Tracing lead in the marine environment

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Lead sources and the environment

Lead paint and other sources

Vehicle batteries

Household batteries

Vehicle emissions
Lead sources and the environment

Power generation

Urbanisation

Industrial impact
Tracing lead - unique lead fingerprints

Lead isotope ratios i.e. $^{208}\text{Pb}/^{204}\text{Pb}$ or $^{206}\text{Pb}/^{207}\text{Pb}$
Tracing lead - unique lead fingerprints
Antarctica….
pollution hotspots
Casey Station, East Antarctica

1957-58
(then Australia 1958-69)

1969-
Nearby non-impacted sites - natural lead

![Graph showing isotope ratio of Pb isotopes for different locations.](image)
Sediments near Casey - Australian lead

27 samples

- Brown Bay Inner
- Brown Bay Middle
- Brown Bay Outer
- Ref Values

Missouri Pb
Utah Pb
Idaho Pb
Broken Hill and Mt Isa

Sediment grab samples digested with HF
Sediments near Wilkes - US lead

Sediment grab samples digested with HF

- Idaho Pb
- Utah Pb
- Missouri Pb
- Broken Hill and Mt Isa Pb

24 samples

\[
\frac{^{208}\text{Pb}}{^{204}\text{Pb}} \quad \frac{^{206}\text{Pb}}{^{204}\text{Pb}}
\]
Lead isotopes as industrial source markers

Nyrstar Zinc refinery – Hobart, Tasmania

One of the world’s largest zinc refineries – est. 1917
Sediment core profiles - concentrations

1. 1917, Refinery established
2. 1970’s, Environmental controls
3. Present
Sediment core profiles - Lead isotope ratios

1. 1917, Broken Hill (BH) ore only
2. 1937, TAS ore added to BH ore
3. Approx. 65% BH : 35% TAS mix
4. Stricter environmental controls
5. 1984, Elura ore introduced
6. Present
Sediment core profiles - Lead isotope ratios

- Ore type reference signatures
- Derwent core sediments

- Elura Pb
- Rosebery & Hellyer Pb
- Century Pb
- Mt Isa Pb
- Broken Hill Pb

- Diagram showing the relationship between 206Pb/204Pb and 1/[Pb] (mg⁻¹ kg⁻¹)