Industrial Discharges with Neighbourhood Impacts

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New Zealand Context

- Typically discharges to air; occasionally groundwater
- Two scenarios:

1) Close residential proximity – range of impacts
2) Residential proximity less a factor but industrial activity of high public concern – psychosocial impacts

New Zealand Examples

- Former Ivon Watkins-Dow plant, Paritutu
- Exide Technologies Ltd lead battery recycling facility, Petone
- Remediation of former Fruitgrowers Chemical Company site, Mapua

Manufacture Of Herbicide 2,4,5-Trichlorophenoxyacetic Acid

- Former Ivon Watkins-Dow chemical plant in Paritutu, New Plymouth 1962 - 1987
- TCDD formed during TCP manufacture and remains as contaminant in 2,4,5-T
- 1 ppm TCDD until 1973 (0.1 ppm)
- 1986 release of estimated 70-735 mg TCDD led to government inquiry

Interest Groups

- Paritutu Residents Association
- Dioxin Investigation Network
- Dioxin Investigation Action Group
- Poisoned Peoples Association
- Dioxin Legal Action Group
- Responsible Intelligent Members Progressing Against Corruption
- Greenpeace
- NZ Vietnam Veterans Association

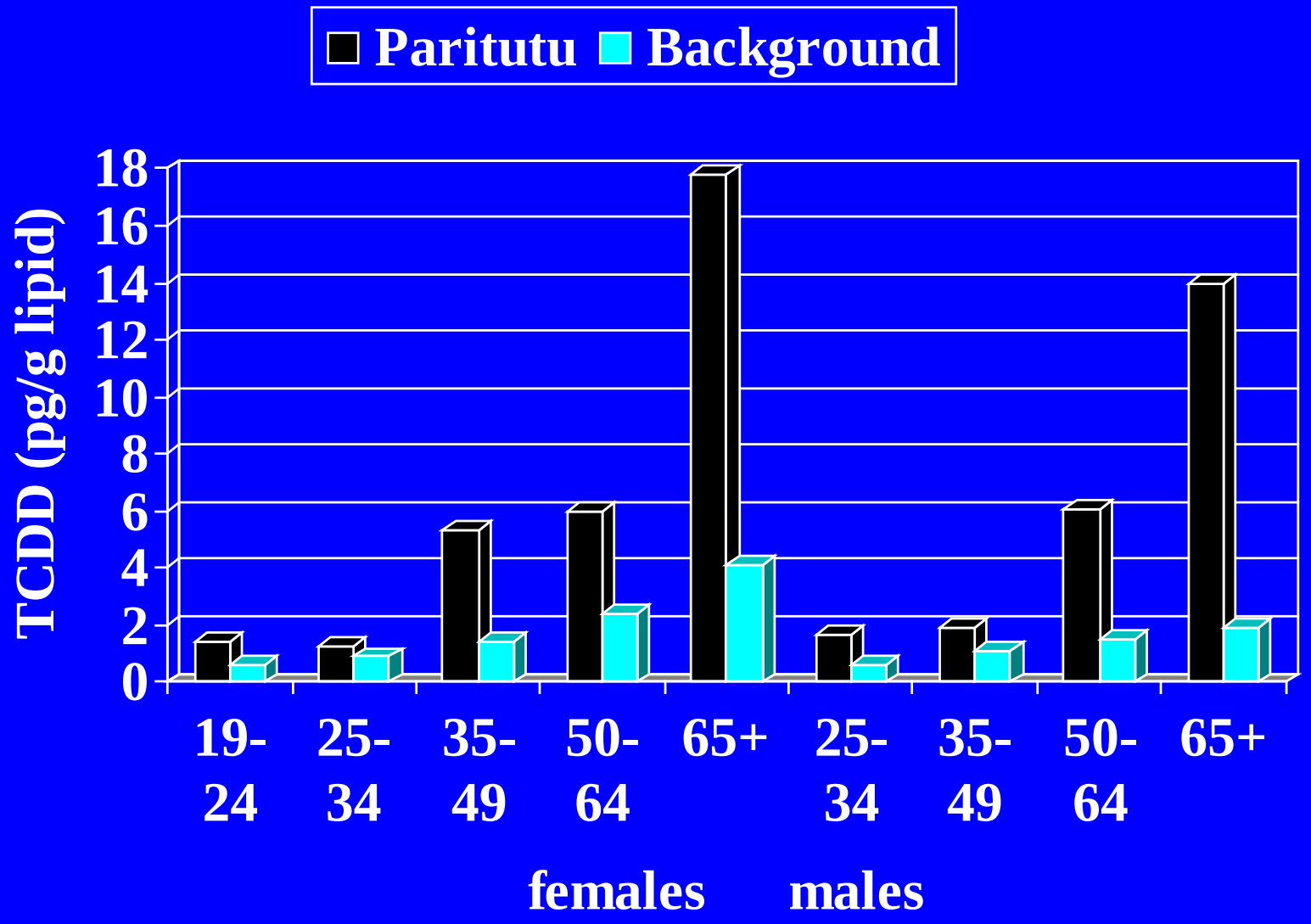
Paritutu Serum Dioxins Study (ESR, 2005)

