DIOXIN ASSESSMENT IN NEW ZEALAND: THE SCIENCE BEHIND THE POLICY

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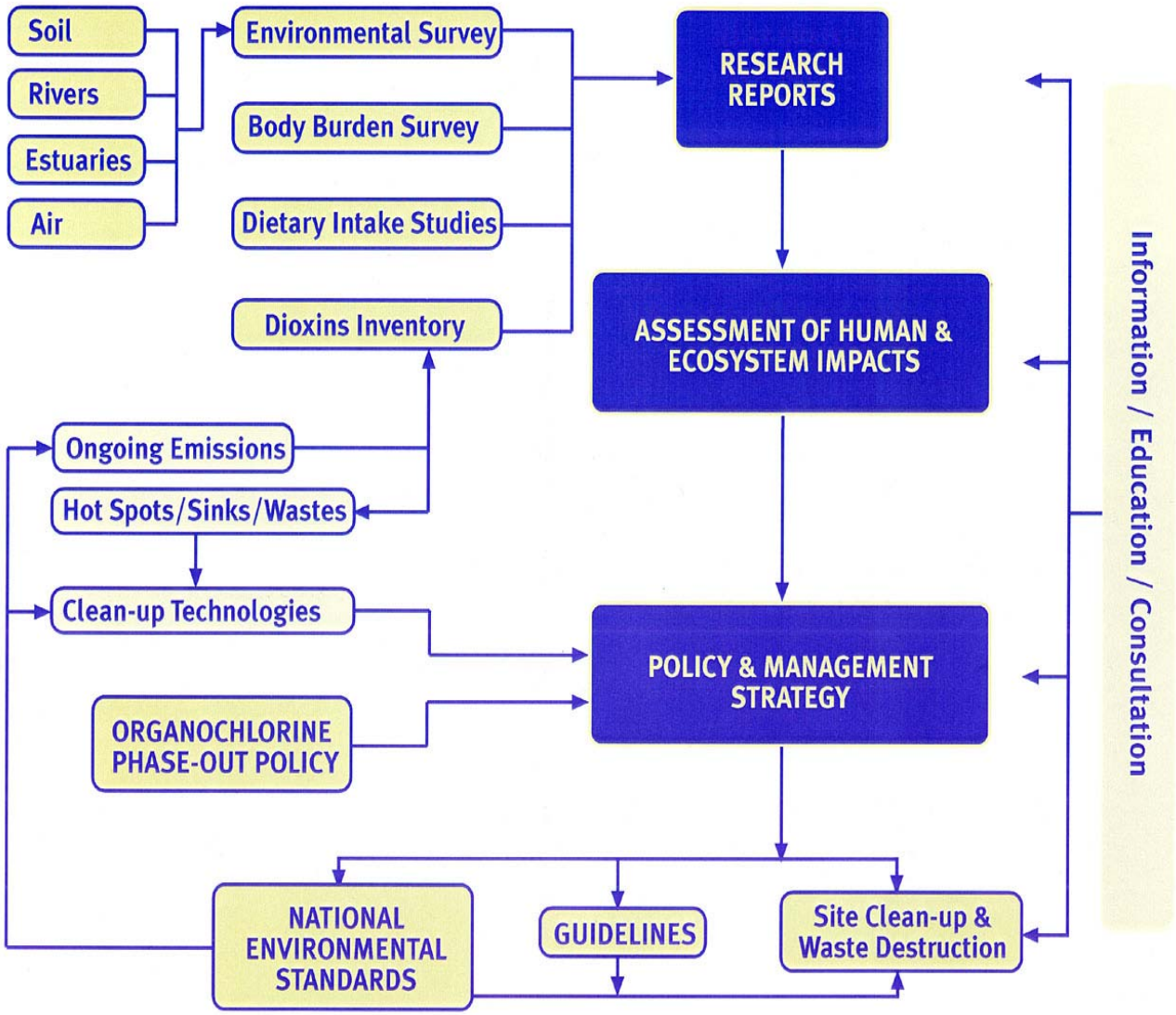
HISTORY

