

James Blando

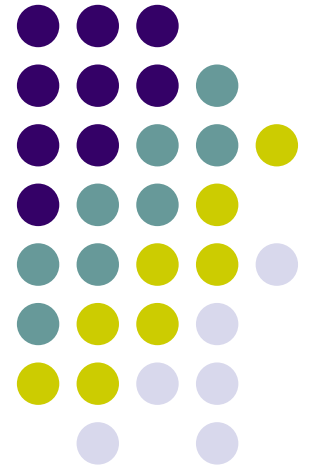
Conflict of interest statement



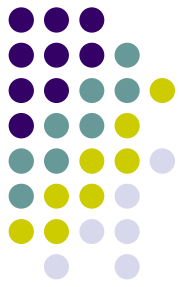
- As required:
- I do not have a financial interest or affiliation with any interests concerning any material I will discuss in my presentation.
- I am not going to discuss any non-FDA approved or investigational drugs or medical devices.

Occupational Lead Exposure in New Jersey

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Background

- Lead has long industrial history
 - Roman Empire
- Lead has regulatory history in USA
 - Lead-Based Paint Poisoning Prevention Act of 1971
 - Leaded automobile gasoline reduction in 1973; final complete phase-out in 1996
- New Jersey has a long industrial history that has changed greatly over the last decade.



Background - Regulatory

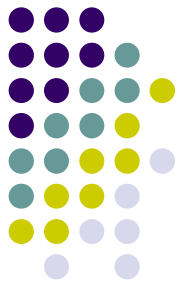
- Occupational Safety and Health Administration (OSHA) lead standard
 - General Industry
 - Construction Industry
- American Conference of Governmental Industrial Hygienists (ACGIH)
- Agency for Toxic Substances and Disease Registry (ATSDR)
- US Environmental Protection Agency

Adsorption & Kinetics

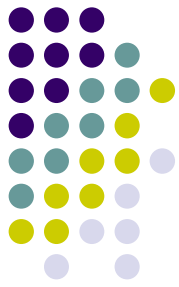


- Adsorption and Kinetics strongly affected by host characteristics such as age, nutritional status, and pre-existing health status
- Ingestion Route
 - Adults ~10% whereas Children ~50%
- Inhalation
 - Higher absorption
- Biological Half-Lives and Deposition
 - Adults
 - Blood as PbB ~ 30 days
 - Bone ~ 10 or more years, some estimates as high as 30 years
 - Children may differ

Common Clinical Lab Tests



- Blood Lead measured by AA or ICP
 - indicative of recent exposure (within a month)
- Blood Erythrocyte Protoporphyrin (EP) or Zinc Protoporphyrin (ZPP)
 - indicative of fairly recent exposure (within several months)
 - not specific and not sensitive
- In vivo X-ray fluorescence of bone
 - indicates chronic exposures



Health Effects and levels

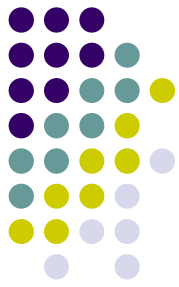
- Health Effects vary greatly among persons of different ages and different exposure levels

- Table 2-1. Blood and Bone Lead Concentrations Corresponding to Adverse Health Effects**

Age	Effect	Blood leada (µg/dL)	Bone leada (:g/g)
Children	Depressed ALAD	<5	ND
Children	Neurodevelopmental effects	<10	ND
Children	Sexual maturation	<10	ND
Children	Depressed vitamin D	>15	ND
Children	Elevated EP	>15	ND
Children	Depressed NCV	>30	ND
Children	Depressed hemoglobin	>40	ND
Children	Colic	>60	ND
Adults (elderly)	Neurobeh effects	>4	>30
Adults	Depressed ALAD	<5	ND
Adults	Depressed GFR	<10	>10
Adults	Elevated blood pressure	<10	>10
Adults	Elevated EP (females)	>20	ND
Adults	Enzymuria/proteinuria	>30	ND
Adults	Peripheral neuropathy	>40	ND
Adults	Neurobehavioral effects	>40	ND
Adults	Altered thyroid hormone	>40	ND
Adults	Reduced fertility	>40	ND
Adults	Depressed hemoglobin	>50	ND

