	Product	Matrix	Stat	UA	Workdate	Duedate
L23995-1	3 - 1/2 Grab Composite, 0 - 2 cm								
L23995-2	3 - 1/2 Grab Composite, 0 - 10 cm								
23995-3	3 - 1/2 Grab Composite, 0 - 2 cm								
23995-4	3 - 1/2 Grab Composite, 0 - 10 cm								
23995-5	3 - 1/2 Grab Composite, 0 - 2 cm								
L23995-6	3 - 1/2 Grab Composite, 0 - 10 cm								
L23995-7	3 - 1/2 Grab Composite, 0 - 2 cm								
23995-8	3 - 1/2 Grab Composite, 0 - 10 cm								
62440-1	WG62440-2 ICP200								
G62440-2	METHOD BLANK								
WG62440-3	ERA SOIL								
G62440-4	PACS1								
G62440-5	L23995-4 RPD-SOL								
62440-6	L23995-4 ICP200								
WG62440-7	L23995-4 5X								

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 07/03/02 02:50
Run ID: R81540 Workgroup: WG62440 (Norfolk - 6/4/02)

SB:WG62440-1 MB:WG62440-2 Matrix: BLANK WTR Listtype: MTICP-SED Method: EPA3050A/6010B (06-02-004-002) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Truevalue	SB Value	% Rec.	Qual	Limits	Truevalue	Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Silver, Total, ICP	.004	.02	mg/L	<MDL	1.2	1.15	95		85-115								
Aluminum, Total, ICP	.1	.5	mg/L	<MDL	12	11.5	96		85-115								
Arsenic, Total, ICP	.05	.25	mg/L	<MDL	4	3.75	94		85-115								
Beryllium, Total, ICP	.001	.005	mg/L	<MDL	0.4	.379	95		85-115								
Cadmium, Total, ICP	.003	.015	mg/L	<MDL	1.2	1.09	90		85-115								
Chromium, Total, ICP	.005	.025	mg/L	<MDL	1.2	1.13	94		85-115								
Copper, Total, ICP	.004	.02	mg/L	<MDL	1.2	1.14	95		85-115								
Iron, Total, ICP	.05	.25	mg/L	<MDL	50	47.2	94		85-115								
Manganese, Total, ICP	.002	.01	mg/L	<MDL	5	4.83	97		85-115								
Nickel, Total, ICP	.02	.1	mg/L	<MDL	1.2	1.11	93		85-115								
Lead, Total, ICP	.03	.15	mg/L	<MDL	4	3.67	92		85-115								
Selenium, Total, ICP	.05	.25	mg/L	<MDL	2	1.87	94		85-115								
Thallium, Total, ICP	.2	1	mg/L	<MDL	4	3.6	90		85-115								
Zinc, Total, ICP	.005	.025	mg/L	<MDL	4.2	4.52	108		85-115								

MB:WG62440-2 Matrix: BLANK WTR Listtype: MTICP-SED Method: EPA3050A/6010B (06-02-004-002) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Silver, Total, ICP	.004	.02	mg/L	<MDL	
Aluminum, Total, ICP	.1	.5	mg/L	<MDL	
Arsenic, Total, ICP	.05	.25	mg/L	<MDL	
Beryllium, Total, ICP	.001	.005	mg/L	<MDL	
Cadmium, Total, ICP	.003	.015	mg/L	<MDL	
Chromium, Total, ICP	.005	.025	mg/L	<MDL	
Copper, Total, ICP	.004	.02	mg/L	<MDL	
Iron, Total, ICP	.05	.25	mg/L	<MDL	
Manganese, Total, ICP	.002	.01	mg/L	<MDL	
Nickel, Total, ICP	.02	.1	mg/L	<MDL	
Lead, Total, ICP	.03	.15	mg/L	<MDL	
Selenium, Total, ICP	.05	.25	mg/L	<MDL	
Thallium, Total, ICP	.2	1	mg/L	<MDL	
Zinc, Total, ICP	.005	.025	mg/L	<MDL	

LCS:WG62440-3 Matrix: SOIL Listtype: MTICP-SED Method: EPA3050A/6010B (06-02-004-002) Project: PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	LCS Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Aluminum, Total, ICP	24	120	mg/Kg		4800	3910	81		120			
Arsenic, Total, ICP	12	60.1	mg/Kg		53.2	57	106		120			
Beryllium, Total, ICP	.24	1.2	mg/Kg		68.3	70.1	103		120			
Cadmium, Total, ICP	.72	3.61	mg/Kg		151	154	102		120			
Chromium, Total, ICP	1.2	6.01	mg/Kg		99.4	95.9	97		120			
Copper, Total, ICP	.96	4.81	mg/Kg		59.2	59.1	100		120			
Iron, Total, ICP	12	60.1	mg/Kg		9880	8430	85		120			
Nickel, Total, ICP	4.8	24	mg/Kg		63.3	64.9	102		120			
Lead, Total, ICP	7.2	36.1	mg/Kg		97.8	103	106		120			
Selenium, Total, ICP	12	60.1	mg/Kg		143	148	104		120			
Zinc, Total, ICP	1.2	6.01	mg/Kg		123	117	95		120			

SRM:WG62440-4 Matrix: SALTWTRSED Listtype: MTICP-SED Method: EPA3050A/6010B (06-02-004-002) Project: PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	SRM Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Arsenic, Total, ICP	12	62.3	mg/Kg		211	167	79		120			
Cadmium, Total, ICP	.75	3.74	mg/Kg		2.38	1.9	81		120			
Chromium, Total, ICP	1.2	6.23	mg/Kg		113	50.8	45		120			
Copper, Total, ICP	1	4.98	mg/Kg		452	411	91		120			
Manganese, Total, ICP	.5	2.49	mg/Kg		470	258	55		120			
Nickel, Total, ICP	5	24.9	mg/Kg		44.1	30.8	70		120			
Lead, Total, ICP	7.5	37.4	mg/Kg		404	347	86		120			
Selenium, Total, ICP	12	62.3	mg/Kg		1.09	<MDL	0		120			
Zinc, Total, ICP	1.2	6.23	mg/Kg		824	697	85		120			

