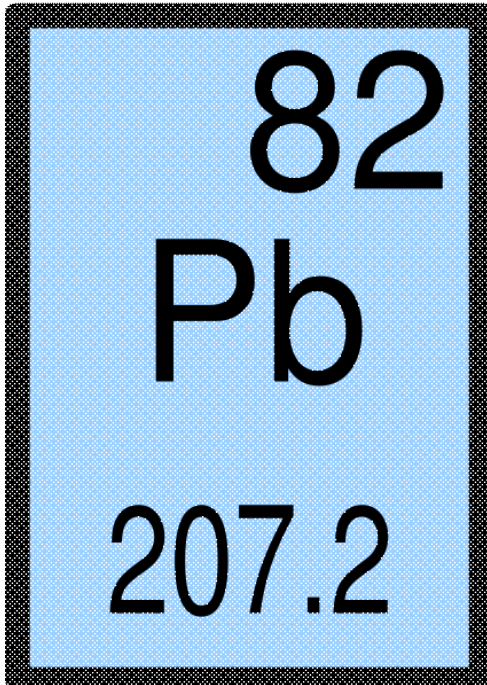


Childhood Lead Poisoning Prevention in California: Reducing Toxic Exposure for a Better Future

William Hale, REHS, Chief
Lead Hazard Reduction Section
Childhood Lead Poisoning Prevention
Branch
California Department of Public Health



Presentation Overview



- Lead Poisoning and Effects
- Sources of Lead Exposure
- Identifying Lead Sources
- Remediation of Lead Hazards

Scope of the Problem



- Lead poisoning is the most common and preventable environmental disease among California children¹
- **No known safe levels^{1,2,3}**
- Prevention is the best approach so children are not exposed
- Screening is the approach to early diagnosis of exposure, if it has occurred

¹ MMWR May 27, 2005 / 54(20);513-516

² Koller et al. EHP, Jun 2004

³ Bellinger, Current Opinions in Pediatrics, 2008, 20:172-177

How Are Children Poisoned?



- Highest exposure risk is usually when children begin to crawl (at age 6 months) and over first couple years of life.
- Most children ingest lead (via dust, soil, and paint) through crawling and hand-to-mouth behavior (e.g. putting toys & their hands in their mouths).
- Lead hazards in housing are a major source of exposure.
- Since 2003 all blood lead levels are reported to the State of California

California Lead Poisoning Prevention Program 2012 Statistics*



Total children age less than 21 tested for BLL**	650,402	
Total BLL \geq 4.5 mcg/dL*** (5 mcg/dL) & < 9.5 mcg/dL (10 mcg/dL)	10,722	1.6%
Total BLL \geq 9.5 mcg/dL (10 mcg/dL)	1,781	0.3%

* County BLL Statistics from 2007-2012 are available:

<http://www.cdph.ca.gov/programs/CLPPB/Pages/default.aspx>

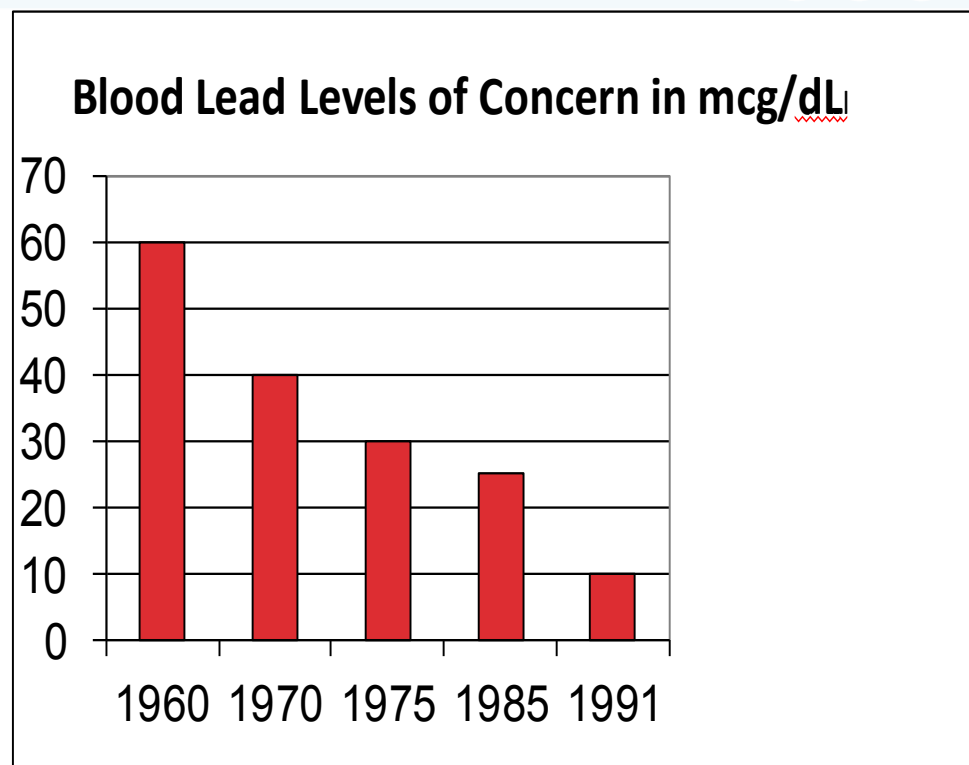
** Blood Lead Level = BLL

*** Microgram of lead per deciliter of blood = mcg/dL. For the purpose of case management, BLLs are rounded to the nearest whole number.

History of Centers for Disease Control and Prevention (CDC) Blood Lead “Levels of Concern” in the US



- The CDC “Level of Concern” decreased from 60 mcg/dL in 1960 to 10 mcg/dL in 1991
- In 2012 the CDC eliminated the term “Level of Concern”
- All levels need to be considered



Preventing Lead Poisoning in Young Children: A Statement by the Centers for Disease Control, October 1991

Legislative Interventions

- Lead in residential paint reduced in 1977 and became effective March 1978
- This level was further reduced to 0.009% (90 ppm) effective August 2009
- Leaded gasoline phase out complete in mid 1990's for on-road vehicles

Blood Lead Level



- Since 2012 the CDC reference level is **5 mcg/dL**
 - The CDC recommends that providers monitor and provide follow-up for children with levels ≥ 2 S.D. (top 2.5%) above the mean for the population as defined in the most recent National Health and Nutrition Examination Survey (NHANES), which is now **5 mcg/dL**
- This guidance will be reevaluated every 4 years¹
- Most children have BLL below 2 mcg/dL²

¹http://www.cdc.gov/nceh/lead/ACCLPP/CDC_Response_Lead_Exposure_Recs.pdf

² Bellinger, Current Opinions in Pediatrics, 2008, 20:172-177

Metabolism of Lead



- Main absorption in children is gastrointestinal
- Absorption is similar to iron and calcium
- 65 -70% total body lead is stored in bone in children^{1,2}
 - Half-life in blood is about 1 month
 - Half-life in bone is 10-30 years

Lead lines



¹Barry, PS, Br J Ind Med. 1975 May; 32(2): 119-139.

²Leggett, RW, Environ Health Perspectives 1993; 101: 598-616

Known Effects of Lead Poisoning



- Hematopoietic System: Anemia
 - Interferes with Heme Synthesis
- Neurologic System: Neurotoxin
 - Learning Disorders, IQ
 - Attention Deficit Hyperactivity Disorder (ADHD)
- Cardiovascular and Renal Systems
 - Hypertension
 - Atherosclerosis
- Endocrine System
 - Delayed Puberty