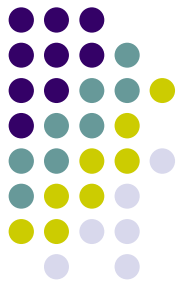
- EP = erythrocyte protoporphyrin; GFR = glomerular filtration rate; NCV = nerve conduction velocity; ND = no data

Background – OSHA standard



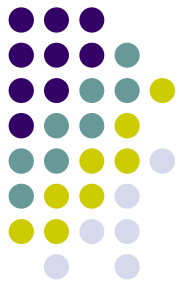
- General Industry Standard
 - 29 CFR 1910.1025
 - Compliance triggers based on air samples
 - Initial determination
 - Action level of 30 ug/m³; PEL 50 ug/m³
 - Basic hygiene, training, frequency of monitoring, BLL, controls, medical removal
- Construction Standard
 - 29 CFR 1926.62
 - similarities to general industry standard
 - variability makes compliance difficult
 - difficult to enforce because of transient nature of jobs

Background – NJDHSS Reporting Regulations

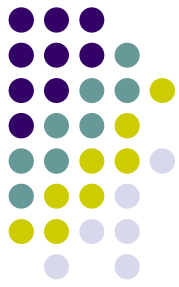


- NJ ABLES program
 - Funded by NIOSH
 - Occupational health surveillance for lead exposure
- Physicians and APNs
 - NJAC Title 8 Chapter 57 sub-chapter 3
- Hospitals
 - NJAC Title 8 Chapter 57 sub-chapter 3
- Clinical Laboratories
 - NJAC Title 8 Chapter 44 sub-chapter 2

ABLES Program



- Identify risk factors among workers with elevated blood lead levels (BLL) $\geq 40 \mu\text{g/dl}$ that persist for more than one year
 - Interviews conducted
- Develop and implement strategies to reduce identified risks and evaluate the intervention
 - free work site evaluations
 - recommendations sent to employer and employee
 - Free training provided



ABLES program

- Project on Targeted Ceramics Industry
- Air lead levels are much lower than 10 years ago (only a few above OSHA PEL of $50 \mu\text{g}/\text{m}^3$)
- Average BLL - Trends
 - 1986 - $37 \mu\text{g}/\text{dl}$ (max 56)
 - 1996 - $33 \mu\text{g}/\text{dl}$ (max 41)
 - 1997 - $31 \mu\text{g}/\text{dl}$ (max 35)
 - 1999 - $32 \mu\text{g}/\text{dl}$ (max 36)
- Not all workers are tested according to OSHA Lead Standard
- For majority of workers English is a second language - communication problems

Occupational Survey of Lead Use in NJ 2003 - Methodology



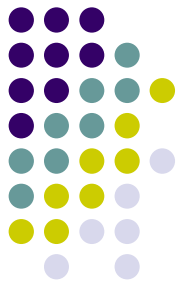
- Utilized Chemical Handling Survey validated in 2003 – 2004 and reported by Lefkowitz et al.
- Questions in five broad descriptive categories.
 - basic facility information;
 - operational characteristics;
 - material handling;
 - lead usage;
 - engineering and personal exposure control measures descriptions.
- Survey mailed to 104 companies in ABLES registry.
 - 45 companies responded, 43% response rate.
- Conducted on-site visits for 16 of the survey respondents, which is 35% of sample
- Survey responses from companies with employees in Adult Blood Registry ≥ 25 $\mu\text{g}/\text{dL}$ were analyzed.