LD:WG62440-5 L23995-4 Matrix: SALTWTRSED Listtype: MTICP-SED Method: EPA3050A/6010B (06-02-004-002) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	LD Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Silver, Total, ICP	.2	1.02	mg/Kg	<MDL		<MDL						20
Aluminum, Total, ICP	5.1	25.4	mg/Kg	7080		6920				2		20
Arsenic, Total, ICP	2.5	12.7	mg/Kg	2.7		3.2						20
Beryllium, Total, ICP	.051	.254	mg/Kg	.13		.13						20
Cadmium, Total, ICP	.15	.762	mg/Kg	<MDL		<MDL						20
Chromium, Total, ICP	.25	1.27	mg/Kg	8.18		7.91				3		20
Copper, Total, ICP	.2	1.02	mg/Kg	9.07		8.41				8		20
Iron, Total, ICP	2.5	12.7	mg/Kg	14900		14600				2		20
Manganese, Total, ICP	.1	.508	mg/Kg	179		171				5		20
Nickel, Total, ICP	1	5.08	mg/Kg	9.85		9.37				5		20
Lead, Total, ICP	1.5	7.62	mg/Kg	3.5		3.5						20
Selenium, Total, ICP	2.5	12.7	mg/Kg	<MDL		<MDL						20
Thallium, Total, ICP	10	50.8	mg/Kg	<MDL		<MDL						20
Zinc, Total, ICP	.25	1.27	mg/Kg	35.7		35.9				1		20

MS:WG62440-6 L23995-4 Matrix: SALTWTRSED Listtype: MTICP-SED Method: EPA3050A/6010B (06-02-004-002) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	MS Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Silver, Total, ICP	.2	.991	mg/Kg	<MDL	1.2	55.9	94		75-125			
Aluminum, Total, ICP	5	24.8	mg/Kg	7080	12	8520	242	L	75-125			
Arsenic, Total, ICP	2.5	12.4	mg/Kg	2.7	4	188	93		75-125			
Beryllium, Total, ICP	.05	.248	mg/Kg	.13	.4	18.6	93		75-125			
Cadmium, Total, ICP	.15	.743	mg/Kg	<MDL	1.2	53.9	91		75-125			
Chromium, Total, ICP	.25	1.24	mg/Kg	8.18	1.2	62.7	92		75-125			
Copper, Total, ICP	.2	.991	mg/Kg	9.07	1.2	64.8	94		75-125			
Iron, Total, ICP	2.5	12.4	mg/Kg	14900	50	16500	64	G	75-125			
Manganese, Total, ICP	.099	.495	mg/Kg	179	5	406	91		75-125			
Nickel, Total, ICP	.99	4.95	mg/Kg	9.85	1.2	62.3	88		75-125			
Lead, Total, ICP	1.5	7.43	mg/Kg	3.5	4	180	89		75-125			
Selenium, Total, ICP	2.5	12.4	mg/Kg	<MDL	2	91.2	92		75-125			
Thallium, Total, ICP	9.9	49.5	mg/Kg	<MDL	4	171	86		75-125			

MS:WG62440-6 L23995-4 Matrix: SALTWTRSED Listtype: MTICP-SED Method: EPA3050A/6010B (06-02-004-002) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	MS Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Zinc, Total, ICP	.25	1.24	mg/Kg	35.7	4.2	255	105		75-125			

SDIL:WG62440-7 Matrix: SALTWTRSED Listtype: MTICP-SED Method: EPA3050A/6010B (06-02-004-002) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	SDIL Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits

METRO Environmental Laboratory

WORK GROUP REPORT (wk02)

Jul 03 2002, 02:26 pm

Work Group: WG62046 (Norfolk Clean-up Study) for Department: 6 - Metals, Trace

Created: 14-MAY-02 Due: Operator: SH

Sample	Project Number	Project Description	PKey	C	Product	Matrix	Stat	UA	Workdate	Duedate
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	HG-CVAA	SALTWTRSED	DONE	I	28-MAY-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	HG-CVAA	SALTWTRSED	DONE	I	28-MAY-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	HG-CVAA	SALTWTRSED	DONE	I	28-MAY-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	HG-CVAA	SALTWTRSED	DONE	I	28-MAY-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	HG-CVAA	SALTWTRSED	DONE	I	28-MAY-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	HG-CVAA	SALTWTRSED	DONE	I	28-MAY-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	HG-CVAA	SALTWTRSED	DONE	I	28-MAY-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	HG-CVAA	SALTWTRSED	DONE	I	28-MAY-02	14-JUN-02
WG62046-1	MB			S	HG-CVAA	BLANK WTR	DONE	U	14-MAY-02	
WG62046-2	SB			S	HG-CVAA	BLANK WTR	DONE	U	14-MAY-02	
WG62046-3	SRM		SED	S	HG-CVAA	SALTWTRSED	DONE	U	14-MAY-02	
WG62046-4	LD		SED	S	HG-CVAA	SALTWTRSED	DONE	U	14-MAY-02	
WG62046-5	MS		SED	S	HG-CVAA	SALTWTRSED	DONE	U	14-MAY-02	

Comments:

L23995-1	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-2	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-3	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-4	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-5	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-6	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-7	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-8	3 - 1/2 Grab Composite, 0 - 10 cm
WG62046-1	METHOD BLANK
WG62046-2	WG62046-1 HG-SOL
WG62046-3	PACS1
WG62046-4	L23995-4 RPD-SOL
WG62046-5	L23995-4 HG-SOL

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 07/03/02 02:51
Run ID: R80698 Workgroup: WG62046 (Norfolk Clean-up Study)

MB:WG62046-1 Matrix: BLANK WTR Listtype: MTHG-SED Method: EPA 245.5 (06-01-004-003) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Mercury, Total, CVAA	.0002	.002	mg/L	<MDL	

SB:WG62046-2 MB:WG62046-1 Matrix: BLANK WTR Listtype: MTHG-SED Method: EPA 245.5 (06-01-004-003) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Truevalue	SB Value	% Rec.	Qual	Limits	Truevalue	Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Mercury, Total, CVAA	.0002	.002	mg/L	<MDL	0.005	.00521	104		85-115								

SRM:WG62046-3 Matrix: SALTWTRSED Listtype: MTHG-SED Method: EPA 245.5 (06-01-004-003) Project: PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	SRM Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Mercury, Total, CVAA	.1	1	mg/Kg		4.57	4.51	99		120			

LD:WG62046-4 L23995-4 Matrix: SALTWTRSED Listtype: MTHG-SED Method: EPA 245.5 (06-01-004-003) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	LD Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Mercury, Total, CVAA	.019	.195	mg/Kg	<MDL		<MDL						20

MS:WG62046-5 L23995-4 Matrix: SALTWTRSED Listtype: MTHG-SED Method: EPA 245.5 (06-01-004-003) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	MS Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Mercury, Total, CVAA	.02	.197	mg/Kg	<MDL	.005	.51	104		75-125			

