

Remobilisation of Lead and Nickel Residues in Esperance

**Report of the Working Group to the
Steering Committee of the
Esperance Cleanup and Recovery
Project**

Project Scope

Purpose – to determine if

- **lead**
- **and/or nickel** [harder, with ongoing export]
- **residues in the Esperance townsite**
[includes remobilisation from port to town]
- **are being** [concentrated on recent data]
- **remobilised.** [includes by air, water and by human or animal activity].

Data sets reviewed

Air

- Deposition Gauges (EsPA)
- Hivol samplers (EsPA)

Rainwater

- 1539 tanks, 2007 (DOH/UWA/Shire)
- 5 tanks, monthly (EsPA)

Homes

- 21 homes, 2007, 09 (DOH)
- 11 homes, 2008 (LED)

Vegetation

- Leaves, flowers '08, '09 (DEC)

Bird feathers

- 4 sites, '07, '08 (ConsCouncilWA)

Playgrounds

- 10 sites, '08, '09 (Shire)

Bees - too late, site not known.

Golder Report - not reviewed.

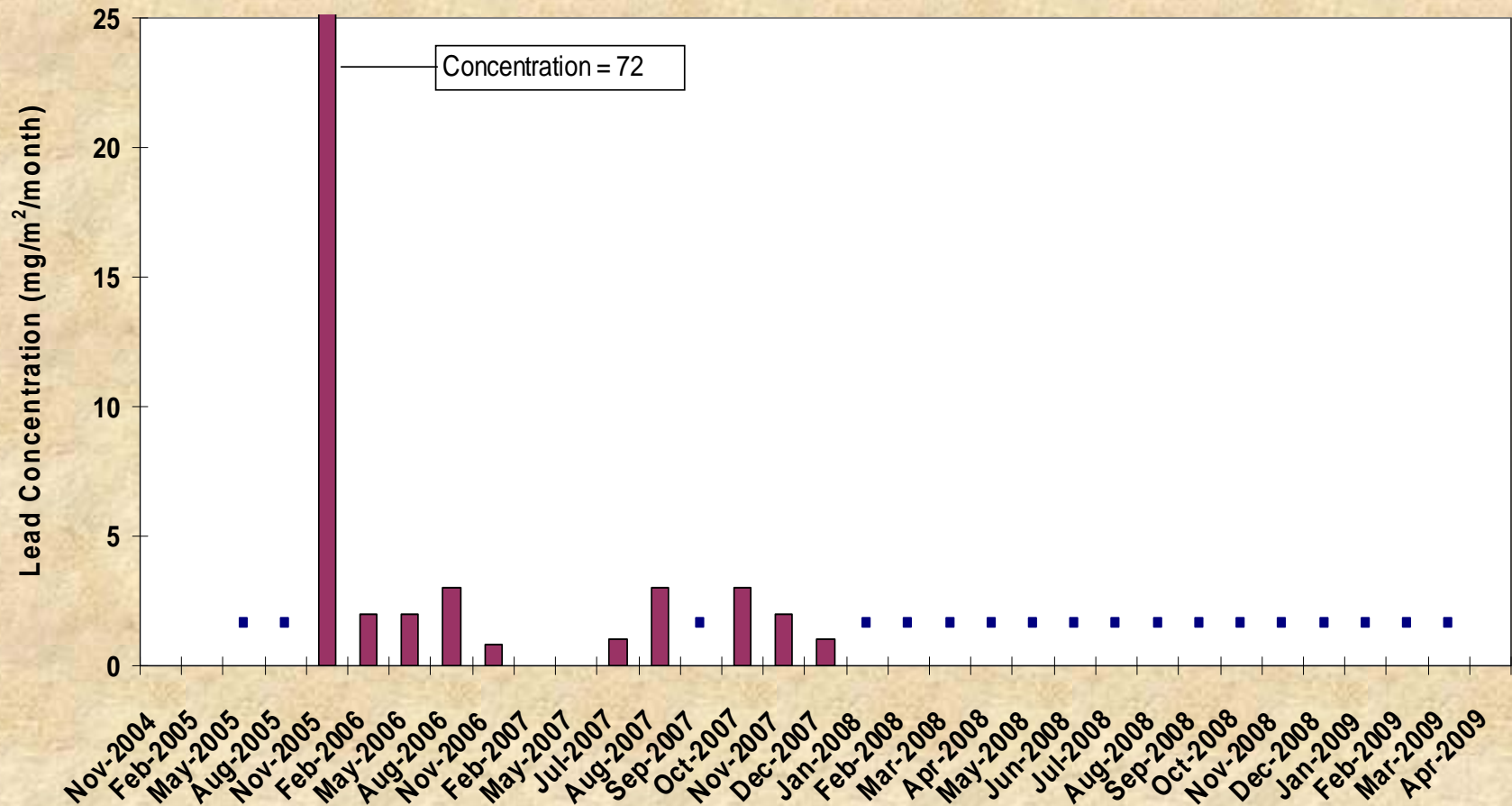


Air Sampling Sites



Lead Deposition on Gauge 8

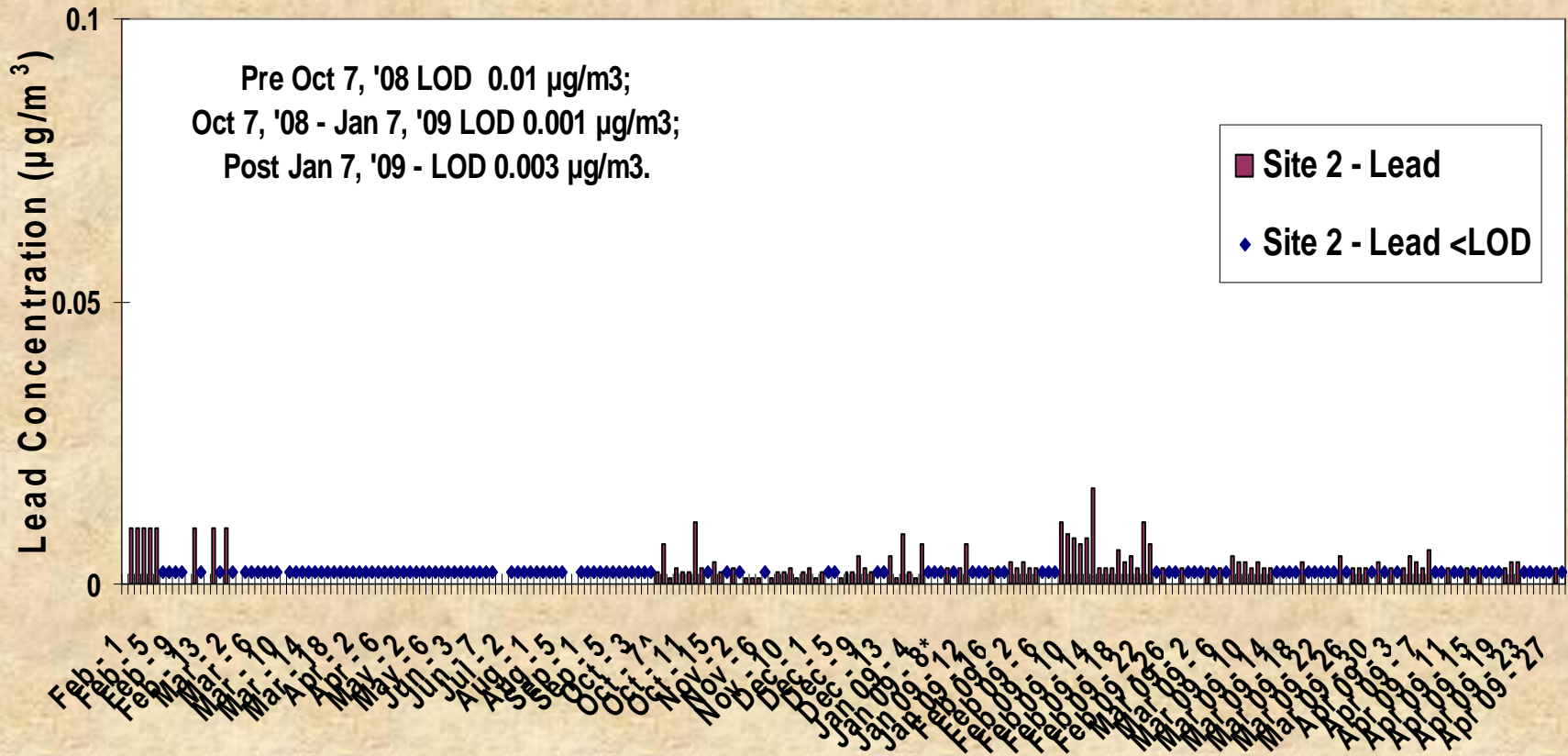
■ indicates concentration below limit of reporting



- Below detection before and after export.
- Some lead during port cleanup, none from final export.
- No standard for lead in dust deposition.