Methodology

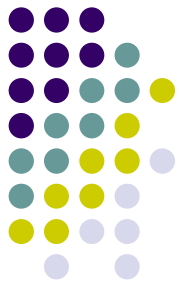
- Survey responses were reviewed by Industrial Hygienist and judgment was made regarding potential for inhalation and incidental ingestion among reported job titles.
- Survey responses were tabulated and described in simple histograms.
- OSHA Integrated Management and Inspection System (IMIS) was searched to determine inspection and regulatory compliance history of survey respondents.

Facility Traits – Survey Respondents



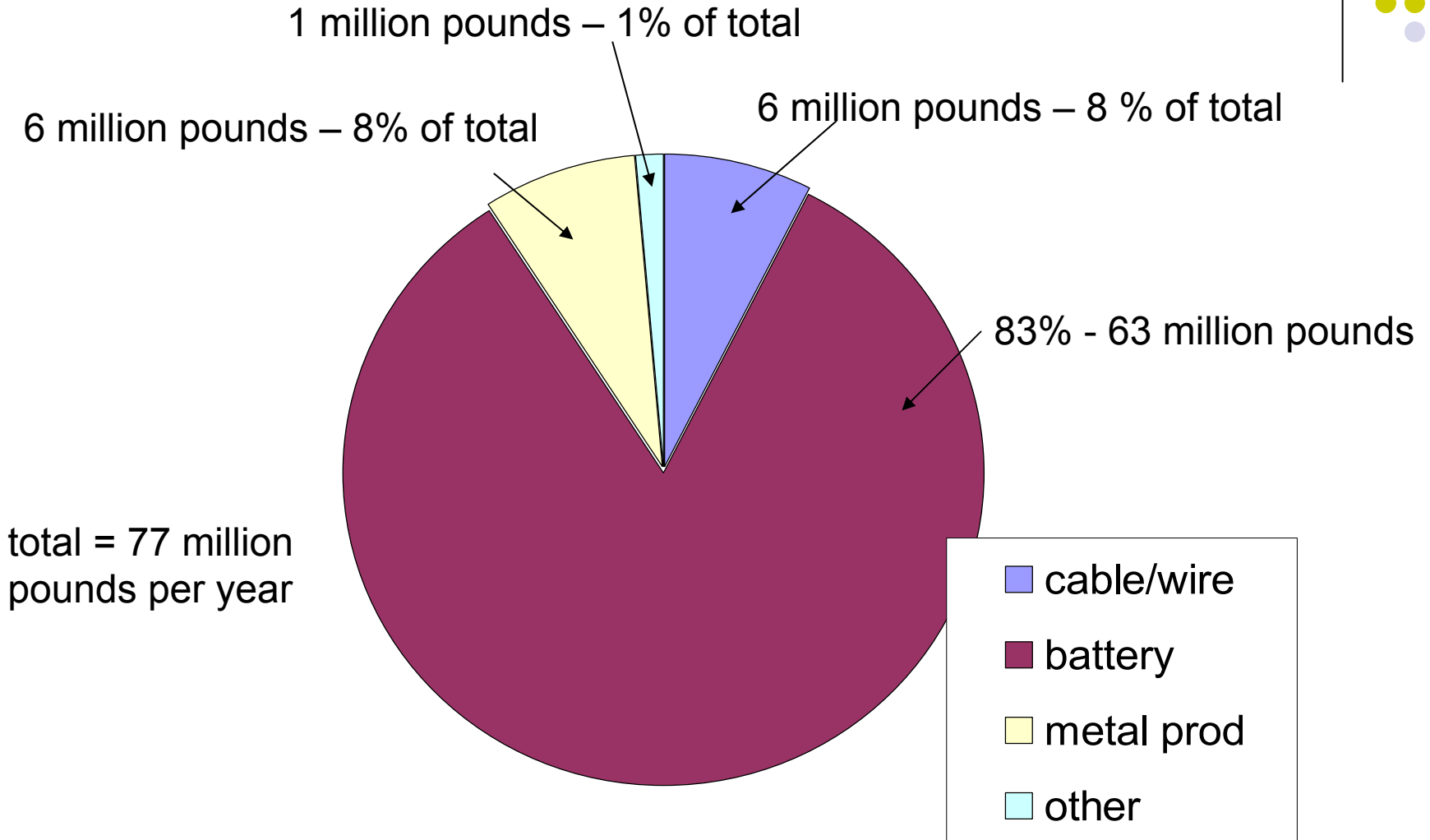
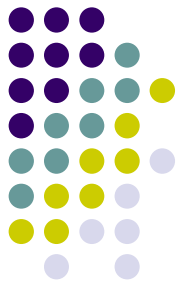
Characteristic	Median value	Maximum value	Minimum value
Total # of employees	45	875	1
Total # employees who handle lead	4	190	1
Days/year lead is handled	180	365	1