- Issues from the historic use of 2,4,5-T and pentachlorophenol
- Discharges from bleached kraft pulp mills
- Emissions from medical waste incineration
- Demonstrate “clean green” status - protection of our agricultural economy

The Process

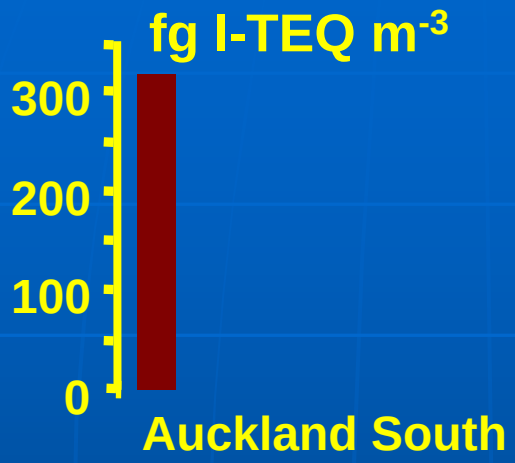

Soil
Rivers
Estuaries
Air
Environmental Survey
Body Burden Survey
Dietary Intake Studies
Dioxins Inventory
RESEARCH REPORTS
ASSESSMENT OF HUMAN & ECOSYSTEM IMPACTS
Ongoing Emissions
Hot Spots/Sinks/Wastes
Clean-up Technologies
ORGANOCHLORINE PHASE-OUT POLICY
POLICY & MANAGEMENT STRATEGY
NATIONAL ENVIRONMENTAL STANDARDS
GUIDELINES
Site Clean-up & Waste Destruction
Information / Education / Consultation

AMBIENT AIR

- Reference sites
- Rural
- Urban (primarily residential)
- Industrial

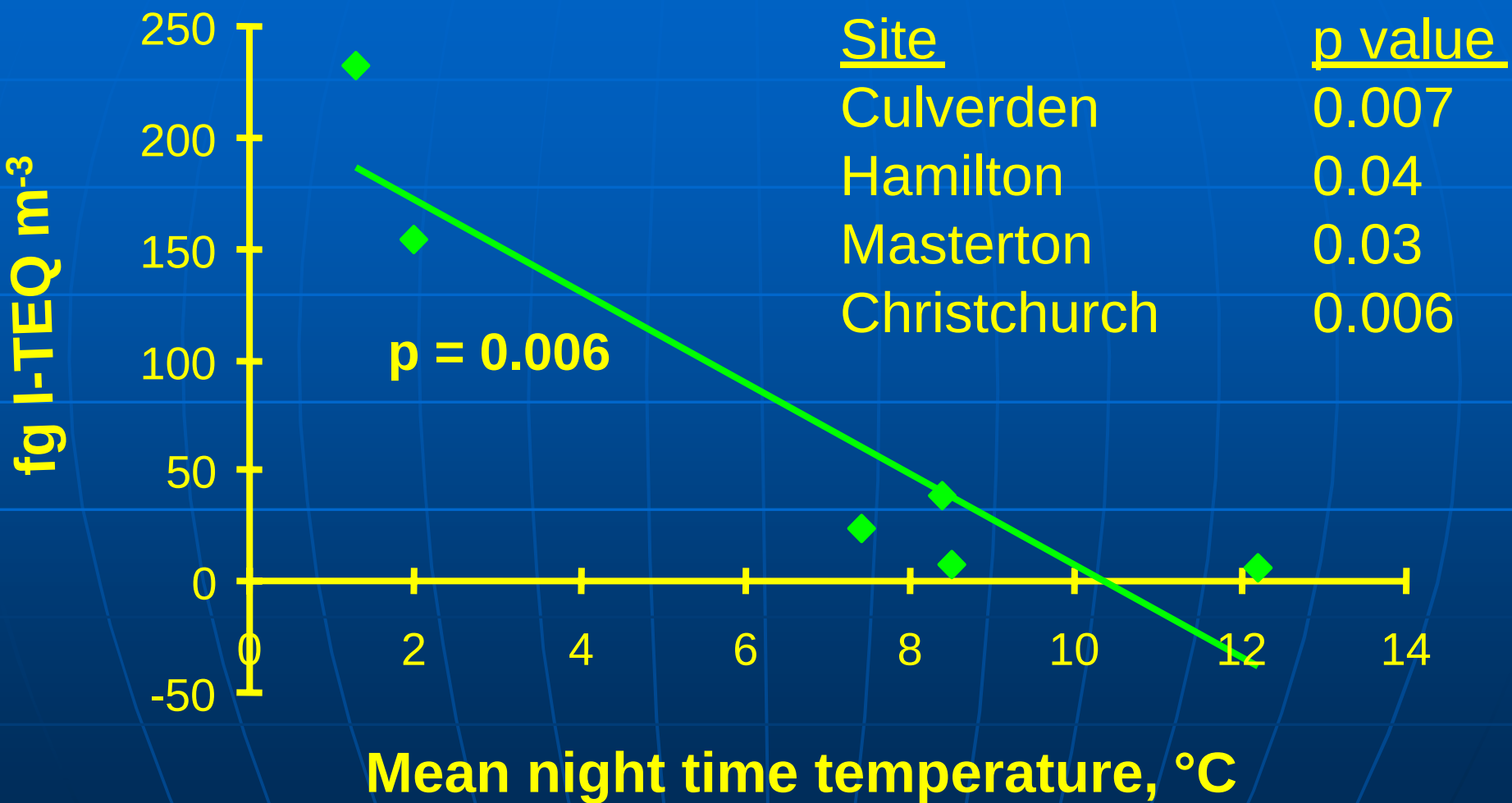
12 month sampling (1996/97)