ORGANIC CHEMISTRY QC DATA

METRO Environmental Laboratory

WORK GROUP REPORT (wk02)

May 02 2002, 02:16 pm

Work Group: WG61857 (PPS#257 PCBLL) for Department: 7 - Organics, Trace

Created: 01-MAY-02 Due: Operator: GW/MM

Sample	Project Number	Project Description	PKey	C	Product	Matrix	Stat	UA	Workdate	Duedate
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	PCBLL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	PCBLL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
L23995-3	423056-160	Norfolk Cleanup Study	SED	S	PCBLL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
L23995-4	423056-160	Norfolk Cleanup Study	SED	S	PCBLL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	PCBLL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	PCBLL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
L23995-7	423056-160	Norfolk Cleanup Study	SED	S	PCBLL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
L23995-8	423056-160	Norfolk Cleanup Study	SED	S	PCBLL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
WG61857-1	MB			S	PCBLL	OTHR SOLID	PREP	U	01-MAY-02	
WG61857-2	SB			S	PCBLL	OTHR SOLID	PREP	U	01-MAY-02	
WG61857-3	MS		SED	S	PCBLL	SALTWTRSED	PREP	U	01-MAY-02	
WG61857-4	MSD		SED	S	PCBLL	SALTWTRSED	PREP	U	01-MAY-02	
WG61857-5	LD		SED	S	PCBLL	SALTWTRSED	PREP	U	01-MAY-02	
WG61857-6	SRM		SED	S	PCBLL	SALTWTRSED	PREP	U	01-MAY-02	

Comments:

L23995-1	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-2	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-3	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-4	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-5	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-6	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-7	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-8	3 - 1/2 Grab Composite, 0 - 10 cm
WG61857-1	MB020501
WG61857-2	WG61857-1
WG61857-3	L23995-4
WG61857-4	WG61857-3 L23995-4
WG61857-5	L23995-1
WG61857-6	HS2

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 05/14/02 02:17
Run ID: R80601 Workgroup: WG61857 (PPS#257 PCBLL)

A/m 5/15/02

MB:WG61857-1 Matrix: OTHR SOLID Listtype: ORPCBLL Method: EPA 8081A/8082 (7-3-03-002) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Aroclor 1016	2	4	ug/Kg	<MDL	
Aroclor 1221	4	8	ug/Kg	<MDL	
Aroclor 1232	4	8	ug/Kg	<MDL	
Aroclor 1242	2	4	ug/Kg	<MDL	
Aroclor 1248	2	4	ug/Kg	<MDL	
Aroclor 1254	2	4	ug/Kg	<MDL	
Aroclor 1260	2	4	ug/Kg	<MDL	

SB:WG61857-2 MB:WG61857-1 Matrix: OTHR SOLID Listtype: ORPCBLL Method: EPA 8081A/8082 (7-3-03-002) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Truevalue	SB Value	% Rec.	Qual	Limits	Truevalue	Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limit
Aroclor 1016	2	4	ug/Kg	<MDL	25	18.3	73		50-150								
Aroclor 1260	2	4	ug/Kg	<MDL	25	20.5	82		50-150								

MS:WG61857-3 MSD:WG61857-4 L23995-4 Matrix: SALTWTRSED Listtype: ORPCBLL Method: EPA 8081A/8082 (7-3-03-002) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	MS Value	% Rec.	Qual	Limits	Truevalue	MSD Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limit
Aroclor 1016	2	4	ug/Kg	<MDL	25	26.5	106		50-150	25	24.1	96		50-150	10		100
Aroclor 1260	2	4	ug/Kg	<MDL	25	22.9	91		50-150	25	23.2	93		50-150	2		100

LD:WG61857-5 L23995-1 Matrix: SALTWTRSED Listtype: ORPCBLL Method: EPA 8081A/8082 (7-3-03-002) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	LD Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limit
Aroclor 1016	2	4	ug/Kg	<MDL		<MDL						100
Aroclor 1221	4	8	ug/Kg	<MDL		<MDL						100
Aroclor 1232	4	8	ug/Kg	<MDL		<MDL						100
Aroclor 1242	2	4	ug/Kg	<MDL		<MDL						100
Aroclor 1248	2	4	ug/Kg	20.6		18.3				12		100
Aroclor 1254	2	4	ug/Kg	23.6		25.3				7		100
Aroclor 1260	2	4	ug/Kg	35.3		5.4				147	E	100

SRM:WG61857-6 Matrix: SALTWTRSED Listtype: ORPCBLL Method: EPA 8081A/8082 (7-3-03-002) Project: PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	SRM Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limit
Aroclor 1254	8	16	ug/Kg		111.8	132	118		80-120			

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 05/14/02 02:17
Run ID: R80601 Workgroup: WG61857 (PPS#257 PCBLL)

Sample #	2,4,5,6-Tetrachlo-ro-m-xylene 50-150	Decachlorobipheny-l 50-150
L23995-1	98	92
L23995-2	94	93
L23995-3	90	90
L23995-4	98	89
L23995-5	94	90
L23995-6	90	89
L23995-7	91	92
L23995-8	99	99
WG61857-1	81	94
WG61857-2	65	109
WG61857-3	84	90
WG61857-4	87	91
WG61857-5	85	88
WG61857-6	103	105

METRO Environmental Laboratory

WORK GROUP REPORT (wk02)

May 14 2002, 08:19 am

Work Group: WG61943 (BS#122-BNALL) for Department: 7 - Organics, Trace

Created: 10-MAY-02 Due: Operator: lm/gw

mple	Project Number	Project Description	PKey	C	Product	Matrix	Stat	UA	Workdate	Duedate
L23995-1	423056-160	Norfolk Cleanup Study	SED	S	BNALL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
L23995-2	423056-160	Norfolk Cleanup Study	SED	S	BNALL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
3995-3	423056-160	Norfolk Cleanup Study	SED	S	BNALL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
3995-4	423056-160	Norfolk Cleanup Study	SED	S	BNALL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
L23995-5	423056-160	Norfolk Cleanup Study	SED	S	BNALL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
L23995-6	423056-160	Norfolk Cleanup Study	SED	S	BNALL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
3995-7	423056-160	Norfolk Cleanup Study	SED	S	BNALL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
3995-8	423056-160	Norfolk Cleanup Study	SED	S	BNALL	SALTWTRSED	PREP	U	14-MAY-02	14-JUN-02
61943-1	MB			S	BNALL	OTHR SOLID	PREP	U	07-MAY-02	
WG61943-2	SB			S	BNALL	OTHR SOLID	PREP	U	07-MAY-02	
WG61943-3	MS		SED	S	BNALL	SALTWTRSED	PREP	U	07-MAY-02	
61943-4	MSD		SED	S	BNALL	SALTWTRSED	PREP	U	07-MAY-02	
61943-5	SRM			S	BNALL	OTHR SOLID	PREP	U	07-MAY-02	
61943-6	LD		SED	S	BNALL	SALTWTRSED	PREP	U	07-MAY-02	