Most Common Clinical Finding

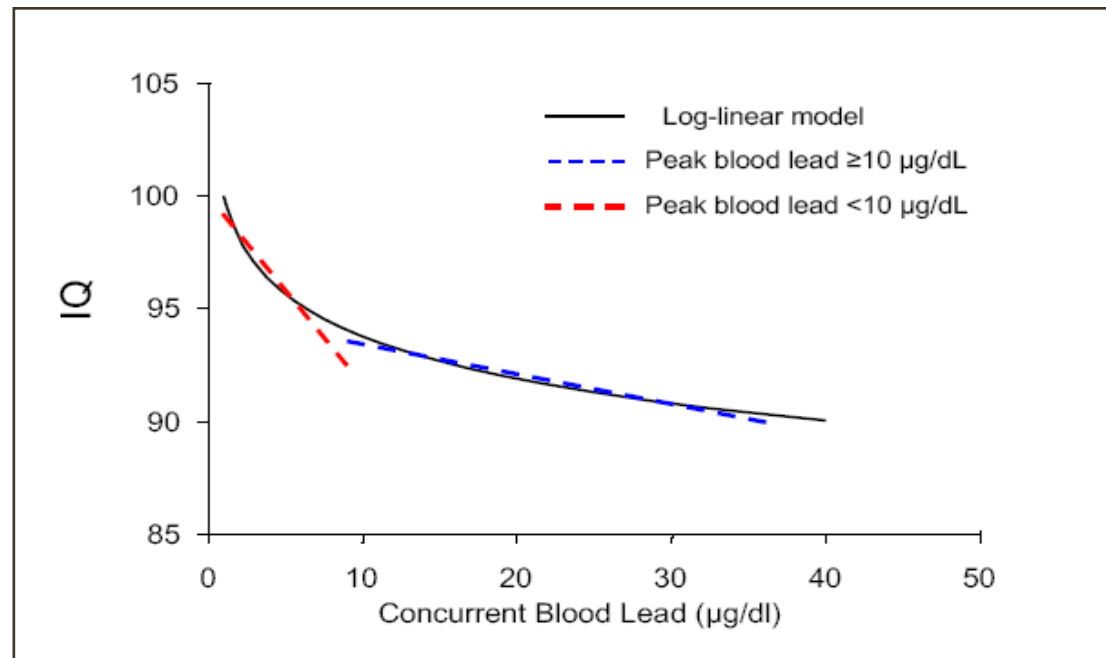


- Neuro-developmental compromise
- Clear reduction in IQ inversely correlated with rising lead levels
- Early lead exposure has persistent effects



Why Is Even Under 10 mcg/dL of Concern?

- Even levels below 10 mcg/dL are inversely associated with lower IQ scores¹
- There is an increased rate of loss of IQ at levels less than 10 mcg/dL²
- There are no known safe levels³



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¹ Canfield et al. NEJM 2003; 348(16):1517-26

² Meta-analysis by Lanphear et al. Environ Health Perspect 2005

³ Confirmed by meta-analysis by Koller et al. EHP, Jun 2004

Prolonged IQ Effects



- Rate of decrease greater at levels less than 10 mcg/dL^{1,2}
- IQ can drop 5-8 points
- Continuing decrease from 10-20 mcg/dl but not as steep^{3,4,5}

¹ Lanphear, 2005, Env Health Perspectives

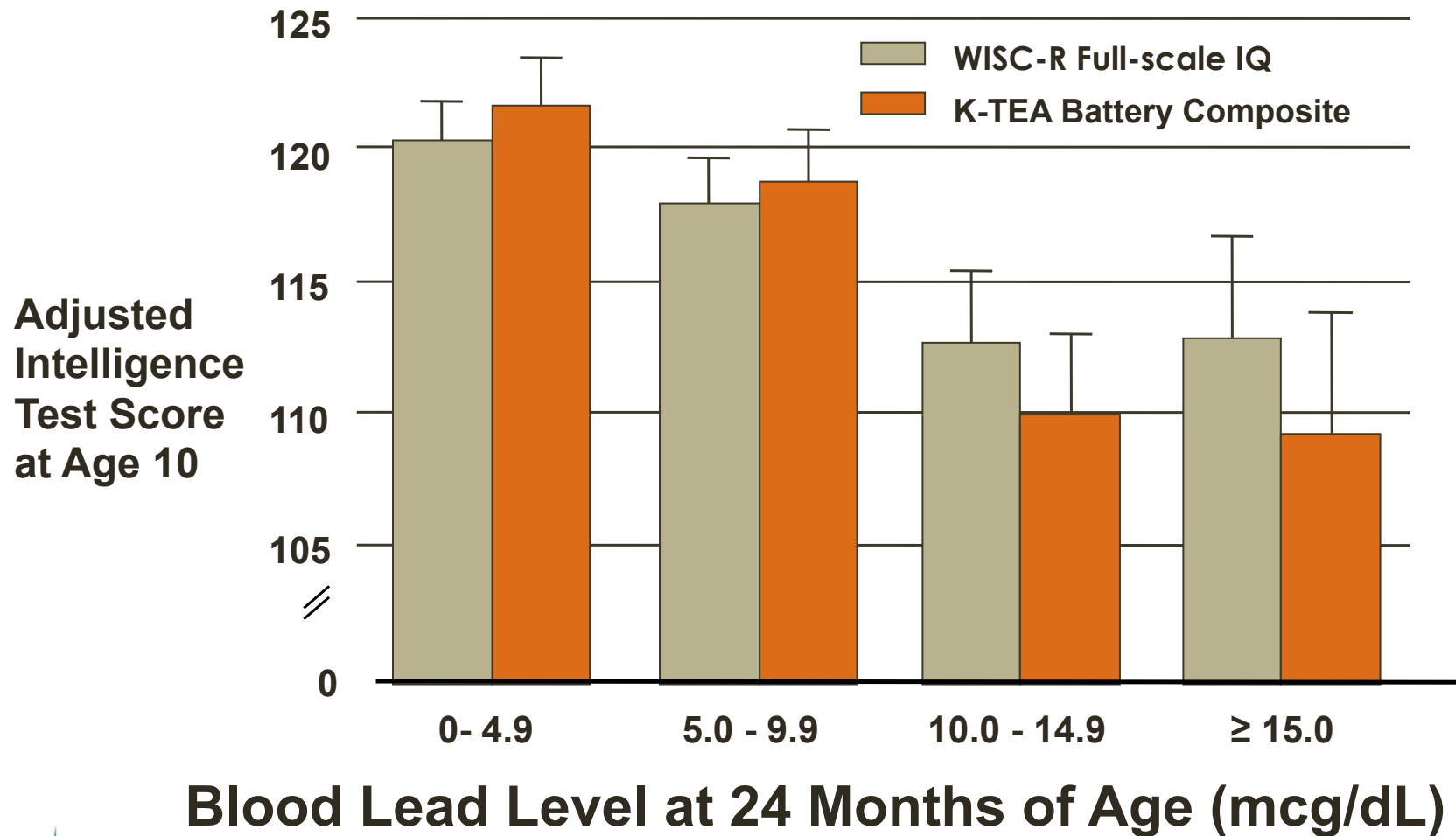
² Bellinger, Current Opinions in Pediatrics, 2008

³ Pocock & Smith, 1994, Review

³ Needleman, 2004, Lead Poisoning

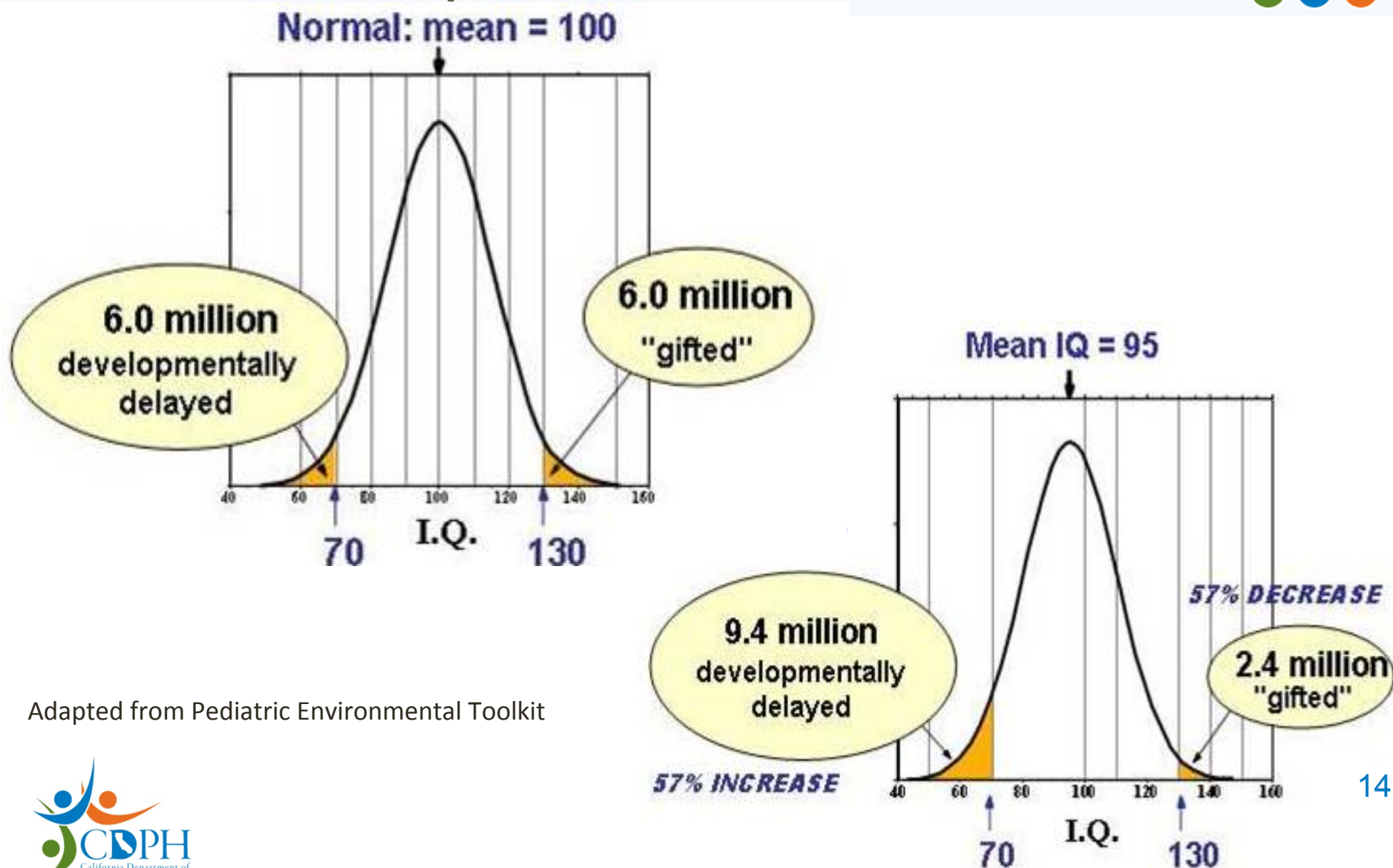
⁴ Lanphear, 2005, Env Health Perspectives