Lead Concentration at Hivol site 2

NEPM Standard ($0.5 \mu\text{g}/\text{m}^3$) (Annual)



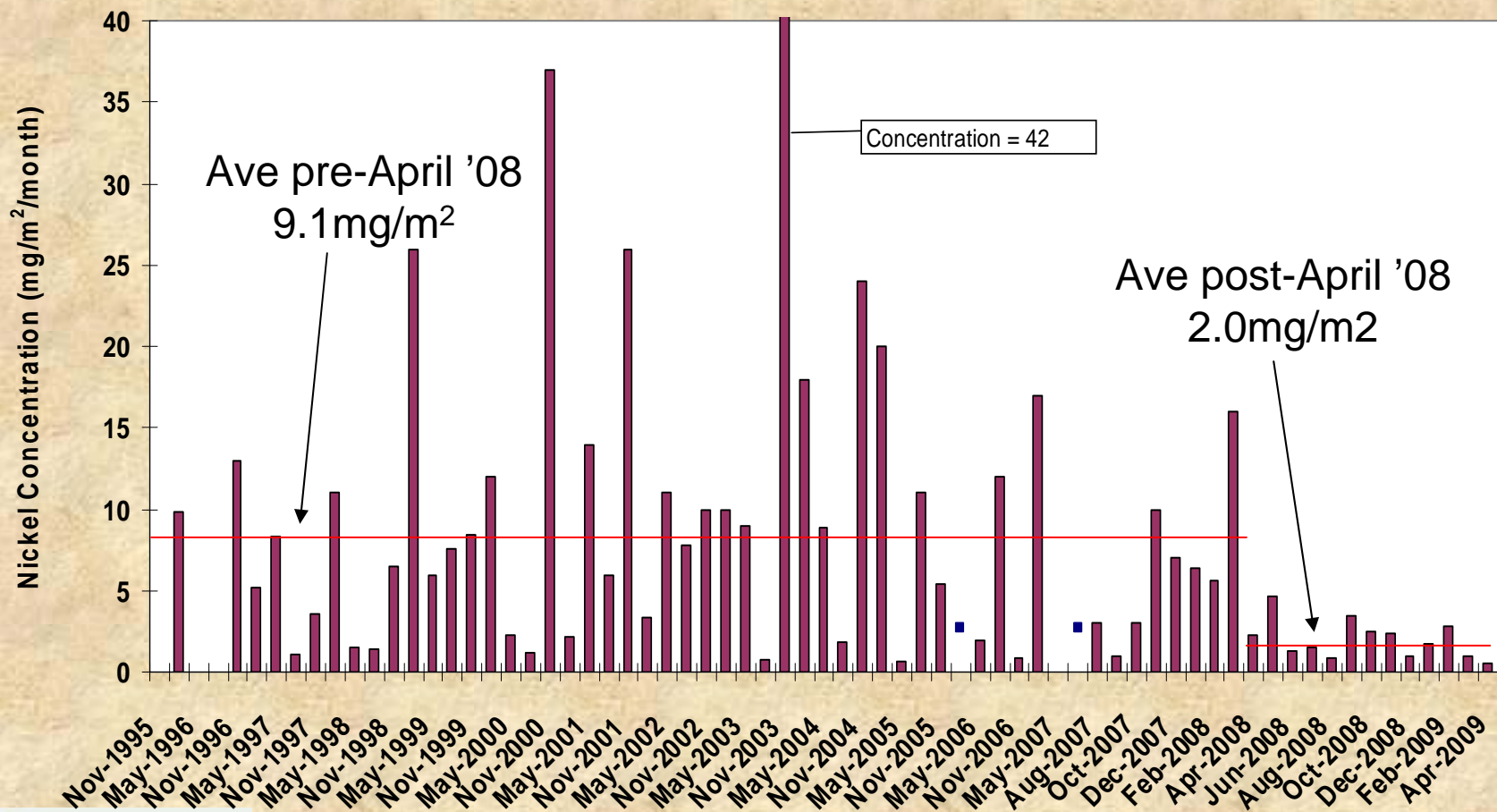
Individual HiVol Sampler Events Within Each Month

- All readings well below standard, many below LOD.
- Scale expanded to show readings - ↑ error near LOD.
- Some lead (extremely low levels) – Port shed removal?