Comments:

3995-1	3 - 1/2 Grab Composite, 0 - 2 cm
23995-2	3 - 1/2 Grab Composite, 0 - 10 cm
L23995-3	3 - 1/2 Grab Composite, 0 - 2 cm
23995-4	3 - 1/2 Grab Composite, 0 - 10 cm
3995-5	3 - 1/2 Grab Composite, 0 - 2 cm
3995-6	3 - 1/2 Grab Composite, 0 - 10 cm
23995-7	3 - 1/2 Grab Composite, 0 - 2 cm
L23995-8	3 - 1/2 Grab Composite, 0 - 10 cm
61943-1	MB050802
61943-2	WG61943-1
61943-3	L23995-3
WG61943-4	WG61943-3 L23995-3
WG61943-5	1944
61943-6	L23995-6

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 06/05/02 11:36
Run ID: R81234 Workgroup: WG61943 (BS#122-BNALL)

A/M
6/6/02

MB:WG61943-1 Matrix: OTHR SOLID Listtype: ORBNALL Method: EPA 3550B/8270C (7-3-01-004) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
N-Nitrosodimethylamine	20	40	ug/Kg	<MDL	
Phenol	9	18	ug/Kg	<MDL	
Bis(2-Chloroethyl)Ether	15	30	ug/Kg	<MDL	
2-Chlorophenol	8	16	ug/Kg	<MDL	
1,3-Dichlorobenzene	.26	.53	ug/Kg	<MDL	
1,4-Dichlorobenzene	.13	.264	ug/Kg	.56	B
1,2-Dichlorobenzene	.26	.53	ug/Kg	<MDL	
Bis(2-Chloroisopropyl)Ether	15	30	ug/Kg	<MDL	
N-Nitrosodi-N-Propylamine	9	18	ug/Kg	<MDL	
Hexachloroethane	15	30	ug/Kg	<MDL	
Nitrobenzene	16	32	ug/Kg	<MDL	
Isophorone	19	38	ug/Kg	<MDL	
2-Nitrophenol	15	30	ug/Kg	<MDL	
2,4-Dimethylphenol	7	14	ug/Kg	<MDL	
Bis(2-Chloroethoxy)Methane	17	34	ug/Kg	<MDL	
2,4-Dichlorophenol	16	32	ug/Kg	<MDL	
1,2,4-Trichlorobenzene	.26	.53	ug/Kg	<MDL	
Naphthalene	14	28	ug/Kg	<MDL	
Hexachlorobutadiene	.75	1.5	ug/Kg	<MDL	
2,4,6-Trichlorophenol	13	26	ug/Kg	<MDL	
2-Chloronaphthalene	16	32	ug/Kg	<MDL	
Acenaphthylene	15	30	ug/Kg	<MDL	
Dimethyl Phthalate	11	22	ug/Kg	<MDL	
2,6-Dinitrotoluene	10	20	ug/Kg	<MDL	
Acenaphthene	7	14	ug/Kg	<MDL	
2,4-Dinitrotoluene	3	6	ug/Kg	<MDL	
Fluorene	13	26	ug/Kg	<MDL	
Diethyl Phthalate	6	12	ug/Kg	<MDL	
4-Chlorophenyl Phenyl Ether	13	26	ug/Kg	<MDL	
N-Nitrosodiphenylamine	20	40	ug/Kg	<MDL	
1,2-Diphenylhydrazine	10	20	ug/Kg	<MDL	
4-Bromophenyl Phenyl Ether	9	18	ug/Kg	<MDL	
Hexachlorobenzene	.66	1.33	ug/Kg	<MDL	
Pentachlorophenol	5	10	ug/Kg	<MDL	
Phenanthrene	4	8	ug/Kg	<MDL	
Anthracene	4	8	ug/Kg	<MDL	
Di-N-Butyl Phthalate	5	10	ug/Kg	<MDL	
Fluoranthene	8	16	ug/Kg	<MDL	
Pyrene	4	8	ug/Kg	<MDL	
Benzyl Butyl Phthalate	6	12	ug/Kg	18	B
Benzo(a)anthracene	2	4	ug/Kg	<MDL	
Chrysene	4	8	ug/Kg	<MDL	
Bis(2-Ethylhexyl)Phthalate	6.7	14	ug/Kg	53.4	B
Di-N-Octyl Phthalate	8	16	ug/Kg	<MDL	
Benzo(b)fluoranthene	3	6	ug/Kg	<MDL	
Benzo(k)fluoranthene	3	6	ug/Kg	<MDL	
Benzo(a)pyrene	3	6	ug/Kg	<MDL	
Indeno(1,2,3-Cd)Pyrene	9	18	ug/Kg	<MDL	
Dibenzo(a,h)anthracene	7	14	ug/Kg	<MDL	
Benzo(g,h,i)perylene	8	16	ug/Kg	<MDL	
Aniline	19	38	ug/Kg	<MDL	

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 06/05/02 11:36
Run ID: R81234 Workgroup: WG61943 (BS#122-BNALL)

MB:WG61943-1 Matrix: OTHR SOLID Listtype: ORBNALL Method: EPA 3550B/8270C (7-3-01-004) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Qual
Benzyl Alcohol	6	12	ug/Kg	<MDL	
2-Methylphenol	19	38	ug/Kg	<MDL	
4-Methylphenol	16	32	ug/Kg	<MDL	
Benzoic Acid	6	12	ug/Kg	<MDL	
2-Methylnaphthalene	14	28	ug/Kg	<MDL	
2,4,5-Trichlorophenol	12	24	ug/Kg	<MDL	
Dibenzofuran	14	28	ug/Kg	<MDL	
Carbazole	7	14	ug/Kg	<MDL	
Coprostanol	14	28	ug/Kg	<MDL	
Caffeine	6	12	ug/Kg	<MDL	