Illustrating the Inverse Relationship Between IQ and Blood Lead Level



Bellinger, et al. Pediatrics, 1992

Effects of Small Shift in IQ Distribution in Normal Population of 260 Million



Adapted from Pediatric Environmental Toolkit

Examples of Other Disorders Associated with Lead Exposure



- Developmental Disorders
 - Fetal Growth, IUGR¹
 - Reproductive Disorders
 - Delayed Sexual Maturation
- Learning Issues
 - Associated with ADHD²
- Cardiovascular Disorders
 - Link to childhood³ and adult hypertension⁴
- Behavioral Disorders
 - Violence and Aggressive Behavior^{5,6}
 - Juvenile delinquency^{7,8}
 - Elevated school drop-out rate⁹
 - Direct effect on behavior¹⁰
 - Potential link to criminal behavior¹¹

References for Articles: Other Disorders Associated with Lead Exposure

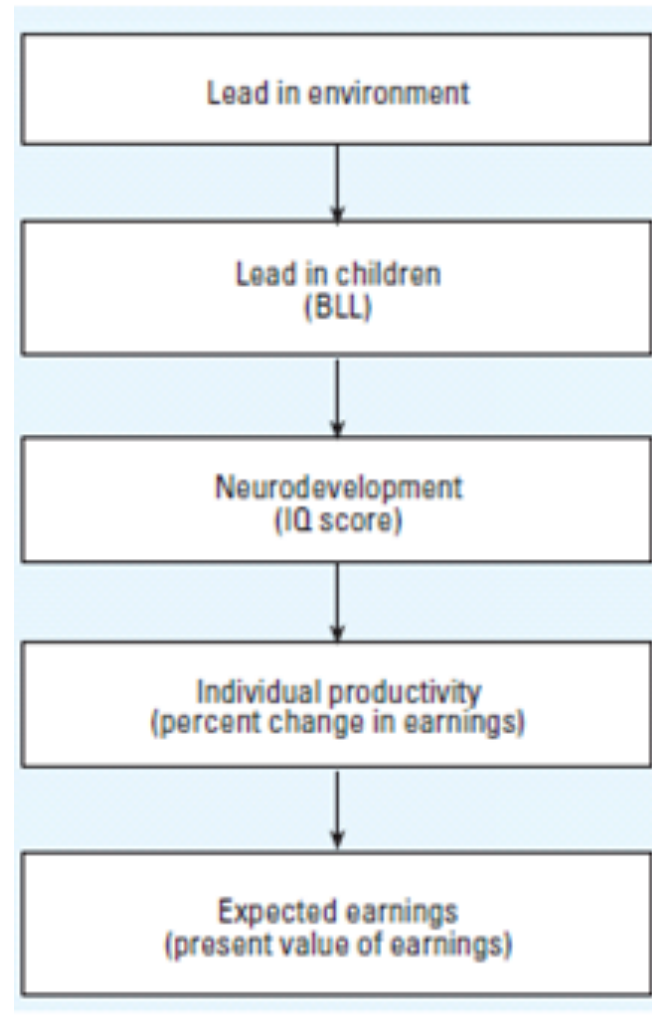


- ¹Hernandez-Avila, M, et al, Arch. Env. Health 2002; 57, 482-48
- ²Braun, et al. Environ Health Perspective 2006; 114:1904-9
- ³Gerr, F, et al, Am J. Ind. Med. 2002; 42:98-106
- ⁴Poreba, R, et al, Toxicology and App Pharmacology 2010; 249: 41-46
- ⁵Gould E Environ Health Perspective 2009; 117(7): 1162-7
- ⁶Mielke, HW, Zahran, S, Environment International 2012; 43:48-55
- ⁷Dietrich KN, et al. Neurotoxicol Teratol 2001; 23(6):511-8
- ⁸Needleman,HL, et al. Neurotoxicol Teratol 2002; 24(6):711-717
- ⁹Needleman, et al. NEJM 1990; 322(2):83-8
- ¹⁰Chen, et al. Pediatrics 2007; 119:e650-8
- ¹¹Wright et al. PLoS Medicine 2008; 5:e101

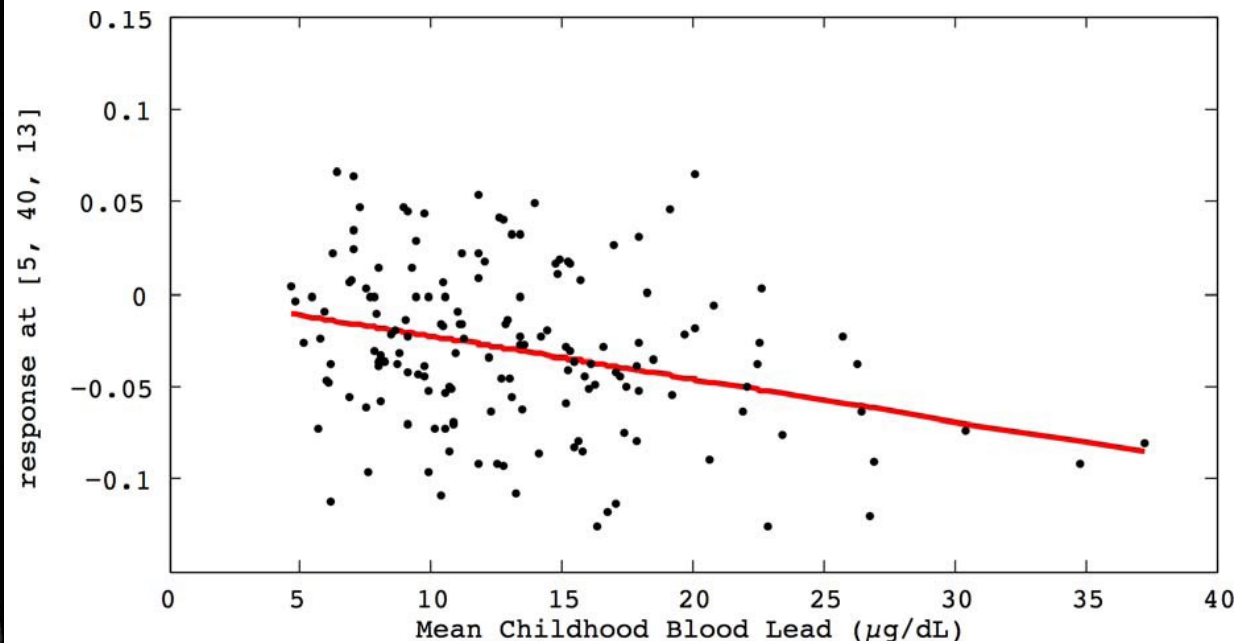
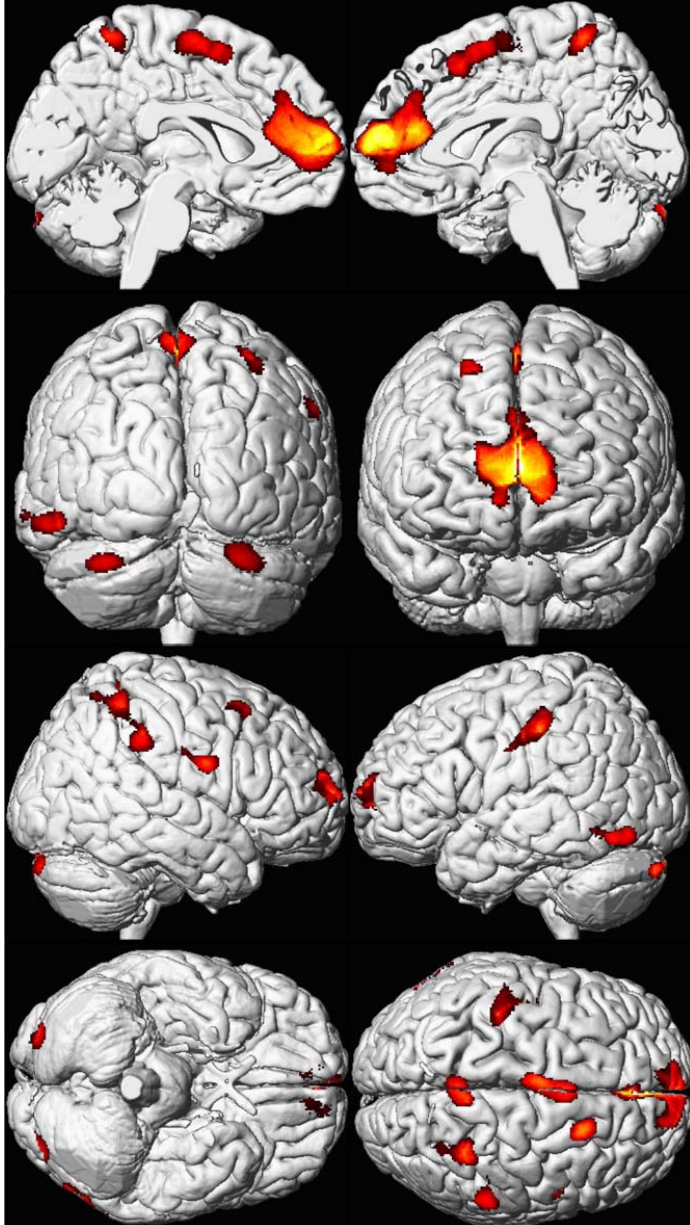
In Economic Terms