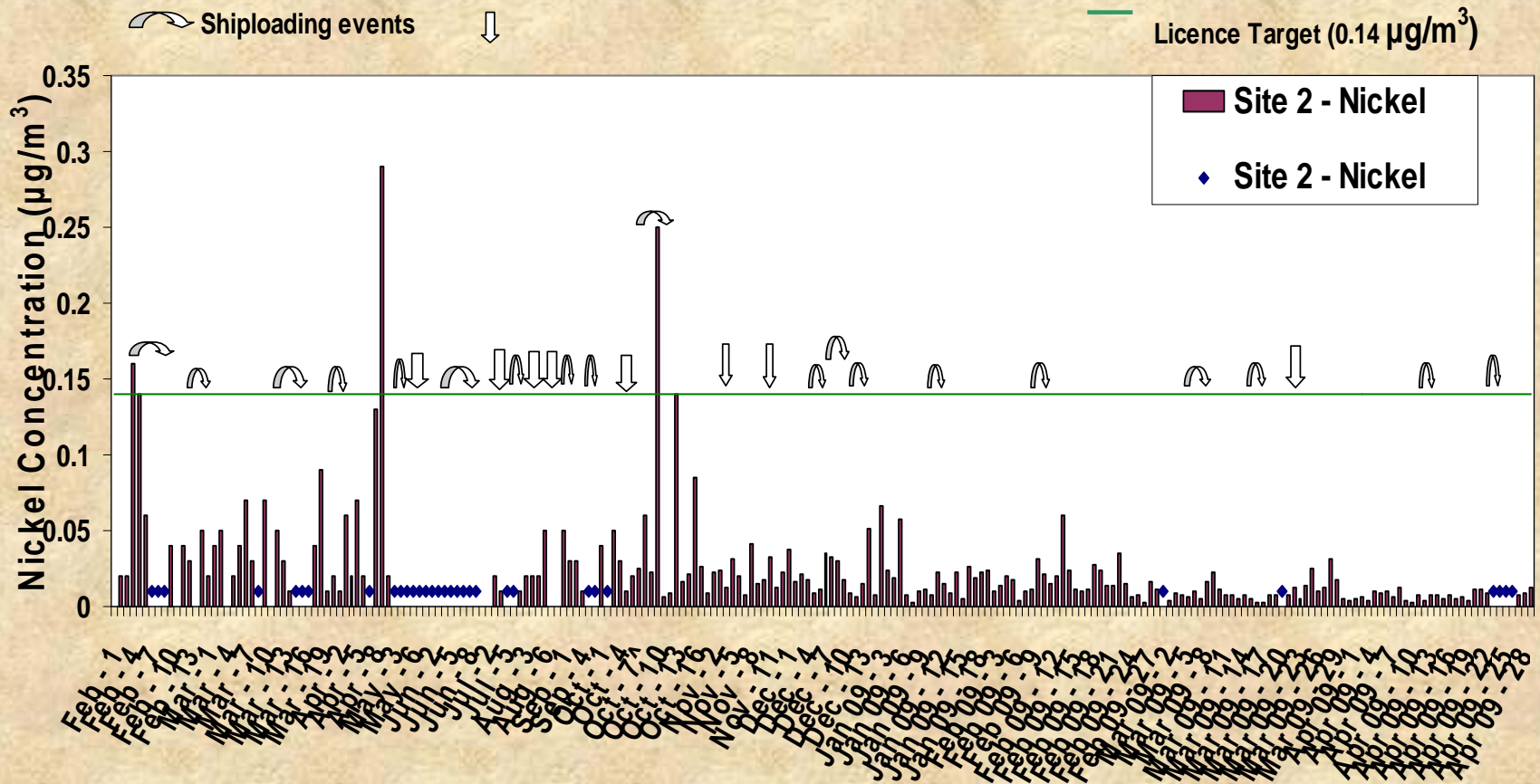
Nickel Deposition on Gauge 1

■ indicates concentration below limit of reporting



- Recent change shows what can be done.
- Must be guaranteed to ensure no recontamination.

