



Outer Harbour Sampling Results Summary

March 2026

This document is a laboratory analysis report detailing the testing and results of sediment samples for various chemical and physical parameters.

Overview of Sediment Analysis Report

This report presents comprehensive laboratory analysis results of sediment samples for various chemical and physical parameters, including moisture content, particle size, metal concentrations, hydrocarbons, and asbestos detection, conducted by SOCOTEC for Wick Harbour Authority under UKAS accreditation.

Sample Collection and Handling Procedures

The samples were collected and handled under specified conditions to ensure integrity.

- Sampled on 11-Mar-26, received on 16-Mar-26.
- Samples were kept cold and in satisfactory condition.
- The analysis was conducted at SOCOTEC's UKAS-accredited laboratories.
- The report emphasizes that opinions are outside UKAS scope and results apply only to received samples.

Physical and Particle Size Analysis

Assessment of sediment composition and moisture content.

- Total moisture at 120°C ranged from 26.8% to 28.0%.
- Total solids content was approximately 72-73%.
- Gravel (>2mm) ranged from 0.36% to 1.48%.
- Sand (63-2000 µm) was about 97.86% to 98.93%.
- Silt (<63 µm) was approximately 0.66% to 0.71%.
- Particle density was around 2.65 to 2.68 Mg/m³.

Heavy Metals Concentration Levels

Analysis of key metals in sediment samples.

- Arsenic levels ranged from 5.9 to 6.7 mg/Kg (Dry Weight).
- Cadmium was below detection limit (<0.04 mg/Kg).
- Chromium ranged from 16.3 to 17.9 mg/Kg.
- Copper levels were between 2.5 and 4.1 mg/Kg.
- Mercury was below 0.01 mg/Kg.
- Nickel ranged from 4.8 to 10.9 mg/Kg.
- Lead ranged from 24.0 to 33.6 mg/Kg.
- Zinc levels ranged from 24.0 to 33.6 mg/Kg.



- Certified reference materials showed recovery rates close to 100%, indicating accurate measurements.

Organic and Hydrocarbon Contaminants

Analysis of PAHs, hydrocarbons, and asbestos.

- Total Hydrocarbon Content (THC) ranged from 1460 to 1470 $\mu\text{g/Kg}$.
- PAH compounds such as Indeno[1,2,3-cd]pyrene and Pyrene showed varying concentrations, with some samples exceeding 25 $\mu\text{g/Kg}$.
- Asbestos was not detected (NAD) in all samples.
- Several PAHs and hydrocarbons were below detection limits, indicating low contamination levels.

Polycyclic Aromatic Hydrocarbons (PAHs) and PCB Levels

Detection of PAHs and PCBs in sediment.

- PAHs like Benzo[a]pyrene ranged from 1.81 to 2.22 $\mu\text{g/Kg}$.
- PCBs such as PCB28, PCB52, PCB101, PCB118, PCB138, PCB153, and PCB180 were all below 0.08 $\mu\text{g/Kg}$, indicating minimal PCB contamination.
- Results were consistent across samples, with some compounds below detection limits.

Trace Elements and Toxic Metals

Analysis of trace elements including arsenic, cadmium, chromium, copper, mercury, nickel, lead, and zinc.

- All elements were within typical environmental background levels.
- Mercury and cadmium were below detection limits.
- The data supports low risk of metal contamination in the sediment samples.

Analytical Methods and Quality Control

Details of analytical techniques and quality assurance.

- Methods included ICP-MS, GC-MS, and sieving, with accreditation under UKAS.
- Detection limits ranged from 0.02 to 1 $\mu\text{g/Kg}$ depending on the analyte.
- Recovery rates for certified reference materials were close to 100%, confirming method accuracy.
- Some peaks coelute (e.g., Benzo[k]fluoranthene with Benzo[j]fluoranthene, Chrysene with Triphenylene), which should be considered when interpreting results.
- No asbestos detected in any samples.
- Deviations such as holding time exceeded or sample contamination were not reported.

Report Notes and Considerations

Important notes for data interpretation.



- Analysis was conducted by both SOCOTEC and approved subcontracted laboratories.
- Results are specific to the samples received and analyzed.
- Some results are reported as percentage trueness due to surrogate standard use.
- The report emphasizes that results should be used with consideration of method limitations and coelution issues.
- The report includes detailed notes on sample handling, analysis procedures, and quality control measures.