- Reducing blood lead has been and continues to be a huge benefit to society
- Estimated savings to society for the decrease of lead from 17.1 mcg/dL to 2 mcg/dL based on productivity and decreased lifetime earnings
- For the year 2000 US birth cohort of 3.8 million individuals
- Approximates \$100-300 billion¹



Regional Brain Volume Loss for the Cincinnati Lead Study Participants



Adapted from Cecil KM, Brubaker CJ, Adler CM, Dietrich KN, Altaye M, et al.(2008) Decreased brain volume in adults with childhood lead exposure. PLoS Med 5(5): e112

Childhood Lead Poisoning Prevention Branch (CLPPB)



CLPPB administers a statewide program to ensure that lead poisoned children receive case management services, including a public health nursing home visit and an Environmental Investigation (EI) of the child's home.

California State Case Definition

Effective July 1, 2016



- Any blood lead level equal to or greater than 14.5 mcg/dL (decreased from 19.5 mcg/dL)
- Any child with two blood lead levels greater than or equal to 9.5 mcg/dL (decreased from 14.5 mcg/dL) drawn at least 30 days apart with at least the second test being venous
- Children with these levels are designated as “Cases” and receive full case management services
- Children with blood lead levels equal to or greater than 4.5 mcg/dL receive, at a minimum, monitoring as well as outreach and education

County Childhood Lead Poisoning Prevention Program (CLPPP)



- Automatic referral and services when child is a case –
 - PHN Case management services and home visits
 - Home environmental investigation to identify lead sources
- Depending on the BLL other children may be eligible for services from the local CLPPP
 - If local jurisdiction does not have a CLPPP, services are provided by the State
- Services are not related to funding source, only to the blood lead level and age less than 21

Case Management Services Provided Through the Local Health Jurisdiction



- Most local health departments contract with the State
 - Public health nursing services
 - Home visit (more rapid for higher blood lead levels)
 - Family education
 - Nutrition assessment
 - Identify other affected children/family members
 - Ongoing monitoring, follow-up and collaboration with health care provider
 - Referrals to other services
 - Further environmental interventions to identify and correct lead sources

Purpose of Environmental Investigation (EI)



To look for the child's lead exposure sources and eliminate them.

Common Sources of Lead are Environmental

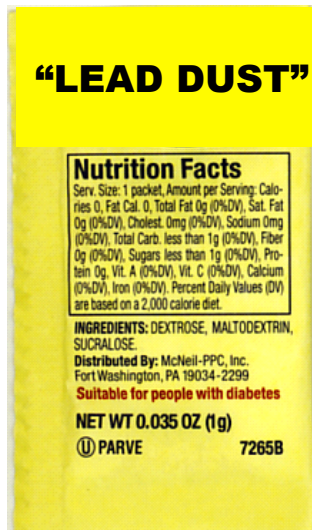


El Procedures at the Case Property Include Testing for:

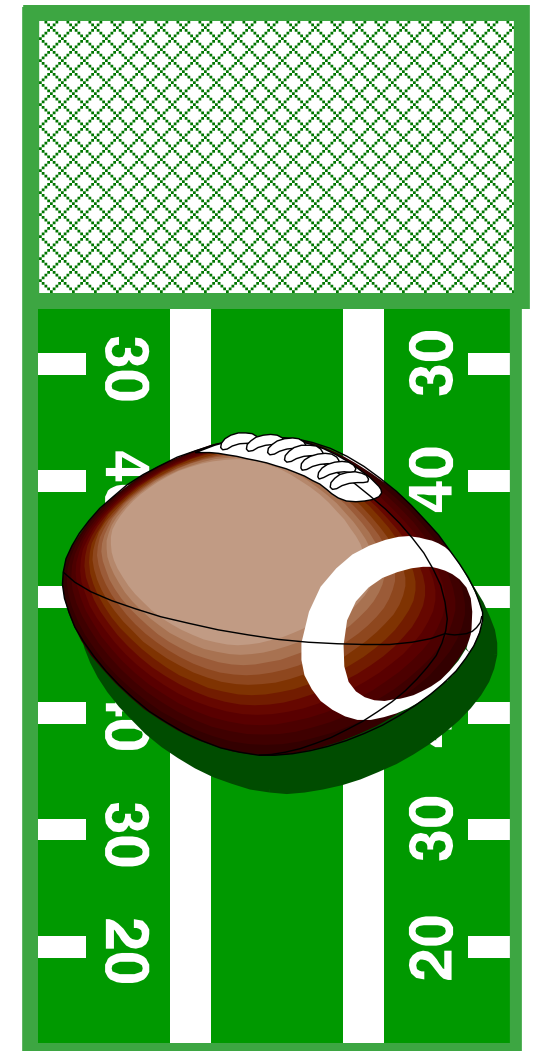
- Deteriorated lead-based paint
 - Cracking, flaking, peeling
- Lead-contaminated dust
- Lead-contaminated soil
- Water
- Other Suspected Lead Exposure Sources



How Much Lead is Hazardous?



- 1 gram packet of lead dust spread over 10,000 square feet gives lead level of 100 mcg/square foot
- Current EPA action level: 40 mcg/square foot
- FDA maximum allowable consumption for children under 6 years of age: 6 mcg per day



Current California Definitions of Lead-Based Paint and Lead Hazards



- Paint, Soil and Dust

- For residential paint on walls, 5000 ppm (0.5% by weight) or 1.0mg/cm² (by XRF) is considered lead-based paint
- Deteriorated (not intact) lead-based paint is a lead hazard
- 400 ppm for soil in play areas
- 250 mcg/square foot on window sills
- 40 mcg/square foot of indoor floor dust (more than 6-fold the FDA maximum for a young child)

- Water

- EPA action level for water is 15 ppb

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Bright! Shiny! Durable!