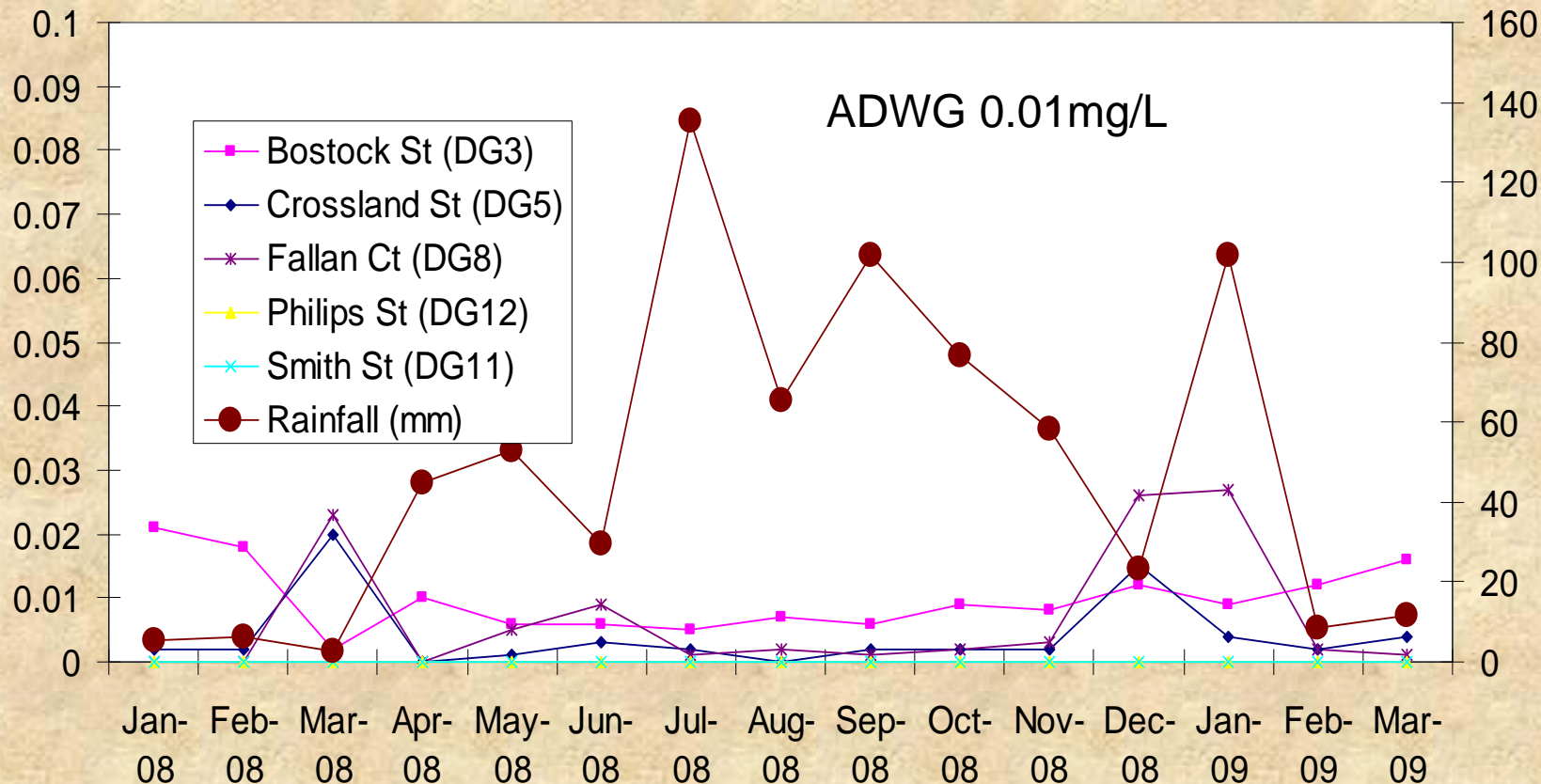
Nickel Concentration at Hivol site 2



Individual HiVol Sampler Events Within Each Month

- Licence target has been generally achieved.
- Ongoing low-level nickel emissions (well below target).
- Recently below detection during loading.

Rainfall vs Lead in Tankwater near port, 2008



- Spikes unrelated to rainfall or lead dust levels.
- Many confounding factors.
- Potential stocks must be removed.

DOH Tank survey

- Post-cleaning sampling October '07;
- Cleaning reduced lead level;
- Some lead persisted – may be
 - Remobilisation, or
 - Lead from '07 port cleanup;
- No sig. differences for tank or catchment characteristics.

EsPA Cleaning protocol too limited?

Lead in tanks

confounding factors

- Lead from flashing on roof, solder in gutters;
- Roof surface rough or smooth;
- Size of tank relative to catchment;
- Size of tank relative to usage rate;
- Tank galvanised, concrete or plastic;
- Tank cleaned, first flush device fitted;
- Gutters, roof cleaned, wash diverted;
- Rain may mobilise, stir sediment or dilute.