SB:WG61943-2 MB:WG61943-1 Matrix: OTHR SOLID Listtype: ORBNALL Method: EPA 3550B/8270C (7-3-01-004) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Truevalue	SB Value	% Rec.	Qual	Limits	Truevalue	Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
N-Nitrosodimethylamine	20	40	ug/Kg	<MDL	133.3333	109	82		50-150								100
Phenol	9	18	ug/Kg	<MDL	133.3333	111	83		50-150								100
Bis(2-Chloroethyl)Ether	15	30	ug/Kg	<MDL	133.3333	97.8	73		50-150								100
2-Chlorophenol	8	16	ug/Kg	<MDL	133.3333	114	85		50-150								100
1,3-Dichlorobenzene	.26	.53	ug/Kg	<MDL	133.3333	96.8	73		50-150								100
1,4-Dichlorobenzene	.13	.264	ug/Kg	.56	133.3333	92.8	69		50-150								100
1,2-Dichlorobenzene	.26	.53	ug/Kg	<MDL	133.3333	99.4	75		50-150								100
Bis(2-Chloroisopropyl)Ether	15	30	ug/Kg	<MDL	133.3333	107	80		50-150								100
N-Nitrosodi-N-Propylamine	9	18	ug/Kg	<MDL	133.3333	97.8	73		50-150								100
Hexachloroethane	15	30	ug/Kg	<MDL	133.3333	82.7	62		50-150								100
Nitrobenzene	16	32	ug/Kg	<MDL	133.3333	126	95		50-150								100
Isophorone	19	38	ug/Kg	<MDL	133.3333	87.4	66		50-150								100
2-Nitrophenol	15	30	ug/Kg	<MDL	133.3333	106	79		50-150								100
2,4-Dimethylphenol	7	14	ug/Kg	<MDL	133.3333	47.1	35	*	50-150								100
Bis(2-Chloroethoxy)Methane	17	34	ug/Kg	<MDL	133.3333	115	86		50-150								100
2,4-Dichlorophenol	16	32	ug/Kg	<MDL	133.3333	109	82		50-150								100
1,2,4-Trichlorobenzene	.26	.53	ug/Kg	<MDL	133.3333	98.8	74		50-150								100
Naphthalene	14	28	ug/Kg	<MDL	133.3333	100	75		50-150								100
Hexachlorobutadiene	.75	1.5	ug/Kg	<MDL	133.3333	96.8	73		50-150								100
2,4,6-Trichlorophenol	13	26	ug/Kg	<MDL	133.3333	84.9	64		50-150								100
2-Chloronaphthalene	16	32	ug/Kg	<MDL	133.3333	114	86		50-150								100
Acenaphthylene	15	30	ug/Kg	<MDL	133.3333	110	83		50-150								100
Dimethyl Phthalate	11	22	ug/Kg	<MDL	133.3333	106	79		50-150								100
2,6-Dinitrotoluene	10	20	ug/Kg	<MDL	133.3333	108	81		50-150								100
Acenaphthene	7	14	ug/Kg	<MDL	133.3333	111	83		50-150								100
2,4-Dinitrotoluene	3	6	ug/Kg	<MDL	133.3333	110	82		50-150								100
Fluorene	13	26	ug/Kg	<MDL	133.3333	122	92		50-150								100
Diethyl Phthalate	6	12	ug/Kg	<MDL	133.3333	114	86		50-150								100
4-Chlorophenyl Phenyl Ether	13	26	ug/Kg	<MDL	133.3333	108	81		50-150								100
N-Nitrosodiphenylamine	20	40	ug/Kg	<MDL	133.3333	110	83		50-150								100
1,2-Diphenylhydrazine	10	20	ug/Kg	<MDL	133.3333	117	88		50-150								100
4-Bromophenyl Phenyl Ether	9	18	ug/Kg	<MDL	133.3333	116	87		50-150								100
Hexachlorobenzene	.66	1.33	ug/Kg	<MDL	133.3333	103	77		50-150								100
Pentachlorophenol	5	10	ug/Kg	<MDL	133.3333	79.5	60		50-150								100
Phenanthrene	4	8	ug/Kg	<MDL	133.3333	110	83		50-150								100

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 06/05/02 11:36
Run ID: R81234 Workgroup: WG61943 (BS#122-BNALL)

SB:WG61943-2 MB:WG61943-1 Matrix: OTHR SOLID Listtype: ORBNALL Method: EPA 3550B/8270C (7-3-01-004) Project: PKey: SED

Parameter	Mdl	Rdl	Units	MB Value	Truevalue	SB Value	% Rec.	Qual	Limits	Truevalue	Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Anthracene	4	8	ug/Kg	<MDL	133.3333	113	85		50-150								100
Di-N-Butyl Phthalate	5	10	ug/Kg	<MDL	133.3333	130	98		50-150								100
Fluoranthene	8	16	ug/Kg	<MDL	133.3333	117	88		50-150								100
Pyrene	4	8	ug/Kg	<MDL	133.3333	132	99		50-150								100
Benzyl Butyl Phthalate	6	12	ug/Kg	18	133.3333	138	90		50-150								100
Benzo(a)anthracene	2	4	ug/Kg	<MDL	133.3333	115	86		50-150								100
Chrysene	4	8	ug/Kg	<MDL	133.3333	131	99		50-150								100
Bis(2-Ethylhexyl)Phthalate	6.7	14	ug/Kg	53.4	133.3333	197	108		50-150								100
Di-N-Octyl Phthalate	8	16	ug/Kg	<MDL	133.3333	129	97		50-150								100
Benzo(b)fluoranthene	3	6	ug/Kg	<MDL	133.3333	97.1	73		50-150								100
Benzo(k)fluoranthene	3	6	ug/Kg	<MDL	133.3333	146	109		50-150								100
Benzo(a)pyrene	3	6	ug/Kg	<MDL	133.3333	107	80		50-150								100
Indeno(1,2,3-Cd)Pyrene	9	18	ug/Kg	<MDL	133.3333	108	81		50-150								100
Dibenzo(a,h)anthracene	7	14	ug/Kg	<MDL	133.3333	101	76		50-150								100
Benzo(g,h,i)perylene	8	16	ug/Kg	<MDL	133.3333	82.1	62		50-150								100
Aniline	19	38	ug/Kg	<MDL	133.3333	55.3	41	*	50-150								100
Benzyl Alcohol	6	12	ug/Kg	<MDL	133.3333	93.3	70		50-150								100
2-Methylphenol	19	38	ug/Kg	<MDL	133.3333	83	62		50-150								100
4-Methylphenol	16	32	ug/Kg	<MDL	133.3333	115	87		50-150								100
Benzoic Acid	6	12	ug/Kg	<MDL	133.3333	<MDL	0	*	50-150								100
2-Methylnaphthalene	14	28	ug/Kg	<MDL	133.3333	118	89		50-150								100
2,4,5-Trichlorophenol	12	24	ug/Kg	<MDL	133.3333	100	75		50-150								100
Dibenzofuran	14	28	ug/Kg	<MDL	133.3333	113	85		50-150								100
Carbazole	7	14	ug/Kg	<MDL	133.3333	157	118		50-150								100
Coprostanol	14	28	ug/Kg	<MDL	1333.3333	643	48	*	50-150								100
Caffeine	6	12	ug/Kg	<MDL	133.3333	121	91		50-150								100