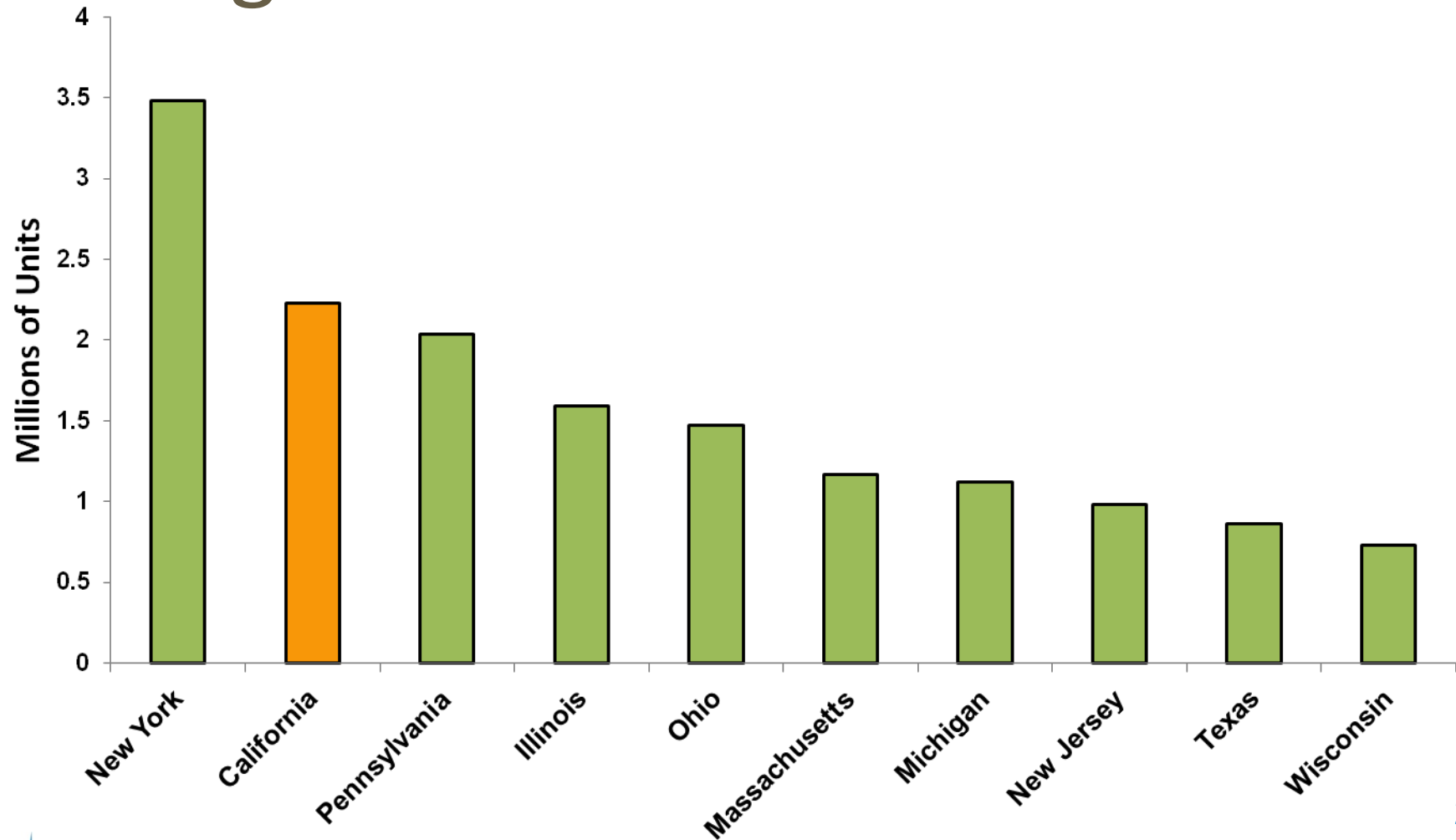


- Pre-1955: White paint was commonly 50% lead
- 1955: Optional industrial voluntary reduction to 1%
- 1971: Federal mandatory maximum allowable level in new paint set at 1%
- 1973: Federal maximum in paint lowered to 0.5% (equivalent to 5000 ppm)
- 1977: Federal maximum of 0.06% (600 ppm) effective 1978
- 2009: Federal maximum is 0.009% (90 ppm) effective August 2009

<http://www.cpsc.gov/businfo/regsumleadpaint.pdf>

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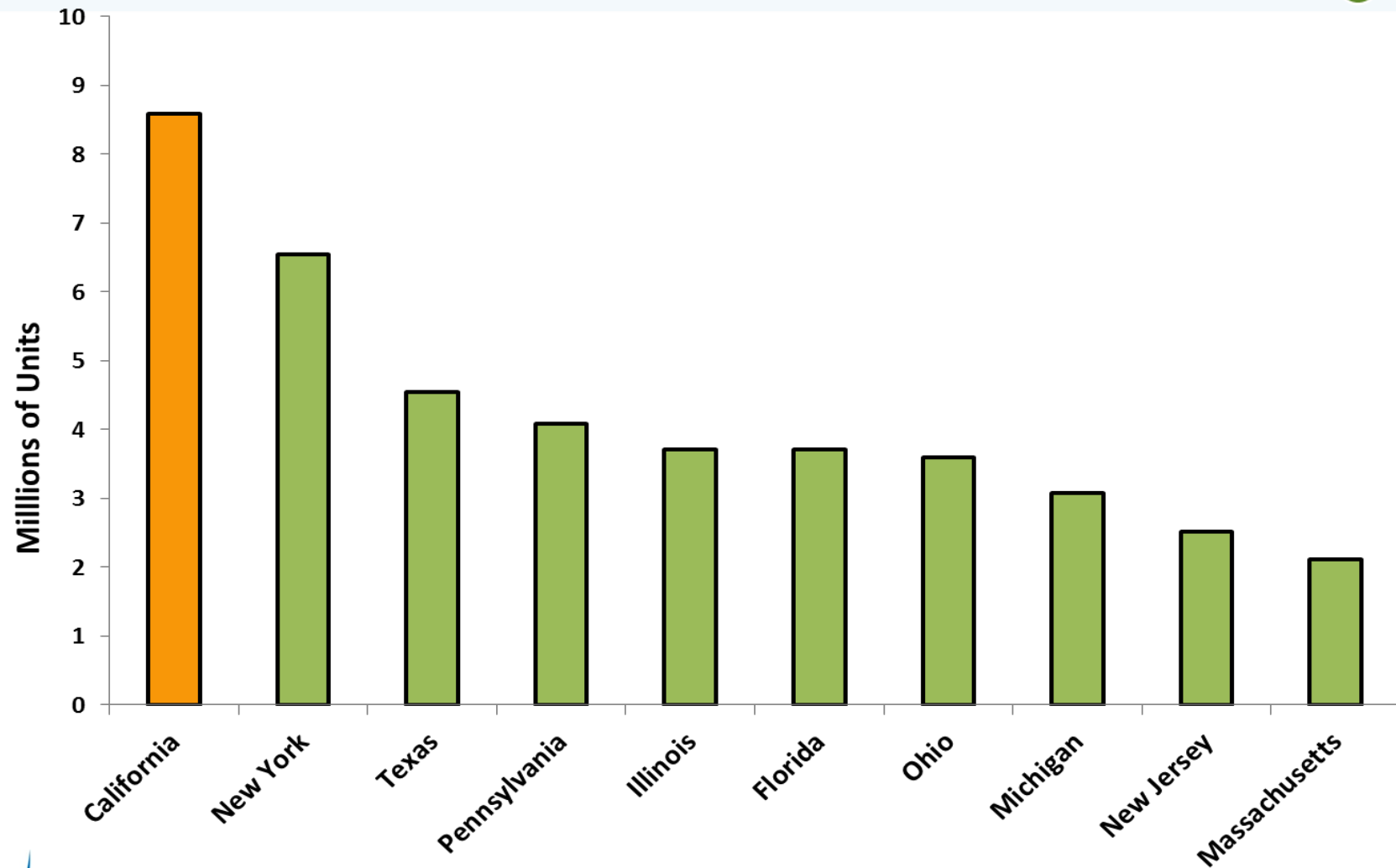
Top Ten States with Pre-1950 Housing¹