- Almost 4-fold increase in mean TCDD above expected background level for New Zealanders of same age and gender

  mean TCDD 6.5 pg/g lipid

  (expected 1.7 pg/g lipid)

Mean TCDD By Age And Gender



Conclusions (ESR, 2005)

- Main exposure from fugitive emissions with a small contribution from home-grown leafy vegetables and 'exposed' fruit
- Location and duration of residence important
  - ≥ 15 yrs mean TCDD 14.7 pg/g; expected 2.4 pg/g

Who Are Most Likely To Have An Elevated TCDD Level ?

- Spatial soil data analysis consistent with TCDD plume extending 1km mainly to east and 400 m to south of plant
- Highest modelled soil concentrations immediately east of plant
- About 500 addresses in area found to be associated with elevated TCDD after long term residence from 1962 - 1987

What Has Happened Since?

- New Plymouth population studies:

cancer mortality and incidence

Excess all cancer, NHL and CLL incidence for 1970-74 (Read et al 2007)

birth defects (Borman and Read 2010)

- New toxicokinetic models → revised Paritutu exposure assessment suggests exposure most significant in 1965-68

What Has Happened Since?

- IWD workers' studies:

mortality – CPHR

All cancers (SMR 1.24, 95% CI 0.90-1.67) ('t Mannetje et al 2005)

morbidity – CPHR

serum dioxins and mortality – Dow

Average TCDD level low compared to other similar occupational cohorts (Collins et al 2008)

All cancers (SMR 1.01, 95% CI 0.80-1.27) (McBride et al 2009)

Health Support Service for Dioxin-Exposed People

- Established in 2008
- Eligibility criteria – where lived or worked in relation to IWD and length of time of residence or employment
- Annual health check +/- referral
- Focus is prevention and early detection of potential health conditions


EXIDE
50

Exide Lead Battery Recycling Plant, Petone

- Exide Technologies Ltd, Petone only lead battery recycling plant in New Zealand
- Secondary lead smelting and lead refining at site since 1965
- Fugitive emissions considered dominant lead dust source
- Neighbours include residents