OSHA Inspection History of Survey Respondents



- Utilized OSHA IMIS database
 - matched on name or address; partial matches acceptable
- Survey respondents
 - 53% (n=24) have never been inspected by OSHA
 - 29% (n=13) have been cited for violating an OSHA standard
 - 18% (n=8) have been cited by OSHA specifically for violations of the lead standard

Lead Usage by Survey Respondents



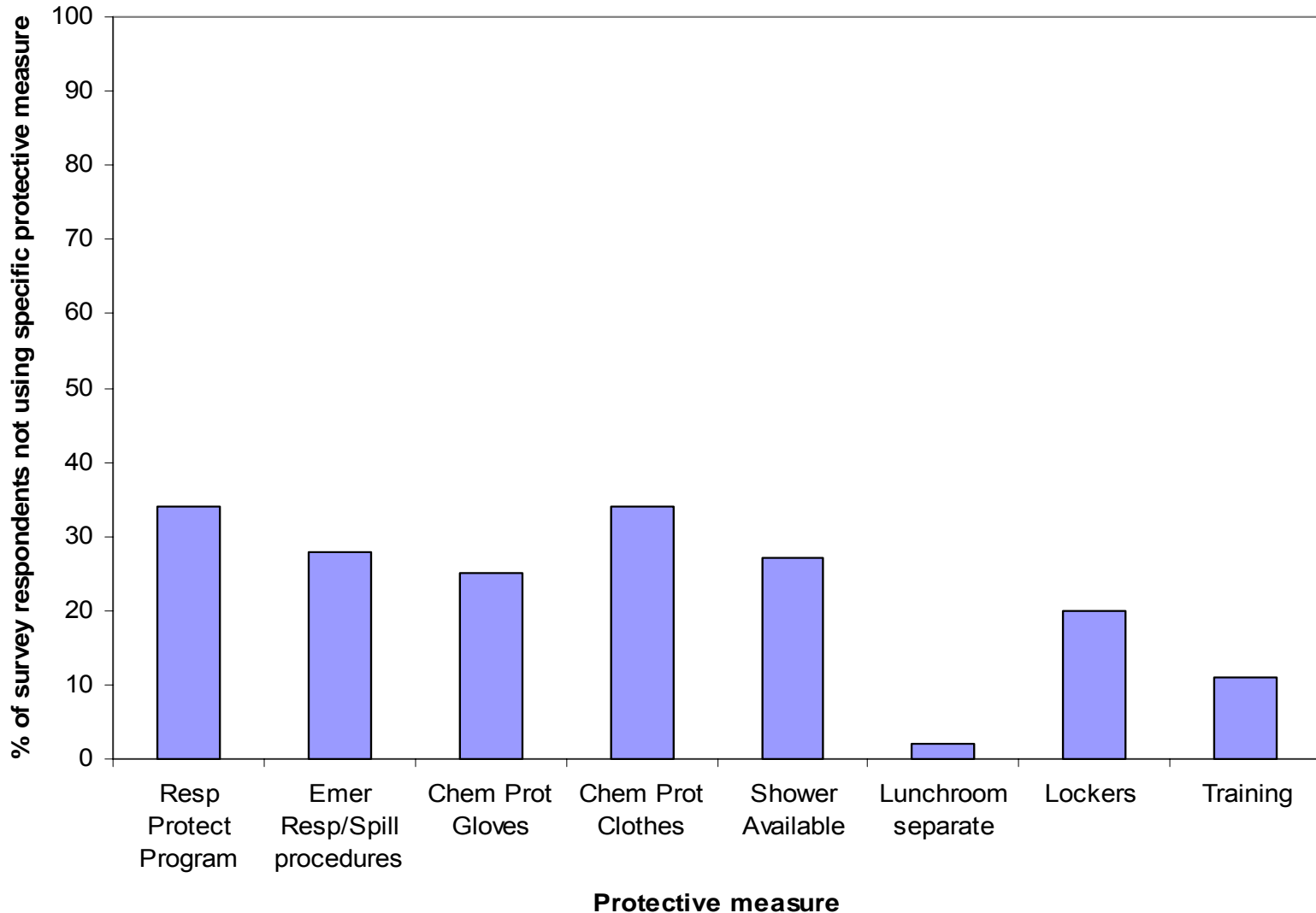
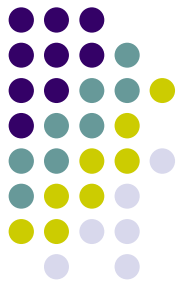
note: other includes pigment production, specialty products, art objects, gun ranges, blending pastes/caulkes/plastics

