

Widening the Esperance investigation

Mass bird deaths in Esperance starting last December sparked a wide environmental investigation by the Department of Environment and Conservation to determine the source of the lead that was revealed to have killed the birds, and the extent of the problem.

More than 250 environmental samples have been collected by DEC, including swabs of buildings, soil, grass, marine sediment and marine organisms, and sent to the Chemistry Centre for analysis. This sampling is indicative and more detailed soil and surface water sampling is required to determine the lead levels in townsite and surrounding areas. Further soil and surface water sampling will be carried out along rail and road corridors.

DEC and the Department of Health will also employ independent consultants to carry out a comprehensive human and ecological risk assessment.

Results have been released, as they became available, in DEC media statements issued on 26 March and 4 April. These and other results received are set out below.

Swabs from building windows

This testing provides a guide only to where further investigation may be required. DEC took a total of 126 swabs from 36 buildings. Of these, five swabs from two buildings were above the majority of other samples and will be investigated.

Min recorded	No reading for 50 swabs – below detection limit of $0.005 \mu\text{g}/\text{cm}^2$
Max recorded	1.4 $\mu\text{g}/\text{cm}^2$
Average (where lead was detected)	0.14 $\mu\text{g}/\text{cm}^2$

$\mu\text{g}/\text{cm}^2$ refers to micrograms per square centimetre

mg/kg refers to milligrams per kilogram, which is equivalent to parts per million

mg/L refers to milligrams per litre

Guidelines quoted are a range of different standards used by DEC and indicate trigger levels for further investigation

Marine sediments

Six samples were taken from a five square metre plot under the Esperance port's discharge pipe. While this is only a small area, the elevated lead and nickel levels recorded have led DEC to require the Port Authority to conduct a detailed site investigation to describe the full extent of the contamination so that a remediation plan can be considered.

	Lead	Nickel
Guideline levels for sediment quality	50 – 220 mg/kg	21 – 52 mg/kg
Under discharge pipe at port	3600 – 29,000 mg/kg	660 – 5900 mg/kg

Fish and sea tube worm samples

Guideline level for ecological investigation for fish	0.5mg/kg of lead
Sea worms	2.6 mg/kg
Herring*	0.091 mg/kg

*Further fish testing has been carried out by the Department of Health

Soil scans (initial)

The following results were obtained from a portable heavy metals detector, which has a lead detection limit of 65 mg/kg (readings less than this can have high errors).

Guideline for soil investigation level: ecological	300 mg/kg
Guideline for soil investigation level: human health, residential land, primary schools	300 mg/kg
Guideline for soil investigation level: human health, parks, recreational open spaces	600 mg/kg

Location of samples	Number of scans	Range of results
Port washdown areas above 300 mg/kg	10, of which 6 were	106 – 18,000 mg/kg
Areas close to port	49, of which 2 were above 300 mg/kg	No reading – 362.6 mg/kg
Schools	17, none of which were above 300 mg/kg	No reading – 100 mg/kg
Railway line	26, of which 5 were above 300 mg/kg	No reading – 1045 mg/kg



Soil samples sent to Chemistry Centre

	Lead	Nickel
Guidelines as for previous table		
Location of samples		
Beach outside port	<0.5 – 15 mg/kg	0.9 – 4.2 mg/kg
Along railway line	7.3 – 160 mg/kg (av. 72.98 mg/kg)	14 – 460 mg/kg (av. 144.3 mg/kg)

Water body and sediment samples

	Lead	Nickel
Guideline level for freshwater ecosystems	0.0034 mg/L	0.011 mg/L
Guideline levels for marine water ecosystems	0.0044 – 0.005 mg/L	0.007 mg/L
Location of samples		
Water from heavy metal washdown sump in port	0.028 – 0.074 mg/L	56 – 58 mg/L
Water bodies outside port	0.0006 – 0.51 mg/L (av. 0.079 mg/L)	0.003 – 0.54 mg/L (av. 0.15 mg/L)
Water body sediments outside port	No reading – 140 mg/kg (av. where lead was detected 76.6 mg/kg)	2.2 – 1200 mg/kg (av. 244.73 mg/kg)

Lead isotope testing

Lead has four naturally-occurring isotopes and the ratio in which these are found is unique to different ore bodies. DEC commissioned Macquarie University in Sydney in collaboration with the CSIRO Radiogenic Isotope Laboratory to analyse the lead 'fingerprint' for a range of samples.

In summary, the lead found in all the bird liver samples provided, water from four out of the five rainwater tank samples, and water from the heavy metal washdown sump at the port was similar to the ore sample collected.

The soil sediment sample provided was found to be a mixture of this lead and another, unknown geologically old source. The water from the fifth rainwater tank was found to be a mixture of the same lead and another, geologically younger source.

Pigeons

The pigeons collected from the port had lead levels in the liver ranging from 16 to 45 mg/kg wet weight. A pooled liver sample from the honeyeaters that died gave a reading of 51 mg/kg wet weight, and results from the lorikeets ranged from 11 to 98 mg/kg wet weight.

Leaf, flower and bird feathers

Preliminary results show high lead levels. The data suggest that dust was ingested from the flowers and preening, and the birds collected extra dust on their feathers from their activities in the foliage. Analysis of the results is continuing.

Summary

This preliminary environmental scan has found that lead has entered both the town and the port marine basin. However, the majority of samples are below the guidelines; although some higher results indicate the need for further investigation. Having evaluated the results the next steps are to conduct a more systematic sampling program and complete a health and ecological risk assessment. This will identify any areas that require a clean up or ongoing monitoring.