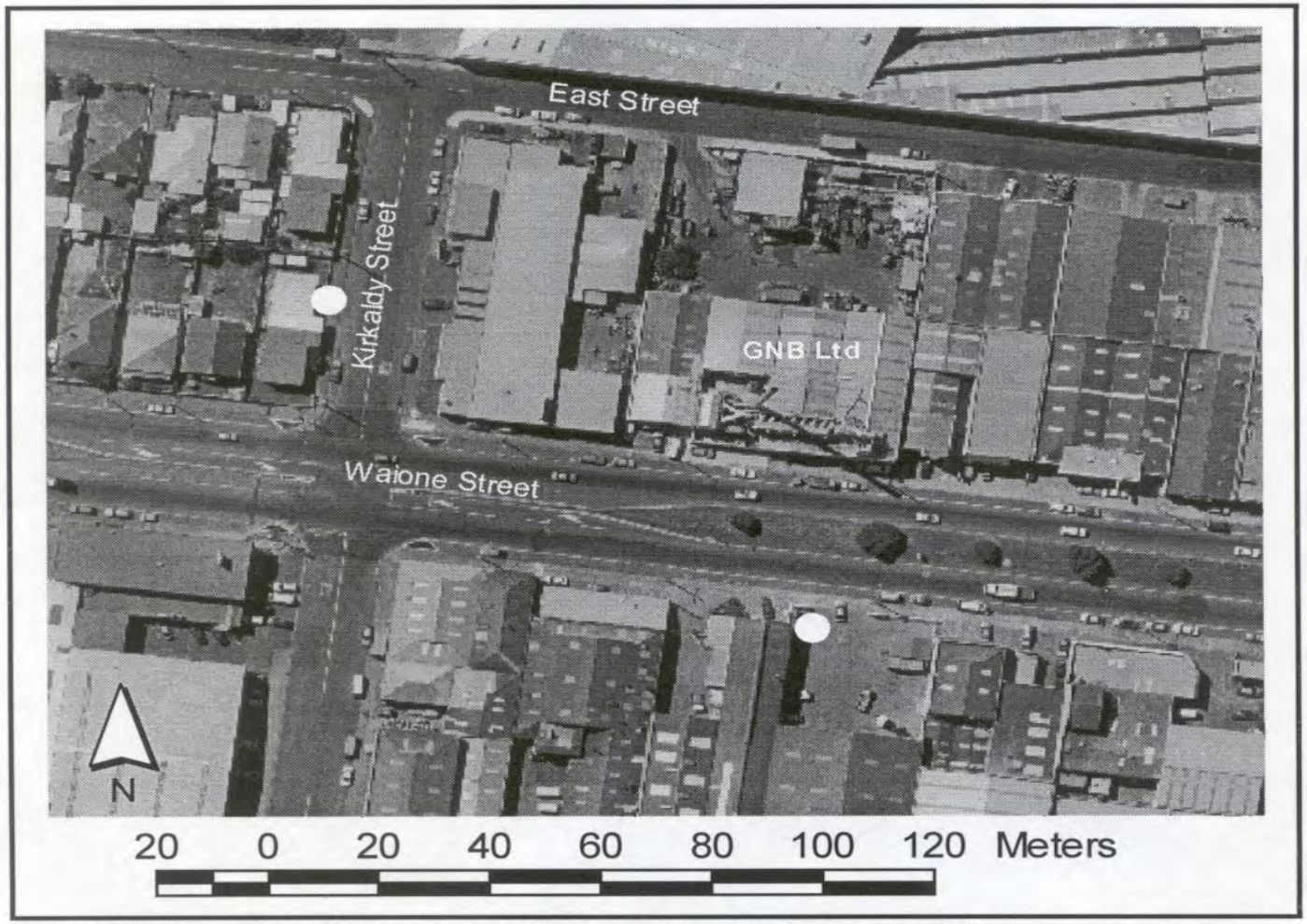