Numerous Uses among survey respondents

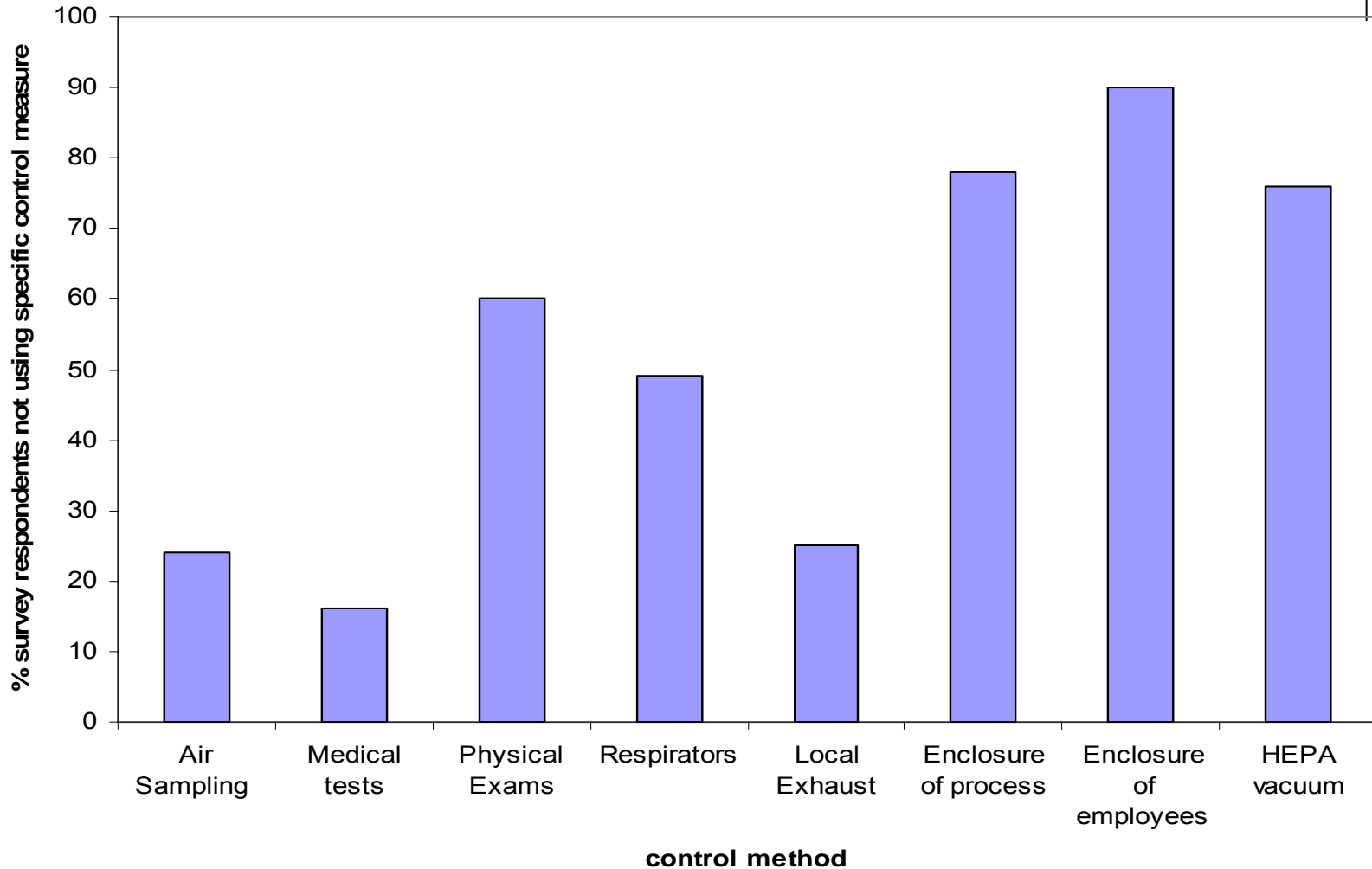
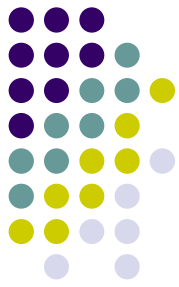