DIOXINS IN AIR



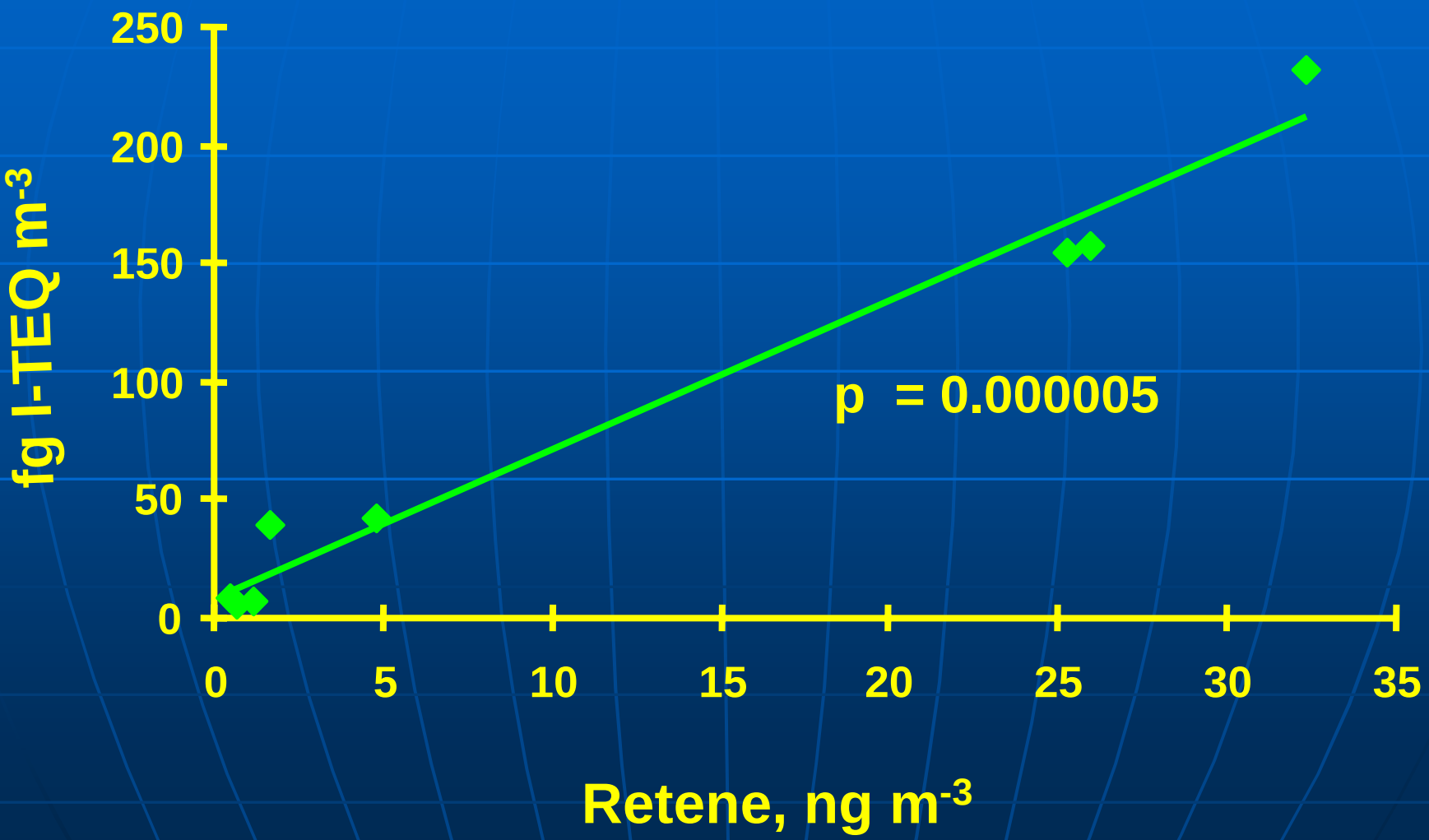
- Levels at urban sites similar
  - winter highs
  - summer lows
  - related to domestic emissions