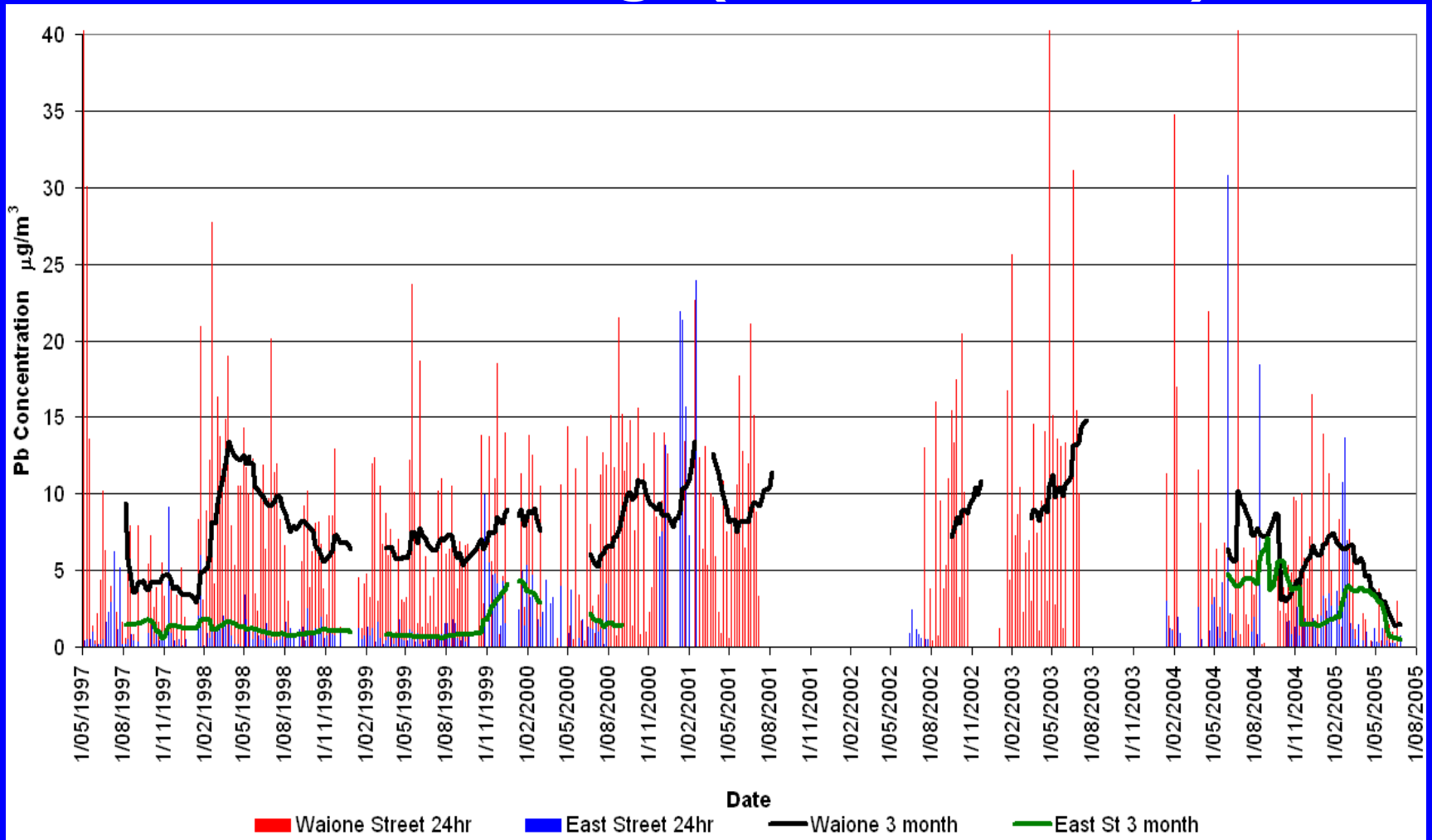