- Some automobile and sign paints
- Casings for wires
- Security seals and locking devices
- Battery components
- Quenching baths
- Secondary metals recovery
- Cross linking agents and pigments in plastics, certain adhesives, and caulks.
- Bullets and bullet primers
- Solder

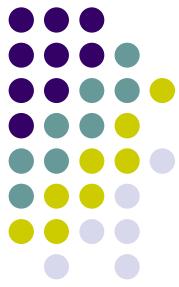
Lack of Protective Measures for companies that have employees with elevated blood lead values and significant exposure potential



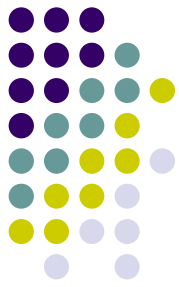
Lack of Evaluation, Controls and Medical Surveillance for Companies with Employees that have Elevated Blood Lead Values and Significant Exposure Potential



Conclusions



- Lead usage & lead exposure is still widespread.
- Many companies with employees that have elevated blood lead values (≥ 25 ug/dL) do not utilize basic hygiene practices.
- The OSHA lead standard would be strengthened if blood lead screening was used in conjunction with air sampling to determine which provisions of the standard are required for full compliance.
- The OSHA referral process for State based surveillance programs for lead (ABLES) are crucial for effective targeting of OSHA inspections.



Contacts

- Consumer, Environmental, and Occupational Health Service (OHS)
 - general phone: (609)584-5367
 - General E-mail: surveillance@doh.state.nj.us
 - general web-site: <http://nj.gov/health/eoh/odisweb/index.html>
 - OHS publications: <http://nj.gov/health/eoh/survweb/odispubs.htm>
 - (includes: What workers need to know about lead exposure, What physicians need to know about lead exposure, Homemade Fishing Weights can be Hazardous to your Health, and Lead bullets and firing ranges – Protect yourself and your family)
- Adult Lead Contact Information
 - Jim Blando (609)826-4958
 - E-mail: james.blando@doh.state.nj.us