28

¹ Based on 2010 Census Data

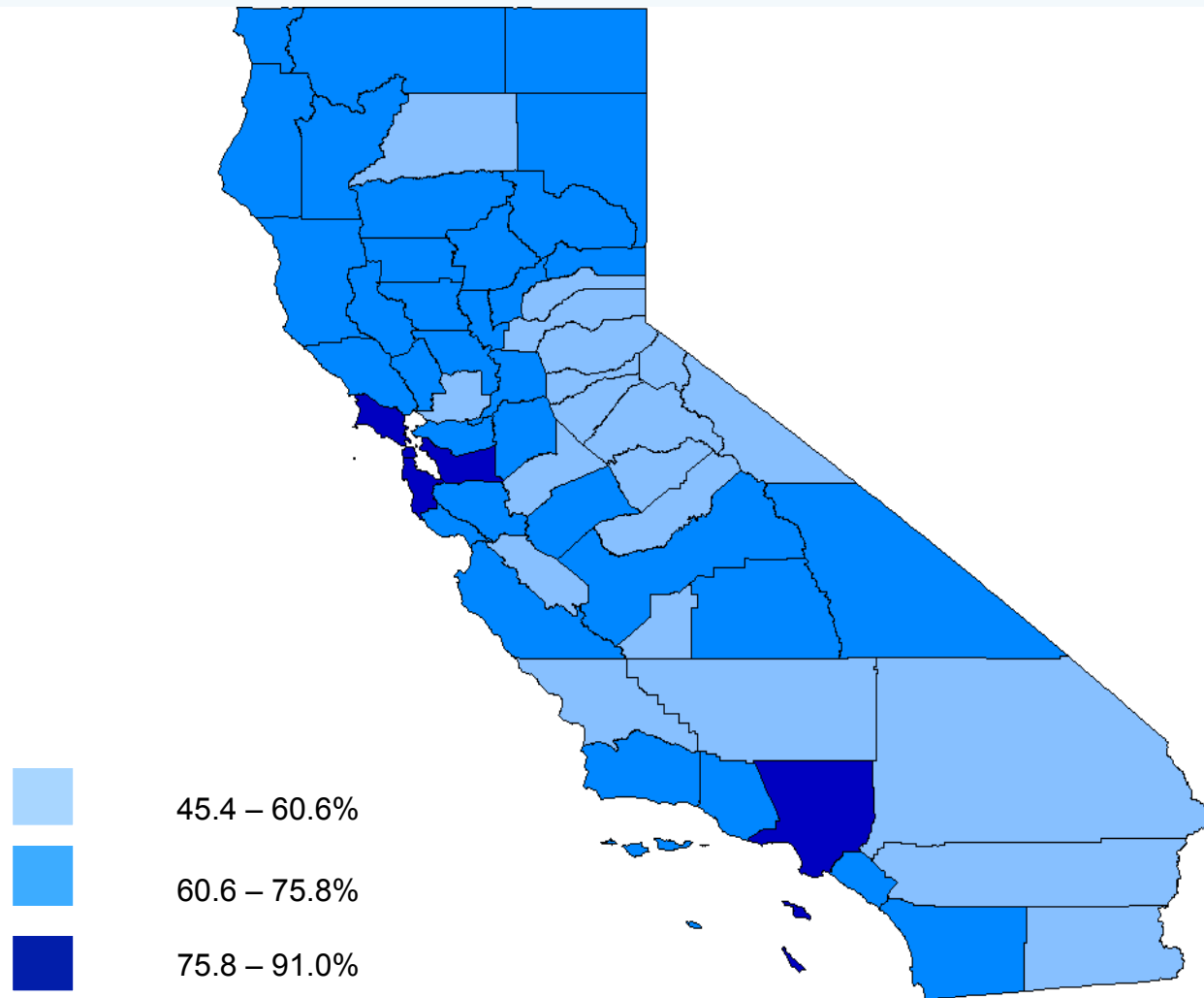
Top Ten States with Pre-1980 Housing¹



29

¹ Based on 2010 Census Data

Percent of homes built before 1980 in California by County (2000 Census data)





- Pica
- Chipping paint
- Dust





Leaded Gasoline



THE SATURDAY EVENING POST

WHAT A POWERFUL DIFFERENCE
THIS HIGH-OCTANE GASOLINE MAKES!



You can sit back and relax... and enjoy a powerful difference in your own car's performance, too. Just make sure you have a high-octane gasoline in the tank. You see, the octane rating of a gasoline determines how much power it can deliver. That's why octane rating is so important... and why it's so important for you to always get a high-octane fuel. Look for the familiar "Ethyl" emblem on the pump. That's the sure sign you're getting a high-octane gasoline for more driving pleasure.

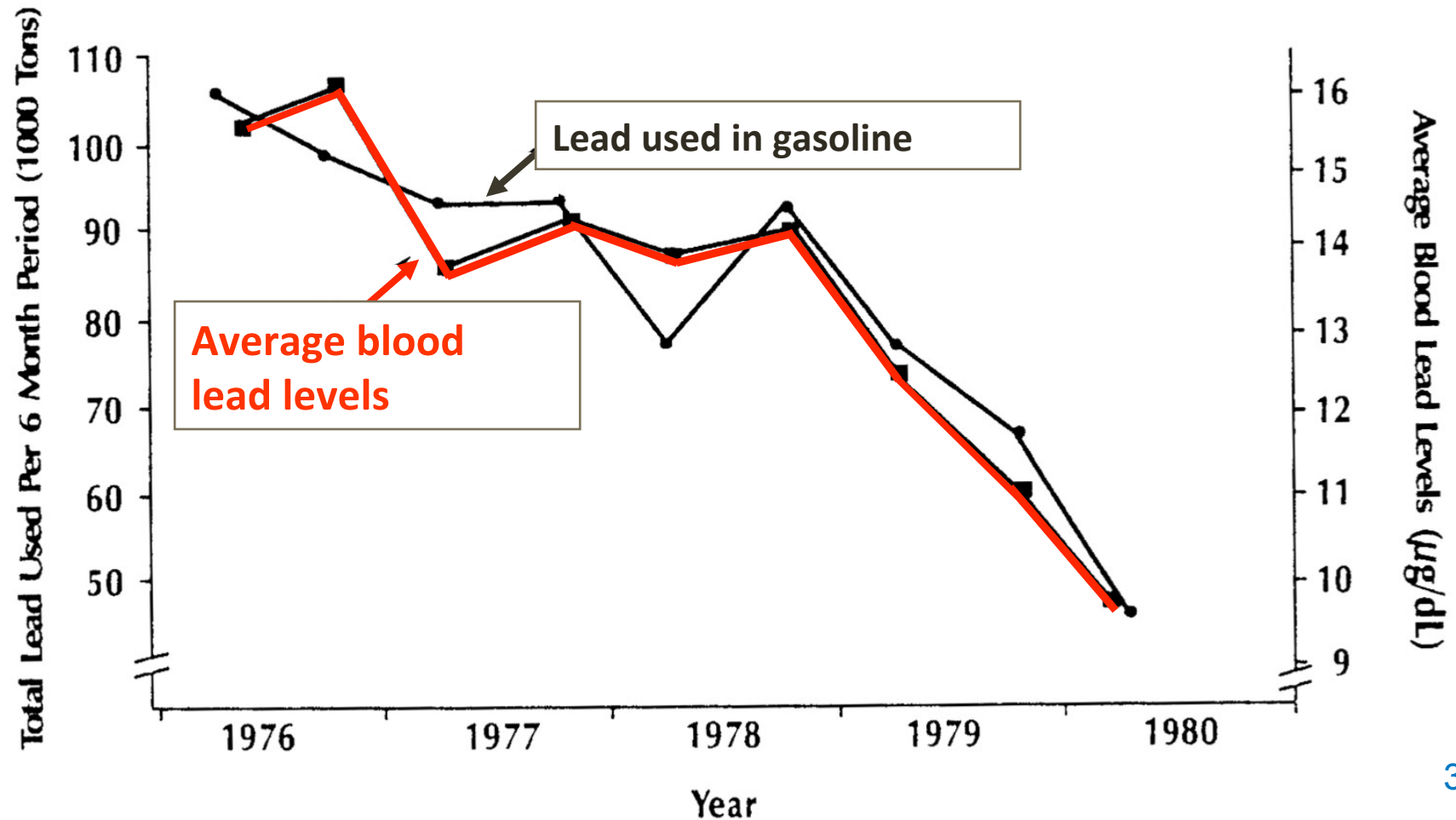
ETHYL CORPORATION
New York 100, N. Y.
Ethyl Corporation Ltd., in Canada



Enjoy full power—
use high-octane
"ETHYL" gasoline!