Lead dust in houses

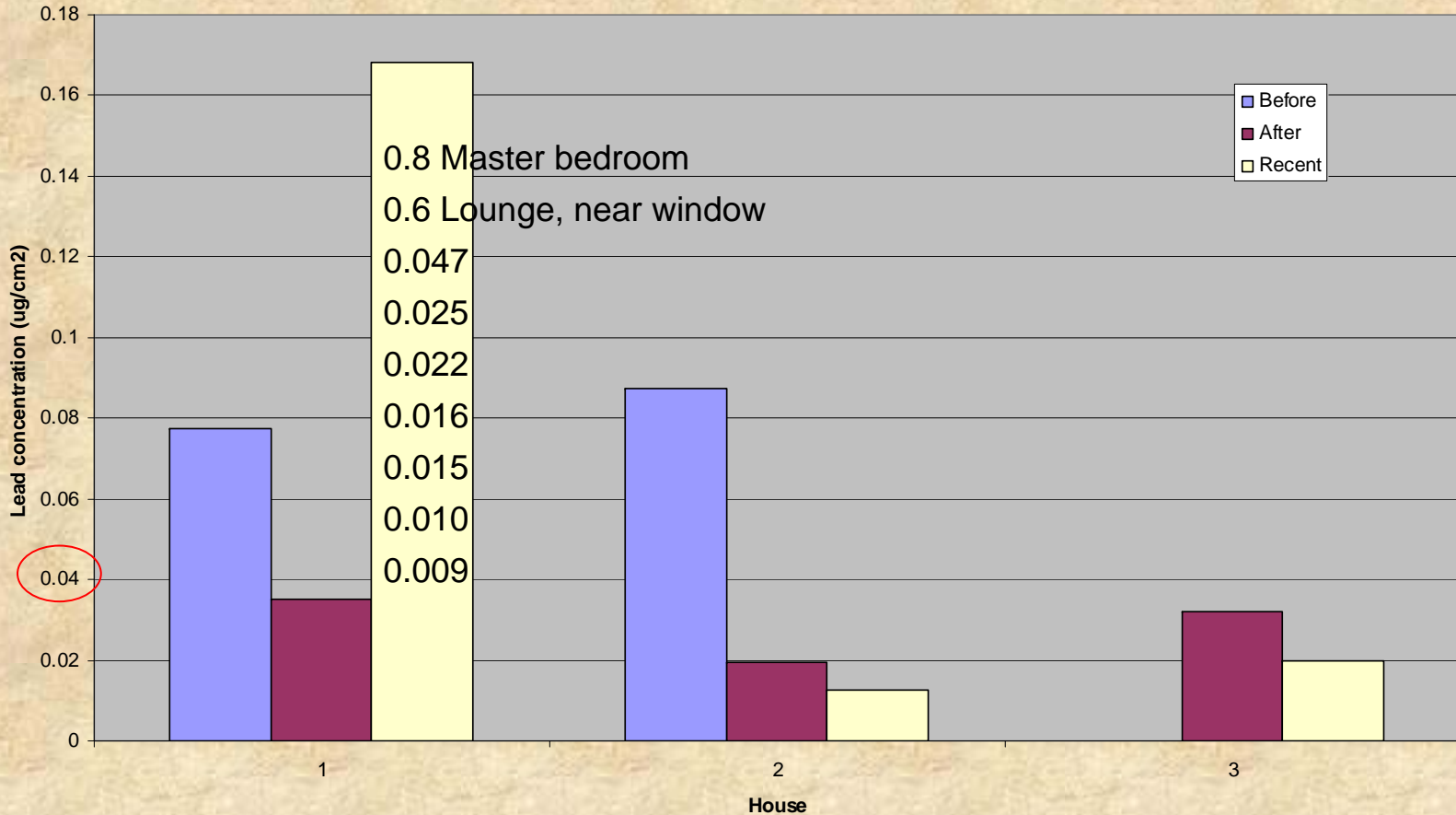
Internal dust

(std. 0.04 $\mu\text{g}/\text{cm}^2$ accessible to young children)

Survey	<0.04	0.04-0.24	>0.24
LED 2008 (near port)	10 62.5%	6 37.5%	0
DOH 2009 (transects)	119 86%	16 11%	4 3%

- Focus on points common to both surveys.
- Export ceased, some cleaning, still exceedances.
- Surfaces may have been overlooked – cleaning protocol must be thorough.
- Need ongoing monitoring for recontamination.

Internal lead levels in cleaned houses



- Blue – pre-cleaning, Red – after, 2007, Yellow – 2009.
- House 1 – 2/10 surfaces v, high, rest low (ave. 0.02).
- Recontamination or surfaces overlooked in cleaning?