Correlation of I-TEQ with Mean Night Time Temperature

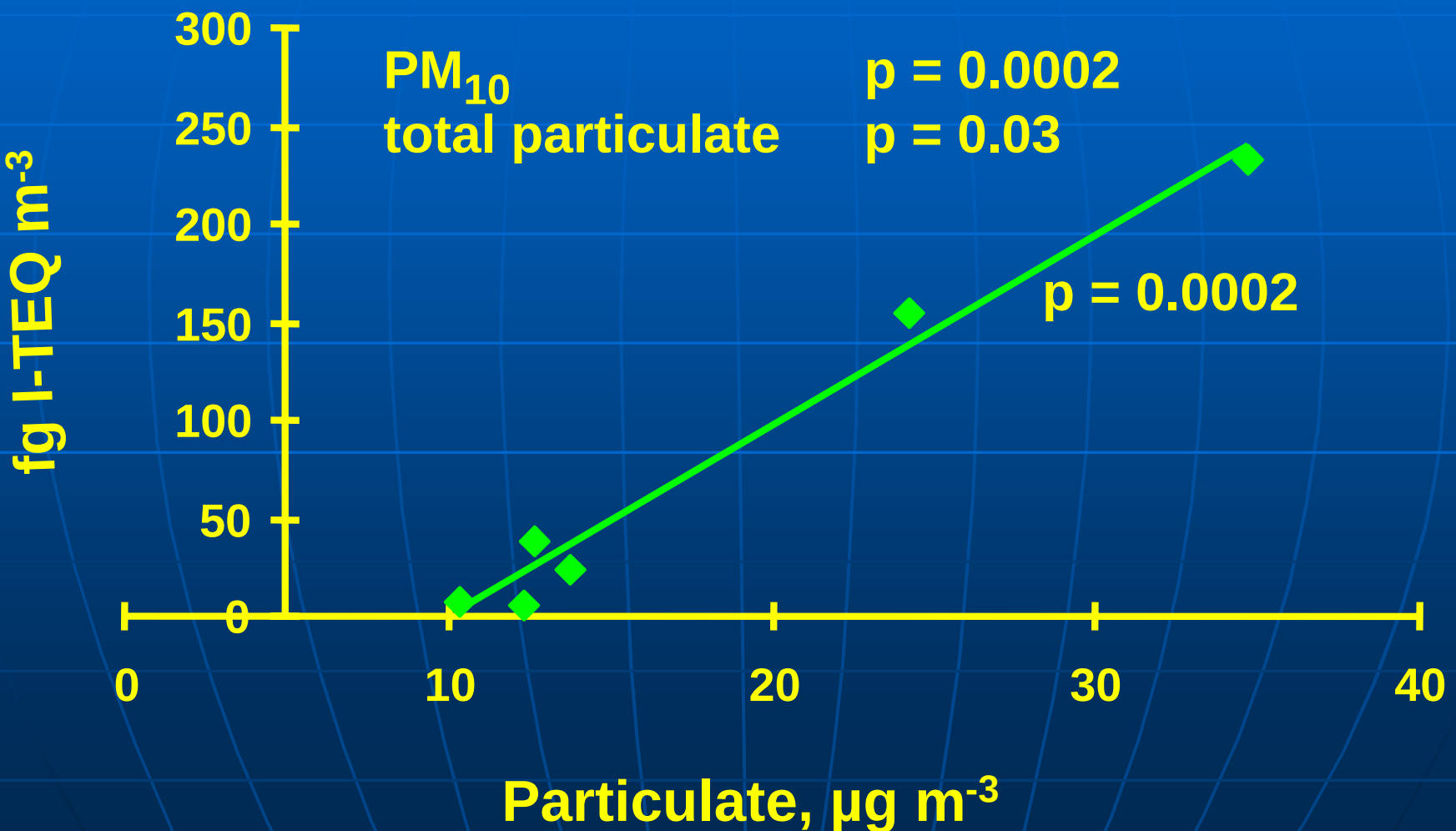


Site	p value
Culverden	0.007
Hamilton	0.04
Masterton	0.03
Christchurch	0.006

Correlation of I-TEQ with Retene



Correlation of I-TEQ with Particulate at Christchurch



DIETARY STUDY

- Common foods containing animal fats
  - meats
  - dairy products
  - fish
- Staple foods
  - cereals and other foods
- Purchased at retail outlets and cooked
- Dietary modelling for adult [median] and adolescent male [90th centile]

Dietary intake

- Adult male 0.37 pg TEQ_{tot}/kg bw/day
- Adolescent male 0.84 pg TEQ_{tot}/kg bw/day

- Compare with:
  MoH IMMI of 30 pg TEQ/kg bw/day, and
  WHO range of 1 – 4 pg TEQ/kg bw/day

Serum study

- Baseline estimates of organochlorine levels in New Zealanders
- Relationships between organochlorines and age, sex, ethnicity, and geographic region
- Assessment of health risk from body burdens

Study design

- Component of the National Nutrition Study
- Representative sample of New Zealanders
- Blood collection (1,834 samples for pooling; approx. 0.05% of population)
- Questions about occupational exposure
- Serum pooled according to:
  - age
  - sex
  - ethnicity
  - geographic region