MS:WG61943-3 MSD:WG61943-4 L23995-3 Matrix: SALTWTRSED Listtype: ORBNALL Method: EPA 3550B/8270C (7-3-01-004) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	MS Value	% Rec.	Qual	Limits	Truevalue	MSD Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
N-Nitrosodimethylamine	20	40	ug/Kg	<MDL	133.3333	122	92		50-150	133.3333	107	80		50-150	14		100
Phenol	9	18	ug/Kg	<MDL	133.3333	112	84		50-150	133.3333	105	79		50-150	6		100
Bis(2-Chloroethyl)Ether	15	30	ug/Kg	<MDL	133.3333	96.6	72		50-150	133.3333	87.1	65		50-150	10		100
2-Chlorophenol	8	16	ug/Kg	<MDL	133.3333	118	88		50-150	133.3333	105	79		50-150	11		100
1,3-Dichlorobenzene	.26	.53	ug/Kg	<MDL	133.3333	90.7	68		50-150	133.3333	82.2	62		50-150	9		100
1,4-Dichlorobenzene	.13	.264	ug/Kg	.773	133.3333	88.4	66		50-150	133.3333	80.1	60		50-150	10		100
1,2-Dichlorobenzene	.26	.53	ug/Kg	<MDL	133.3333	94.2	71		50-150	133.3333	86.1	65		50-150	9		100
Bis(2-Chloroisopropyl)Ether	15	30	ug/Kg	<MDL	133.3333	105	79		50-150	133.3333	99.3	74		50-150	7		100
N-Nitrosodi-N-Propylamine	9	18	ug/Kg	<MDL	133.3333	98.2	74		50-150	133.3333	90.9	68		50-150	8		100
Hexachloroethane	15	30	ug/Kg	<MDL	133.3333	75.5	57		50-150	133.3333	68.9	52		50-150	9		100
Nitrobenzene	16	32	ug/Kg	<MDL	133.3333	118	89		50-150	133.3333	111	84		50-150	6		100
Isophorone	19	38	ug/Kg	<MDL	133.3333	86.3	65		50-150	133.3333	79.4	60		50-150	8		100
2-Nitrophenol	15	30	ug/Kg	<MDL	133.3333	105	78		50-150	133.3333	98.9	74		50-150	5		100
2,4-Dimethylphenol	7	14	ug/Kg	<MDL	133.3333	63	47	G	50-150	133.3333	59.5	45	*	50-150	4		100
Bis(2-Chloroethoxy)Methane	17	34	ug/Kg	<MDL	133.3333	109	82		50-150	133.3333	102	76		50-150	8		100
2,4-Dichlorophenol	16	32	ug/Kg	<MDL	133.3333	115	87		50-150	133.3333	105	79		50-150	10		100
1,2,4-Trichlorobenzene	.26	.53	ug/Kg	<MDL	133.3333	91	68		50-150	133.3333	85	64		50-150	6		100
Naphthalene	14	28	ug/Kg	<MDL	133.3333	94.7	71		50-150	133.3333	87.9	66		50-150	7		100
Hexachlorobutadiene	.75	1.5	ug/Kg	<MDL	133.3333	88.4	66		50-150	133.3333	83.1	62		50-150	6		100

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 06/05/02 11:37
Run ID: R81234 Workgroup: WG61943 (BS#122-BNALL)