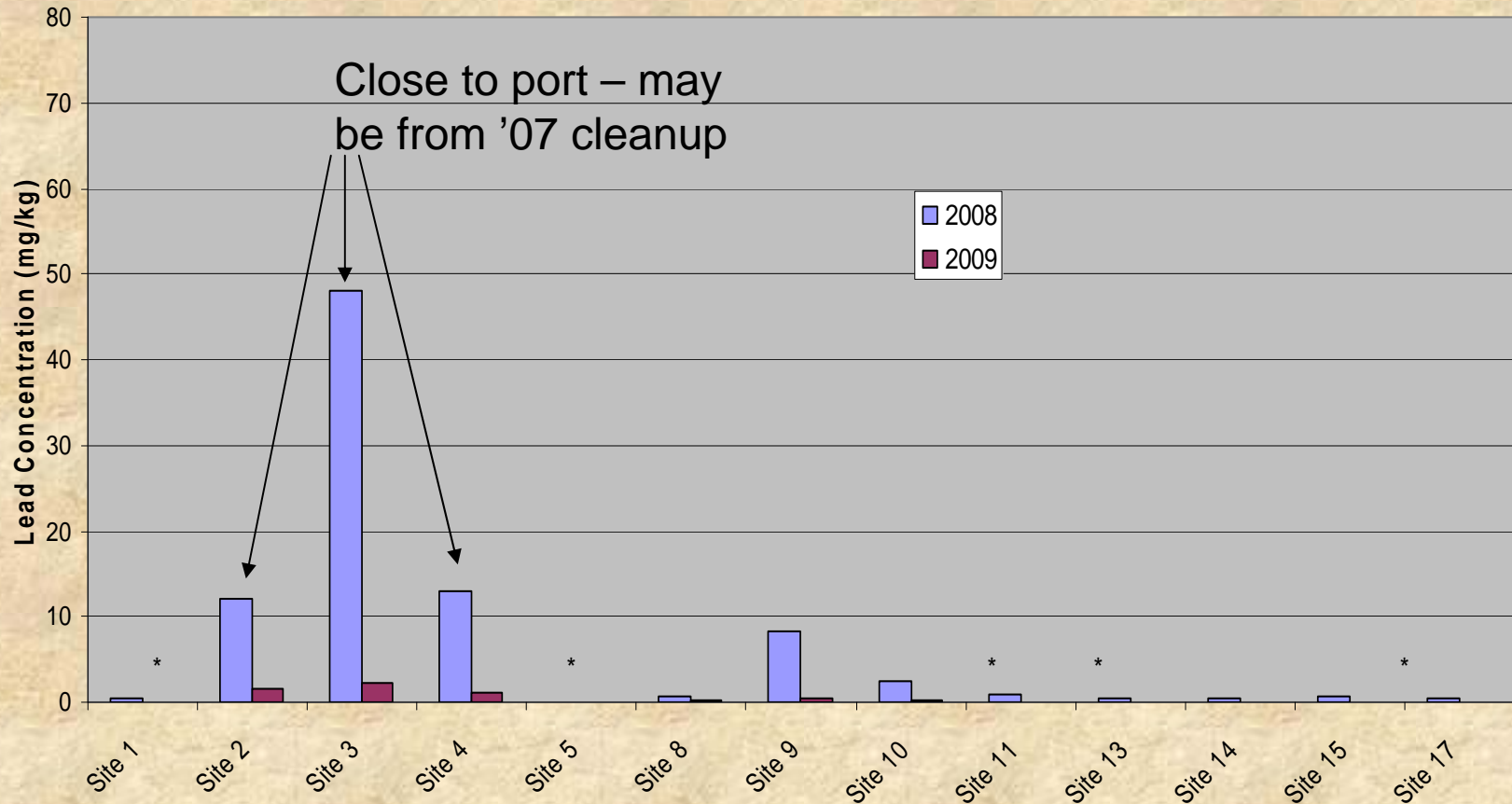
Lead dust in houses

- **'07 DOH survey** – cleaning controlled lead dust but recontamination occurred;
- **'08 LED survey** – some accessible surfaces still above limit; ceiling voids may be ongoing source of contamination;
- **'09 DOH survey** – recontamination or overlooked surfaces?

Thorough cleaning protocol with verification.