Figure 2.2 Site Layout and Location of Samplers (O)

Resource Consent 2001

- Regional Public Health recommended:
  - 3 year consent term due to uncertainty of potential health effects
  - deposition monitoring for lead emissions
- Regional Council granted an air discharge permit for 10 years
  - some deposition monitoring
  - review clause within 6 months of 3rd anniversary

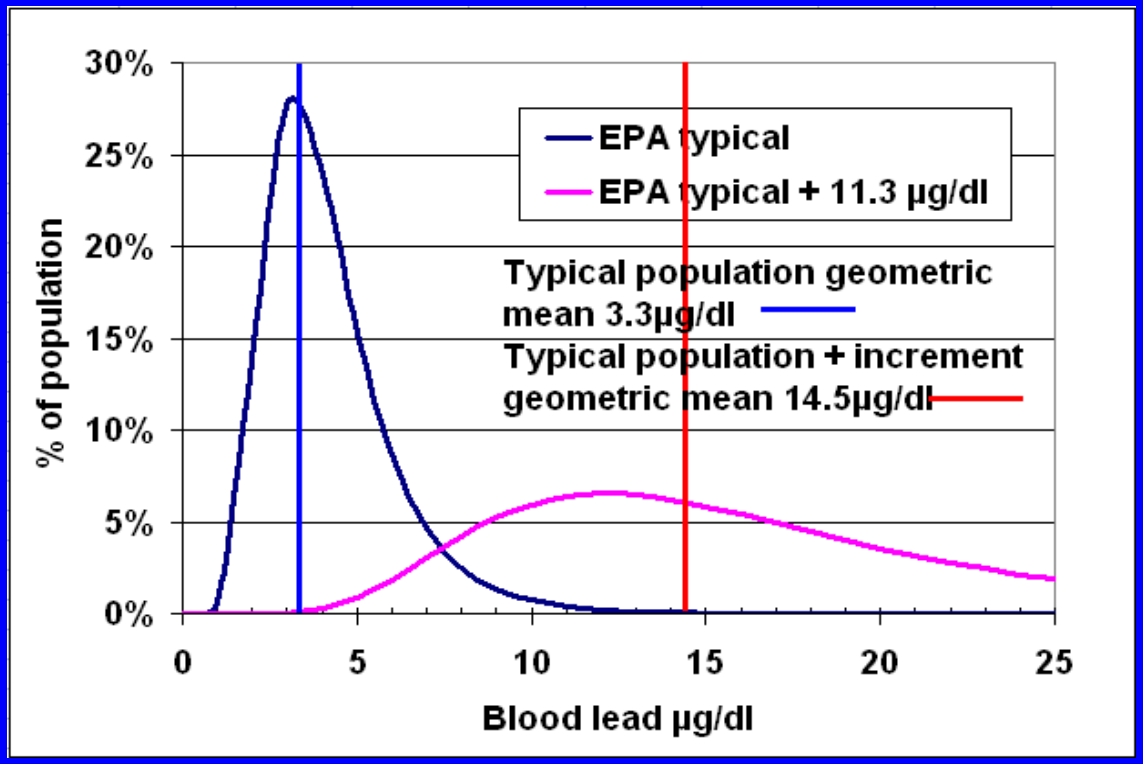
Exide Fenceline Lead in Air Monitoring (1997-2005)



Resource Consent Review

- Late 2004 review of potential public health impacts of fugitive lead emissions
- Found fugitive emissions posed a potential health risk to both workers and residents, in particular children, in plant's vicinity
- Models estimated average blood lead increment of 6.3 µg/dl (ATSDR) and 11.3 µg/dl (IEUBK) for closest children

IEUBK Model's Predicted Children's Blood Lead Levels for Lead Emissions



Resource Consent Review

- January 2005 RPH recommended GWRC review resource consent
- May 2005 GWRC publicly notified resource consent review
- RPH's submission recommended boundary control limits be set

Resource Consent Review

- Modelled limits based on limiting population mean PbB increment to 1 µg/dl and IQ decrement to 1 point
  - for southern boundary was 10-15% of three monthly results that had been recorded
- Also protective for pregnant outdoor workers in Waione St

Resource Consent Review

- October GWRC decision
  - set fugitive emissions control limits at 3 boundaries
- 3 appeals to Environment Court mainly relating to level of limits
- January 2006 – Environment Court confirms GWRC decision

What Happened?

- Extensive plant upgrading 2006-2008
- Southern boundary limit exceeded twice in 2007 resulting in fines
- Subsequent monitoring results well below limits

Mapua, Nelson

- Fruitgrowers Chemical Company 1932-88
- Organochlorine pesticides mainly DDX and dieldrin; some heavy metals
- Orphaned site

Issues

- Site borders Mapua channel and surrounded by residential and commercial premises
- Remediation carried out on site 2004-6
- No previous commercial use of mechanochemical dehalogenation process

Issues

- Allegation of poor environmental management made to PCE late 2006 → investigations (PCE, MoH, DoL)
- Inadequate air monitoring – range of chemicals; southern site
- Breaches of resource consent conditions

Public Health Risk Assessment

- Nelson Marlborough DHB Public Health Service report Feb 2010
- Public health risk relates predominantly to air discharges and emissions
- Information gaps
- 60-70 properties may have been affected

Summary of Risk

Contaminant	Exposure	Risk
PM10	(likely) many exceedances	(likely) low-medium
ammonia	(likely) low	(likely) very low
dioxins	probable (11/04-03/06)	unknown
PCBs	possible	unknown
benzene	possible	unknown
OCPs, As	possible (S); low (N & W)	unknown; negligible

Predicted Dioxins Deposition

Current Status

- Ministry of Health- Health Research Council funded morbidity and serum study in the field