MS:WG61943-3 MSD:WG61943-4 L23995-3 Matrix: SALTWTRSED Listtype: ORBNALL Method: EPA 3550B/8270C (7-3-01-004) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	MS Value	% Rec.	Qual	Limits	Truevalue	MSD Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
2,4,6-Trichlorophenol	13	26	ug/Kg	<MDL	133.3333	94.4	71		50-150	133.3333	87.8	66		50-150	7		100
2-Chloronaphthalene	16	32	ug/Kg	<MDL	133.3333	112	84		50-150	133.3333	104	78		50-150	7		100
Acenaphthylene	15	30	ug/Kg	<MDL	133.3333	108	81		50-150	133.3333	100	75		50-150	8		100
Dimethyl Phthalate	11	22	ug/Kg	<MDL	133.3333	108	81		50-150	133.3333	99.7	75		50-150	8		100
2,6-Dinitrotoluene	10	20	ug/Kg	<MDL	133.3333	111	83		50-150	133.3333	104	78		50-150	6		100
Acenaphthene	7	14	ug/Kg	<MDL	133.3333	106	80		50-150	133.3333	99.5	75		50-150	6		100
2,4-Dinitrotoluene	3	6	ug/Kg	<MDL	133.3333	113	85		50-150	133.3333	104	78		50-150	9		100
Fluorene	13	26	ug/Kg	<MDL	133.3333	123	93		50-150	133.3333	113	85		50-150	9		100
Diethyl Phthalate	6	12	ug/Kg	<MDL	133.3333	116	87		50-150	133.3333	107	80		50-150	8		100
4-Chlorophenyl Phenyl Ether	13	26	ug/Kg	<MDL	133.3333	109	82		50-150	133.3333	101	76		50-150	8		100
N-Nitrosodiphenylamine	20	40	ug/Kg	<MDL	133.3333	122	91		50-150	133.3333	114	85		50-150	7		100
1,2-Diphenylhydrazine	10	20	ug/Kg	<MDL	133.3333	117	88		50-150	133.3333	110	83		50-150	6		100
4-Bromophenyl Phenyl Ether	9	18	ug/Kg	<MDL	133.3333	119	89		50-150	133.3333	108	81		50-150	9		100
Hexachlorobenzene	.66	1.33	ug/Kg	<MDL	133.3333	104	78		50-150	133.3333	96.7	73		50-150	7		100
Pentachlorophenol	5	10	ug/Kg	<MDL	133.3333	97.2	73		50-150	133.3333	96.9	73		50-150	0		100
Phenanthrene	4	8	ug/Kg	<MDL	133.3333	115	87		50-150	133.3333	107	80		50-150	8		100
Anthracene	4	8	ug/Kg	<MDL	133.3333	119	90		50-150	133.3333	109	82		50-150	9		100
Di-N-Butyl Phthalate	5	10	ug/Kg	<MDL	133.3333	137	103		50-150	133.3333	127	95		50-150	8		100
Fluoranthene	8	16	ug/Kg	<MDL	133.3333	129	97		50-150	133.3333	118	88		50-150	10		100
Pyrene	4	8	ug/Kg	<MDL	133.3333	125	93		50-150	133.3333	134	100		50-150	7		100
Benzyl Butyl Phthalate	6	12	ug/Kg	<MDL	133.3333	130	97		50-150	133.3333	133	100		50-150	3		100
Benzo(a)anthracene	2	4	ug/Kg	6.11	133.3333	118	84		50-150	133.3333	113	80		50-150	5		100
Chrysene	4	8	ug/Kg	<MDL	133.3333	127	95		50-150	133.3333	122	92		50-150	3		100
Bis(2-Ethylhexyl)Phthalate	6.7	14	ug/Kg	26.1	133.3333	172	110		50-150	133.3333	178	114		50-150	4		100
Di-N-Octyl Phthalate	8	16	ug/Kg	<MDL	133.3333	118	89		50-150	133.3333	137	103		50-150	15		100
Benzo(b)fluoranthene	3	6	ug/Kg	7.84	133.3333	108	75		50-150	133.3333	107	74		50-150	1		100
Benzo(k)fluoranthene	3	6	ug/Kg	<MDL	133.3333	133	100		50-150	133.3333	121	91		50-150	9		100
Benzo(a)pyrene	3	6	ug/Kg	10.2	133.3333	109	74		50-150	133.3333	107	73		50-150	1		100
Indeno(1,2,3-Cd)Pyrene	9	18	ug/Kg	<MDL	133.3333	99.8	75		50-150	133.3333	89.2	67		50-150	11		100
Dibenzo(a,h)anthracene	7	14	ug/Kg	<MDL	133.3333	110	82		50-150	133.3333	98.6	74		50-150	10		100
Benzo(g,h,i)perylene	8	16	ug/Kg	<MDL	133.3333	90.1	68		50-150	133.3333	80.7	61		50-150	11		100
Aniline	19	38	ug/Kg	<MDL	133.3333	44	33	G	50-150	133.3333	40.4	30	*	50-150	10		100
Benzyl Alcohol	6	12	ug/Kg	<MDL	133.3333	92.6	69		50-150	133.3333	88.4	66		50-150	4		100
2-Methylphenol	19	38	ug/Kg	<MDL	133.3333	86.7	65		50-150	133.3333	81.5	61		50-150	6		100
4-Methylphenol	16	32	ug/Kg	<MDL	133.3333	81.7	61		50-150	133.3333	80.4	60		50-150	2		100
Benzoic Acid	6	12	ug/Kg	<MDL	133.3333	90.4	68		50-150	133.3333	89.1	67		50-150	1		100
2-Methylnaphthalene	14	28	ug/Kg	<MDL	133.3333	114	85		50-150	133.3333	106	79		50-150	7		100
2,4,5-Trichlorophenol	12	24	ug/Kg	<MDL	133.3333	104	78		50-150	133.3333	109	82		50-150	5		100
Dibenzofuran	14	28	ug/Kg	<MDL	133.3333	114	86		50-150	133.3333	105	79		50-150	8		100
Carbazole	7	14	ug/Kg	<MDL	133.3333	162	122		50-150	133.3333	145	109		50-150	11		100
Coprostanol	14	28	ug/Kg	<MDL	1333.3333	640	48	G	50-150	1333.3333	732	55		50-150	14		100
Caffeine	6	12	ug/Kg	<MDL	133.3333	124	93		50-150	133.3333	107	80		50-150	15		100

SRM:WG61943-5 Matrix: OTHR SOLID Listtype: ORBNALL Method: EPA 3550B/8270C (7-3-01-004) Project: PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	SRM Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Naphthalene	270	2800	ug/Kg		1629.3333	270	17	G	80-120			100
Phenanthrene	400	800	ug/Kg		5202.6667	4260	82		80-120			100
Anthracene	400	800	ug/Kg		1746.6667	883	51	G	80-120			100

SRM:WG61943-5 Matrix: OTHR SOLID Listtype: ORBNALL Method: EPA 3550B/8270C (7-3-01-004) Project: PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	SRM Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Fluoranthene	800	1600	ug/Kg		8802.6667	7630	87		80-120			100
Pyrene	400	800	ug/Kg		9573.3333	7740	81		80-120			100
Benzo(a)anthracene	200	400	ug/Kg		4658.6667	3900	84		80-120			100
Chrysene	400	800	ug/Kg		4797.3333	4960	103		80-120			100
Benzo(b)fluoranthene	300	600	ug/Kg		3818.6667	3910	102		80-120			100
Benzo(k)fluoranthene	300	600	ug/Kg		2269.3333	2600	114		80-120			100
Benzo(a)pyrene	300	600	ug/Kg		4242.6667	3930	93		80-120			100
Indeno(1,2,3-Cd)Pyrene	900	1800	ug/Kg		2744	2050	75	G	80-120			100
Dibenzo(a,h)anthracene	400	1400	ug/Kg		418.6667	440	104		80-120			100
Benzo(g,h,i)perylene	800	1600	ug/Kg		2802.6667	1740	62	G	80-120			100