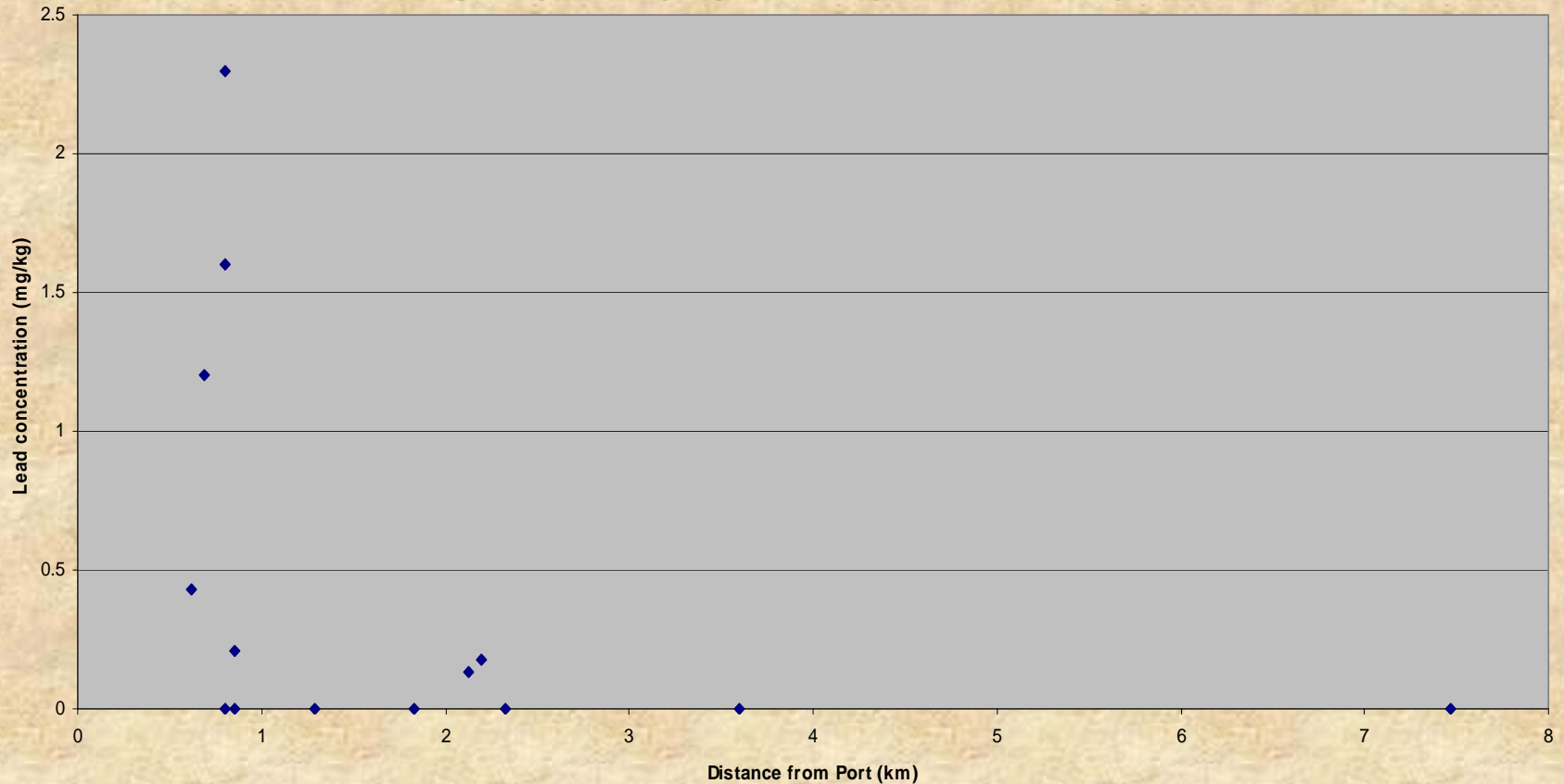
Lead in flowers March '08 vs '09

*Concentration <LOR



Much lower in 2009, but some still above remote control.

Lead in flowers ('09) vs Distance from Port



- Remote sites show background level.
- Some sites close to port low, but still slightly elevated.
- Traces of lead transferred from adjacent old leaves?

Lead on Bush Bird Feathers

- First sample Oct 2007 found high to very high lead levels at impact sites;
- Second survey Oct 08, levels “much lower”, bulked samples to get readings;
- Food chain (ants) sampled to check for bioaccumulation. No high lead found.
- What is ultimate fate of lead in envt?
- Lead binds to surfaces -
 - Harder to remobilise; and
 - Harder to cleanup.

Lead in Playgrounds

- Some swabs of slide handrails above standard – equipment cleaned, ‘soft-fall’ sand replaced, if present;
- Some again elevated after cleaning – suggests remobilisation – how?
- Isotopic analysis of recent swabs – not Magellan lead.

Nickel – the surveys

Houses

- DOH – did not get data;
- LED – “continual recontamination”;
Remobilisation from ceiling or new nickel?

Rainwater

- DOH – 8% >ADWG after cleaning;
- EsPA – 2 sites >ADWG most of last year;
New nickel, since other sites OK?

Feathers

- higher at impact sites in '08;
- almost undetectable in '09;

Flowers

- '09 well below '08 but still some nickel at sites close to port;

Playgrounds

- all sites below detection at February 2009.

Conclusions of data review

- No significant remobilisation of lead in air;
- Some detected in rainwater, playgrounds after cleaning, but source unclear.
- Near port ongoing low level lead on flowers may be historic from leaves.
- Ongoing low levels of nickel detected.
- Further sampling will help to focus cleanup area.

Recommendations

- No general remobilisation, Cleanup OK.
- Protocol must be thorough to remove possible sources of micro-remobilisation (tanks, roofs, cavities).
- Verification sampling needed.
- Ongoing sampling to detect possible remobilisation.
- Strict controls on nickel handling to avoid new nickel contamination.

Acknowledgements

- **Paul Clifton**, Shire of Esperance
- **Michelle Crisp**, LED
- **Nick Dunlop**, Conservation Council of WA
- **Richard Grant**, Esperance Port Authority
- **Martin Matisons**, DOH
- **Peter McCafferty**, ChemCentre
- **Peter Skitmore**, DEC

and, of course, **Wayne & Sam.**