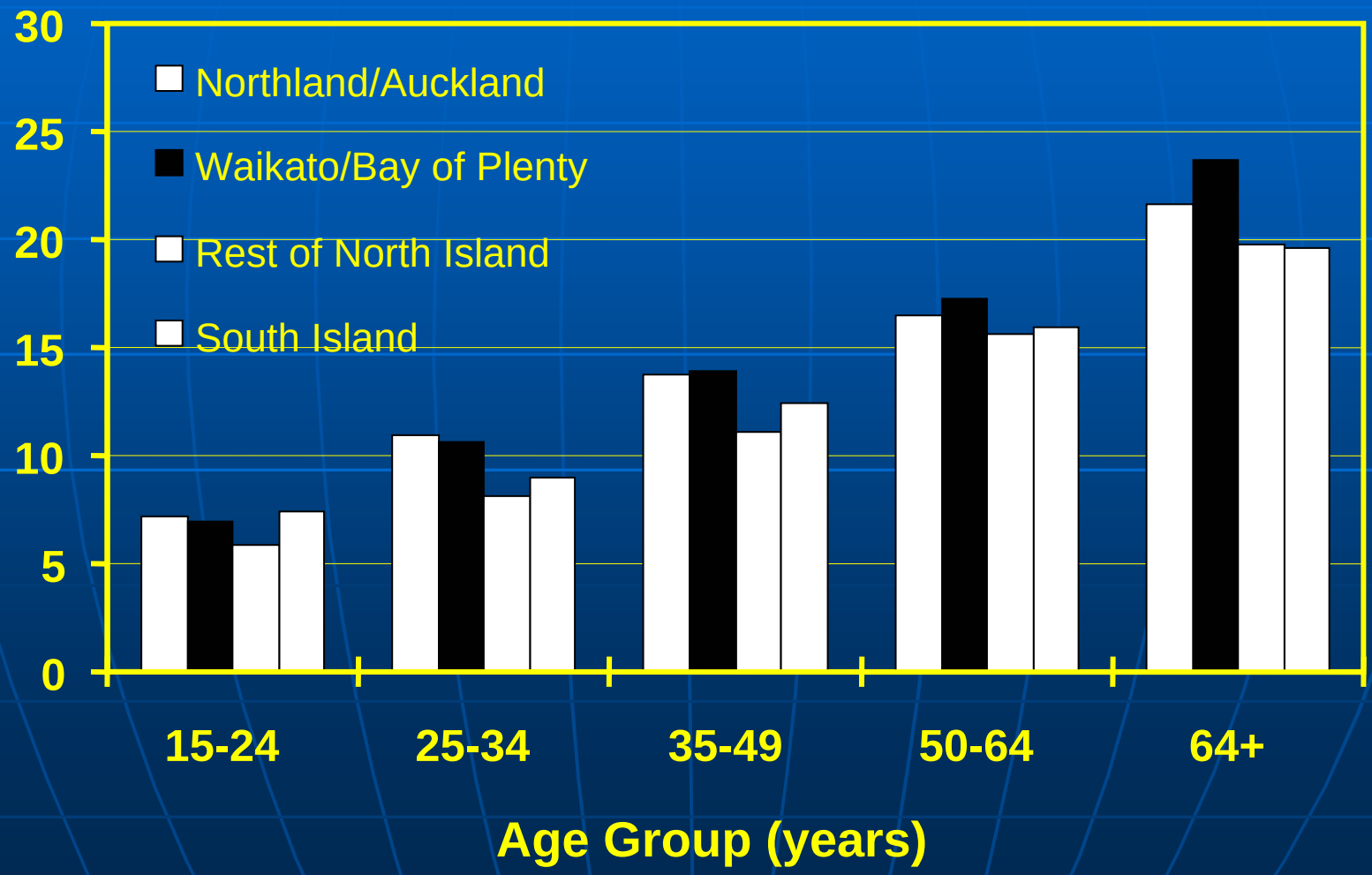
TEQ_{tot} levels; ng/kg lipid wt

- Minimum 9.71
- Maximum 38.5
- Mean 19.7

- Relationships with age
- Small variations with region
- No differences on basis of race or sex