LD:WG61943-6 L23995-6 Matrix: SALTWTRSED Listtype: ORBNALL Method: EPA 3550B/8270C (7-3-01-004) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	LD Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
N-Nitrosodimethylamine	20	40	ug/Kg	<MDL		<MDL						100
Phenol	9	18	ug/Kg	<MDL		<MDL						100
Bis(2-Chloroethyl)Ether	15	30	ug/Kg	<MDL		<MDL						100
2-Chlorophenol	8	16	ug/Kg	<MDL		<MDL						100
1,3-Dichlorobenzene	.26	.53	ug/Kg	<MDL		<MDL						100
1,4-Dichlorobenzene	.13	.264	ug/Kg	.72		.747				4		100
1,2-Dichlorobenzene	.26	.53	ug/Kg	<MDL		<MDL						100
Bis(2-Chloroisopropyl)Ether	15	30	ug/Kg	<MDL		<MDL						100
N-Nitrosodi-N-Propylamine	9	18	ug/Kg	<MDL		<MDL						100
Hexachloroethane	15	30	ug/Kg	<MDL		<MDL						100
Nitrobenzene	16	32	ug/Kg	<MDL		<MDL						100
Isophorone	19	38	ug/Kg	<MDL		<MDL						100
2-Nitrophenol	15	30	ug/Kg	<MDL		<MDL						100
2,4-Dimethylphenol	7	14	ug/Kg	<MDL		<MDL						100
Bis(2-Chloroethoxy)Methane	17	34	ug/Kg	<MDL		<MDL						100
2,4-Dichlorophenol	16	32	ug/Kg	<MDL		<MDL						100
1,2,4-Trichlorobenzene	.26	.53	ug/Kg	<MDL		<MDL						100
Naphthalene	14	28	ug/Kg	<MDL		<MDL						100
Hexachlorobutadiene	.75	1.5	ug/Kg	<MDL		<MDL						100
2,4,6-Trichlorophenol	13	26	ug/Kg	<MDL		<MDL						100
2-Chloronaphthalene	16	32	ug/Kg	<MDL		<MDL						100
Acenaphthylene	15	30	ug/Kg	<MDL		<MDL						100
Dimethyl Phthalate	11	22	ug/Kg	<MDL		<MDL						100
2,6-Dinitrotoluene	10	20	ug/Kg	<MDL		<MDL						100
Acenaphthene	7	14	ug/Kg	<MDL		<MDL						100
2,4-Dinitrotoluene	3	6	ug/Kg	<MDL		<MDL						100
Fluorene	13	26	ug/Kg	<MDL		<MDL						100
Diethyl Phthalate	6	12	ug/Kg	<MDL		<MDL						100
4-Chlorophenyl Phenyl Ether	13	26	ug/Kg	<MDL		<MDL						100
N-Nitrosodiphenylamine	20	40	ug/Kg	<MDL		<MDL						100
1,2-Diphenylhydrazine	10	20	ug/Kg	<MDL		<MDL						100
4-Bromophenyl Phenyl Ether	9	18	ug/Kg	<MDL		<MDL						100
Hexachlorobenzene	.66	1.33	ug/Kg	<MDL		<MDL						100
Pentachlorophenol	5	10	ug/Kg	<MDL		<MDL						100
Phenanthrene	4	8	ug/Kg	46.6		49.1				5		100

LD:WG61943-6 L23995-6 Matrix: SALTWTRSED Listtype: ORBNALL Method: EPA 3550B/8270C (7-3-01-004) Project: 423056-160 PKey: SED

Parameter	Mdl	Rdl	Units	SampValue	Truevalue	LD Value	% Rec.	Qual	Limits	RPD/RSD	Qual	Limits
Anthracene	4	8	ug/Kg	7		7.3						100
Di-N-Butyl Phthalate	5	10	ug/Kg	5		5.8						100
Fluoranthene	8	16	ug/Kg	100		103				3		100
Pyrene	4	8	ug/Kg	95.2		101				6		100
Benzyl Butyl Phthalate	6	12	ug/Kg	33.7		25.2				29		100
Benzo(a)anthracene	2	4	ug/Kg	38.4		35.8				7		100
Chrysene	4	8	ug/Kg	57.6		60.9				5		100
Bis(2-Ethylhexyl)Phthalate	6.7	14	ug/Kg	515		411				22		100
Di-N-Octyl Phthalate	8	16	ug/Kg	<MDL		<MDL						100
Benzo(b)fluoranthene	3	6	ug/Kg	56		53.3				5		100
Benzo(k)fluoranthene	3	6	ug/Kg	39.5		42.5				7		100
Benzo(a)pyrene	3	6	ug/Kg	44.4		45.3				2		100
Indeno(1,2,3-Cd)Pyrene	9	18	ug/Kg	26		27.2				5		100
Dibenzo(a,h)anthracene	7	14	ug/Kg	<MDL		7.9						100
Benzo(g,h,i)perylene	8	16	ug/Kg	19		27.7				37		100
Aniline	19	38	ug/Kg	<MDL		<MDL						100
Benzyl Alcohol	6	12	ug/Kg	<MDL		<MDL						100
2-Methylphenol	19	38	ug/Kg	<MDL		<MDL						100
4-Methylphenol	16	32	ug/Kg	<MDL		<MDL						100
Benzoic Acid	6	12	ug/Kg	88.7		117				28		100
2-Methylnaphthalene	14	28	ug/Kg	<MDL		<MDL						100
2,4,5-Trichlorophenol	12	24	ug/Kg	<MDL		<MDL						100
Dibenzofuran	14	28	ug/Kg	<MDL		<MDL						100
Carbazole	7	14	ug/Kg	12		14						100
Coprostanol	14	28	ug/Kg	183		191				4		100
Caffeine	6	12	ug/Kg	<MDL		<MDL						100

KING COUNTY METRO ENVIRONMENTAL LABORATORY
Lab QC Report - 06/05/02 11:37
Run ID: R81234 Workgroup: WG61943 (BS#122-BNALL)

Sample #	2-Fluorophenol		d5-Phenol		d5-Nitrobenzene		d4-2-Chlorophenol	d4-1,2-Dichlorobenzene	2-Fluorobiphenyl	2,4,6-Tribromophenol	d14-Terphenyl
	50-150		50-150		50-150		50-150	50-150	50-150	50-150	50-150
L23995-1	77	avg=80	69	avg=76.25	72		75	53	81	99	99
L23995-2	75	avg=81.25	69	avg=73.25	69		76	49	80	105	95
L23995-3	83	avg=78	70	avg=72.5	71		77	61	75	82	83
L23995-4	92	avg=85.5	76	avg=81.25	77		85	69	82	89	97
L23995-5	65	avg=70.5	61	avg=67.25	62		64	42	72	92	93
L23995-6	66	avg=71.5	64	avg=67.5	62		67	44	71	89	93
L23995-7	68	avg=71	57	avg=69.75	65		66	50	72	93	92
L23995-8	70	avg=68.25	52	avg=66.25	66		63	48	69	88	82
WG61943-1	92	avg=81	77	avg=86.75	81		85	75	89	70	102
WG61943-2	87	avg=83	86	avg=81	73		83	70	83	76	98
WG61943-3	87	avg=85.75	84	avg=76.75	69		85	66	80	87	92
WG61943-4	81	avg=79.75	78	avg=73.75	64		76	61	74	84	96
WG61943-5	84	avg=88	79	avg=79.75	78		86	64	85	103	92
WG61943-6	75	avg=80	73	avg=74.25	67		74	48	79	98	103