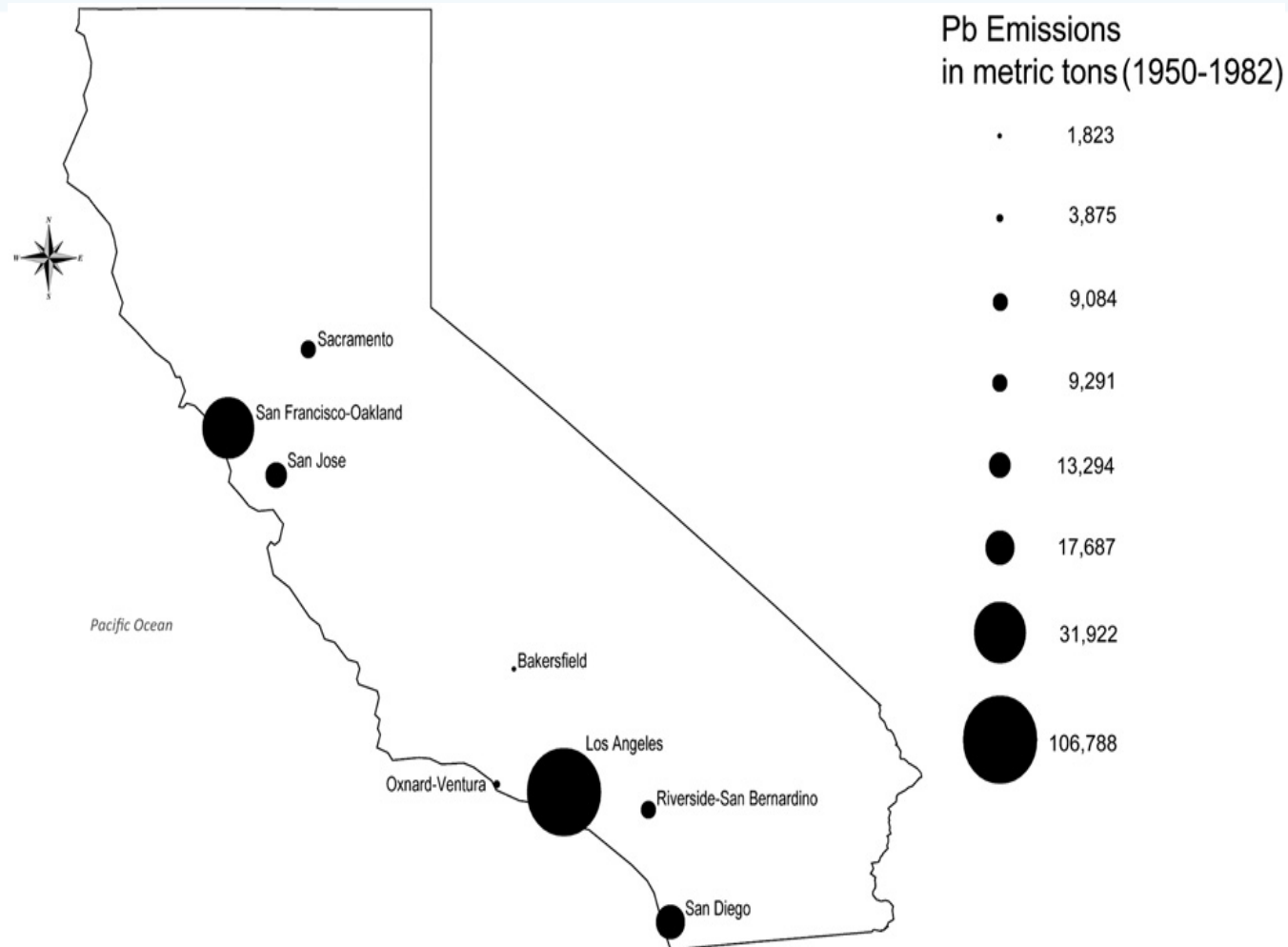


Change in Blood Lead Levels in Relation to Decline in Use of Leaded Gasoline 1976-1980



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Estimated Lead Emissions from Gasoline in 8 Urban Centers in California



Lead in Soil Remains



©Silverunder, Ethnographies®

Lead in Tap Water



- 1991 – Safe Drinking Water Act prohibited lead pipe for residential use (EPA 1991)
- EPA regulatory action level is 15 ppb
 - Based on a targeted number of taps within a water district, if ten percent or more of the taps exceed the action level, then the district must take corrosion control actions and provide public notification and education.
- Pre-1986 housing more likely to have lead in pipes, fittings, solder, fixtures and faucets
- In 2010 California further lowered allowable lead content in plumbing fixtures
- Families should consult with an environmental professional about testing if they have concerns

<http://water.epa.gov/drink/info/lead/index.cfm>

Lead in Tap Water



- Well water should be tested before use
<http://safewater.supportportal.com/link/portal/23002/23015/ArticleFolder/879/Household-Wells>
- Lead in tap water in Washington, D.C. was linked to a change in the disinfection process. The incident led to increased evaluation and ongoing monitoring of lead in drinking water^{1,2}
- In Flint, Michigan, pediatric blood lead levels increased (compared to CDC reference level) after introduction of a more corrosive water source into an aging water system without adequate corrosion control³

¹Guidotti, TL, Elevated Lead in Drinking Water in Washington, DC, 2003-2004: The Public Health Response, EHP May 2007

²Miranda, ML, Changes in Blood Lead levels Associated with Use of Chloramines in Water Treatment Systems, EHP Feb 2007

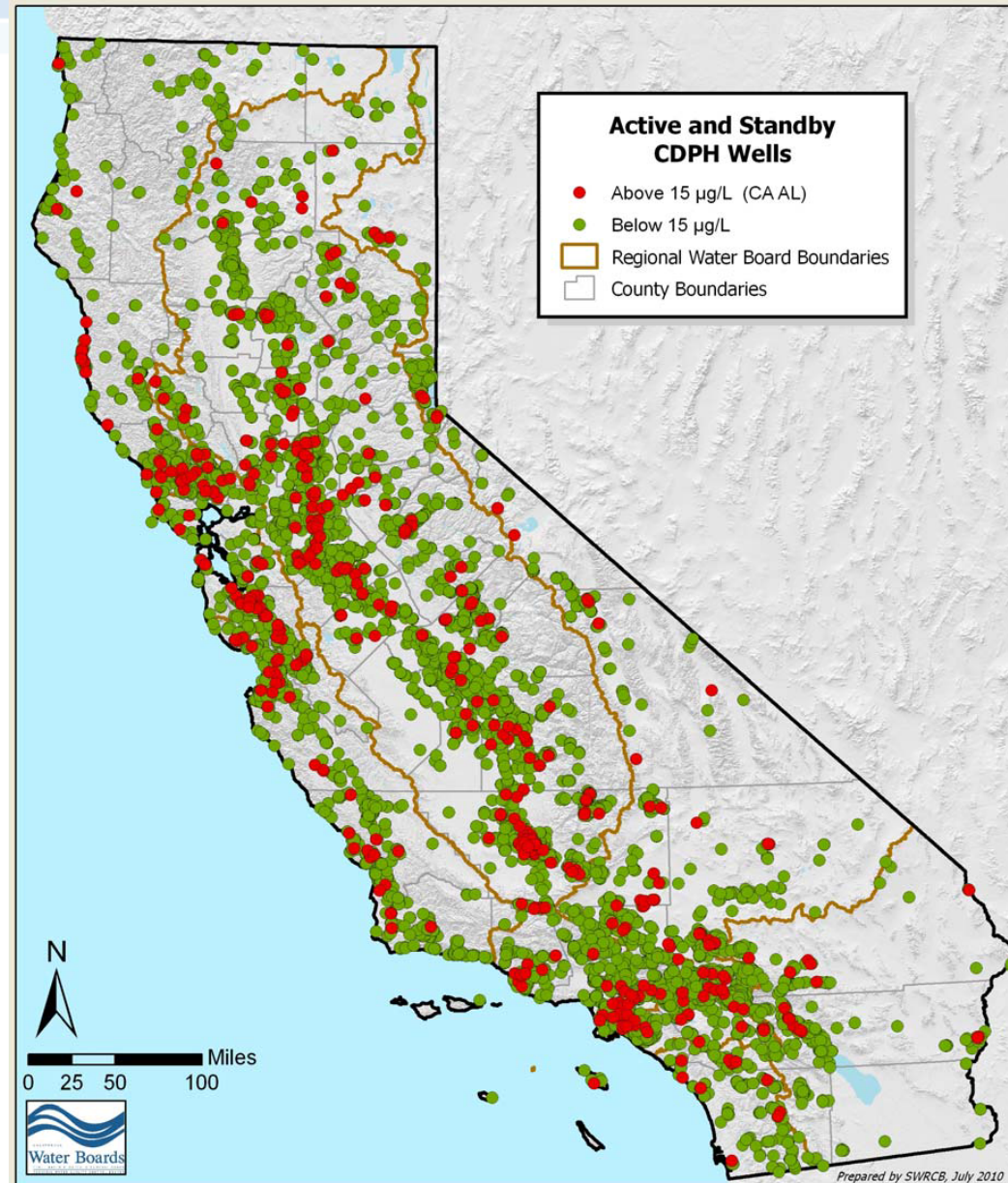
³Hanna-Attisha M, LaChance J, Sadler RC, Schnepf AC. 2016. Elevated blood lead levels in children associated with the Flint drinking water crisis: a spatial analysis of risk and public health response. Am J Public Health 106(2):283-290.

Active and Standby CDPH Wells that have had at Least One Detection of Lead above the Notification Level (493).