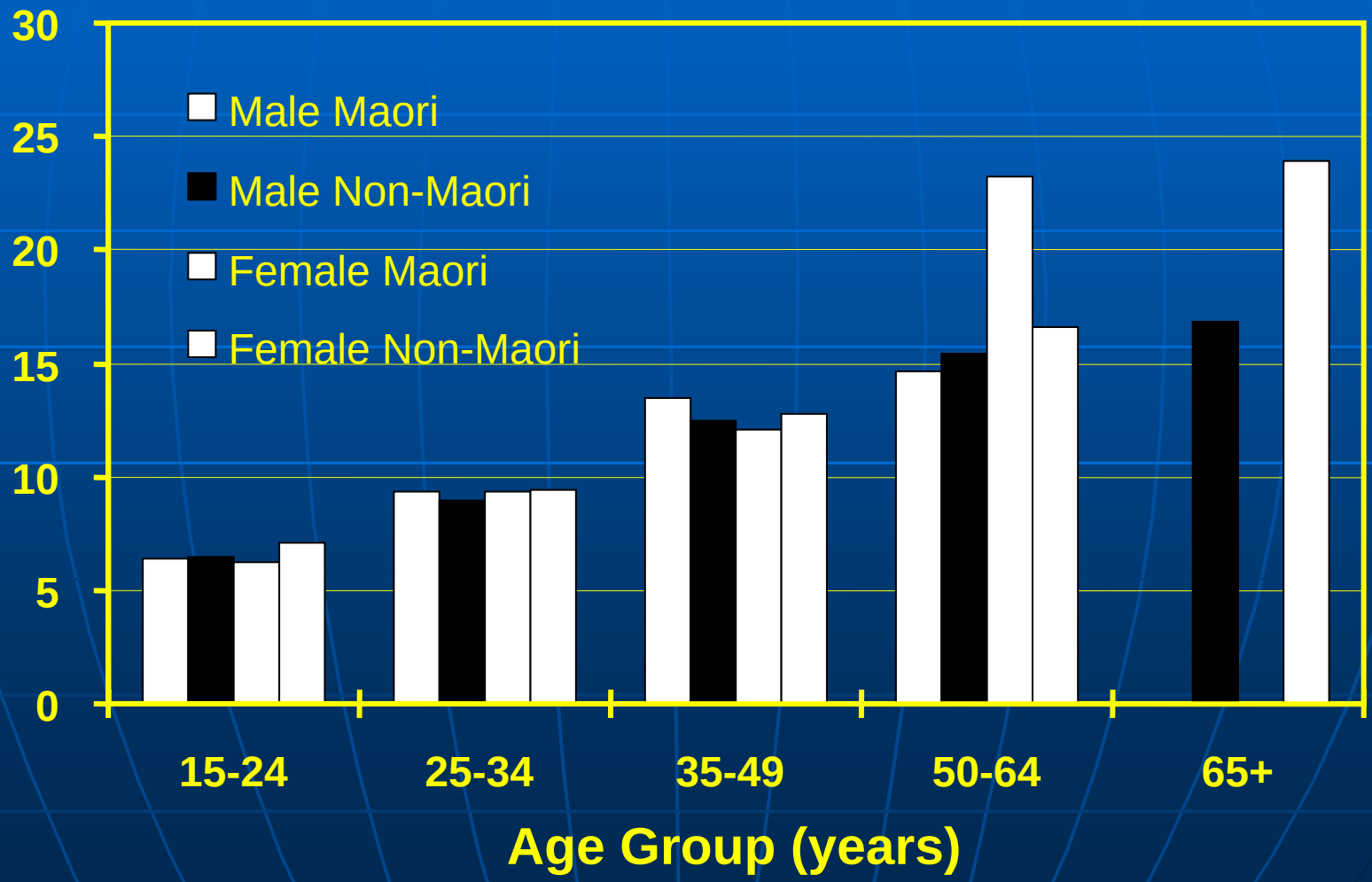
Dioxin TEQ (ng/kg Lipid)

Geographic area, across age-groups



DIOXIN TEQ (ng/kg LIPID)

Sex and ethnicity, across age-groups



Dioxin inventory

- Important to understand pathway and magnitude of exposures
- Assessment of emissions and discharges to air, land and water
- Reference year 1998

Dioxin inventory - air

- Industrial sources (ca. 60%)
  - landfill fires (10-15 g I-TEQ)
  - fuel burning (0.88 – 6.4 g I-TEQ)
  - biological waste incineration (0.38 – 3.5 g I-TEQ)

- Non-industrial sources (ca. 40%)
  - wood burning for heating (0.71 – 8.7 g I-TEQ)
  - backyard waste burning (0.54 – 6.4 g I-TEQ)
  - accidental fires (0.37 – 2.8 g I-TEQ)

Research Findings

- POP levels in the environment *generally* comparatively low (some exceptions)
- Dioxin dietary intakes comparatively low, and below the WHO TDI
- Broad range of sources. Industry emissions about 60% and domestic sources ca 38% of total dioxin discharges to air
- Minimal risk to wildlife from dioxins, except possibly to top of food chain species (marine mammals)

Dioxin Health Risk Appraisal

- *Current* exposures falling (breast milk data)
- But average *lifetime* exposures higher (historical emissions) and are of concern
- Close to the level found to cause non-cancer effects in animals
- Cancer risk estimates high (> 1 in 1000)
- Exposure to infants from breast milk
- Precautionary approach justified to reduce population exposures and increase margin of safety

Information and Reports

MfE web site

http://www.mfe.govt.nz/issues/hazardous/contaminated/dioxins.html

Technical reports

http://www.mfe.govt.nz/publications/hazardous/index.html#organochlorines