State Water Resources
Control Board Division of
Water Quality **GAMA**
Program

Source: July 2010 well
query of CDPH data
using GeoTracker
GAMA



Water from Els



- CLPPB tracked water sampling results from Els of CLPPPs using the CDPH contract lab* from May 2011-January 2016
- Of 878 reports:
 - 9 (1%) of samples were plumbing fixtures (e.g. faucets) ≥ 15 ppb action level and ordered replaced.
 - After replacement, tested < 5 ppb (lab detection limit).
 - 23 (2.6%) of samples were plumbing fixtures ≥ 5 ppb but < 15 ppb.
 - Instructions provided to reduce exposure to lead in water, including the option to replace the plumbing fixture.

*Does not include CLPPPs using separate laboratories: Los Angeles, Long Beach, Pasadena, San Bernardino, and San Francisco.

Many Sources of Exposure



You can find lead...



in chipping paint



in remedies like azarcon, greta, or pay-loo-ah



on your hair, skin, shoes, and clothes after work



in bullets and fishing sinkers



in some toys



in some jewelry
www.dtscc.ca.gov/Toxic-Jewelry-Samples.cfm



in some candies
www.cdph.ca.gov/data/Documents/fdbLICLIC07.pdf



in bare dirt



in traditional makeup, like kohl, surma, or sindoor



in some dishes and pots



in house dust



in foods and brightly-colored spices from outside the USA

Occupational Sources Brought Home



- Construction/abatement/remodeling
- Smelting/soldering/painting
- Storage battery production
- Firing ranges
- Recycling Centers



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At-Risk Activities



- Furniture painting/refinishing
- Glazing, Pottery
- Soldering
- Lead fishing weights
- Collectibles
- Firearms
- Stained Glass
- Jewelry Making



Lead in Imported Ceramics



Cazuela^{1,2}

¹Lynch, R, Jnl Environ Health, May 2008;
Lead Leachability from Lead-Glazed
Ceramic Cooking Vessels



Jarra³

²Villalobos, M, Sci Tot Env Apr 2009

³Callahan GN. Eating dirt. Emerg Infect Dis [serial online] 2003 Aug
www.cdc.gov/ncidod/eid/vol9no8/pdfs/03-0033.pdf

Lead in Traditional Remedies



- Azarcon and Greta
 - Mexican community
 - Bright powders used for gastrointestinal upset (*empacho*)
 - Can be > 150,000 ppm lead¹



Lead in Traditional Remedies: Other Communities



- Patent remedies in Chinese community
- Bright colored powders in South Asian community
- Black-powder cosmetics in Middle Eastern community
- Herbal remedies
- Ayurvedic medicines
- May be > 50,000 ppm



Sindoor

Lead Contamination in Candy and Foods



Turmeric



Chili powder

Maximum allowable lead in candy in California is 0.1 ppm – AB121, 2005

<http://www.cdph.ca.gov/programs/Pages/FDB%20Lead%20In%20Candy%20Program.aspx>

<http://www.cdph.ca.gov/programs/CLPPB/Pages/LeadCandyAlerts.aspx>

Chapulines



- Can be > 5,000 ppm lead



Chapulines from Oaxaca

AJPH, May 2007

Villalobos, M, Sci Tot Env 2009; Apr 1;
407(8):2836-44.

Lead in Consumer Products



CHILDREN'S WOODEN ANGEL PENDANT NECKLACE
CONTAINED 736,000 PARTS PER MILLION LEAD



U.S. Customs and Border Protection





6-07-12 Seattle, WA

Check for recalls at www.cpsc.gov and
www.dtsc.ca.gov/LeadInJewelry.cfm

NLLAP Lab for Lead



- 
- California requires that samples submitted for lead hazard evaluations (includes paint, dust and soil) be analyzed by a laboratory recognized by the United States Environmental Protection Agency (US EPA) National Lead Laboratory Accreditation Program (NLLAP).*
 - Environmental Laboratory Accreditation Program (ELAP) is not a substitute for the NLLAP requirement.
 - “Lead hazard evaluation” means the on-site investigation, for compensation, of lead-based paint or lead hazards for public and residential buildings. (For detail see Title 17, California Code of Regulations, Section 35038.)
- 

On-Site Results



CLPPB encourages local Childhood Lead Poisoning Prevention Programs to use handheld, portable X-ray fluorescence instruments (XRF)



Rapid Results



Rapid, On-Site Testing Allows Lead Program Environmental Professional (EP) to:

- Quickly inform the child's family of locations of lead exposure sources
- So they can take immediate steps to limit exposure



CA On-Site Lead Testing Capacity

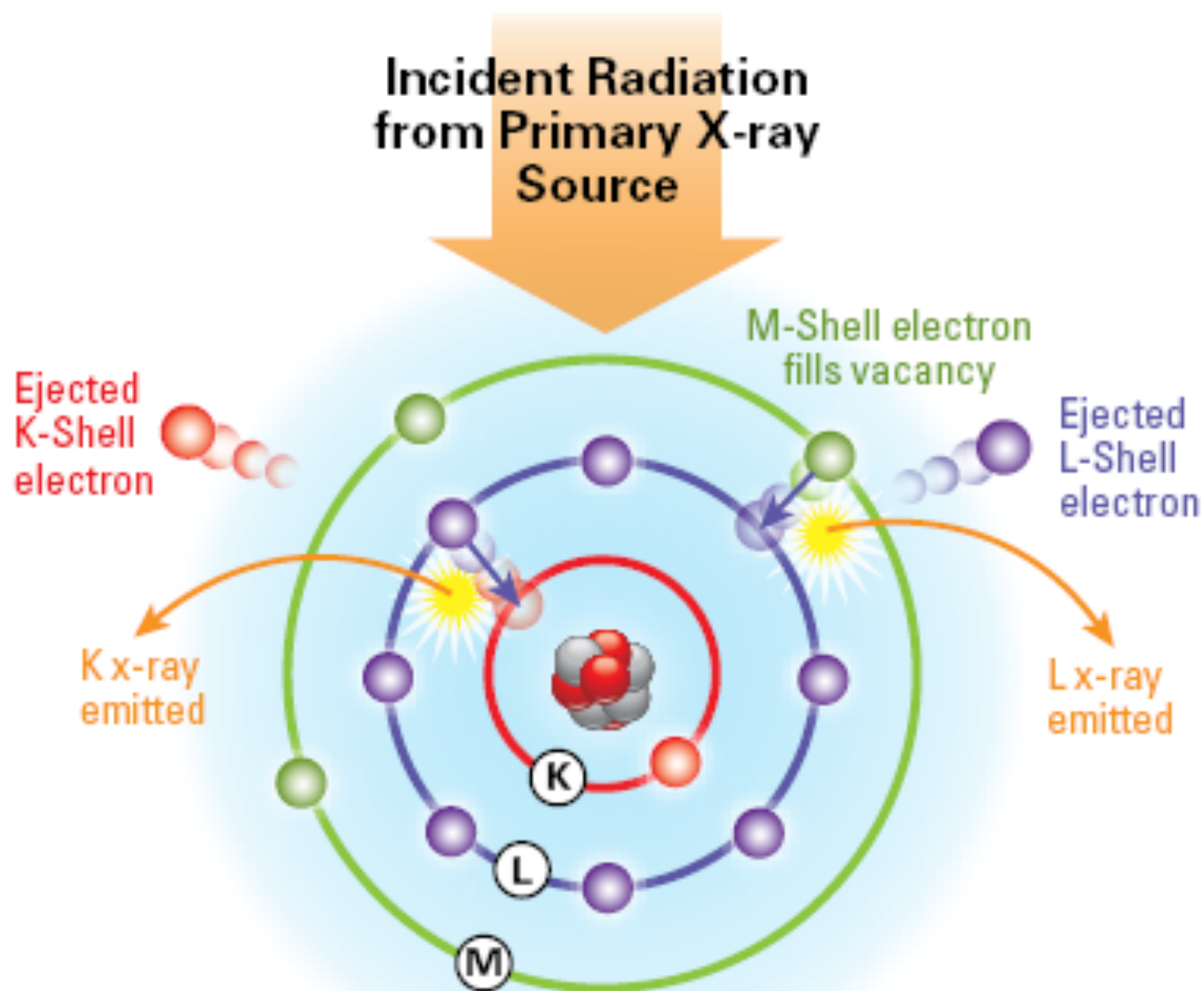


- CLPPB has a portable XRF Instrument Loan Program.
- On-site XRF testing of paint, dust and soil is performed in 54 out of 61 Local Health Jurisdictions.
 - Two of the other jurisdictions use XRF that only read paint; send other samples to lab.
 - Five only submit samples to a laboratory.
- Approximately 80 Environmental Professionals in the Local Health Jurisdictions perform Environmental Investigations in the homes of lead-poisoned children.

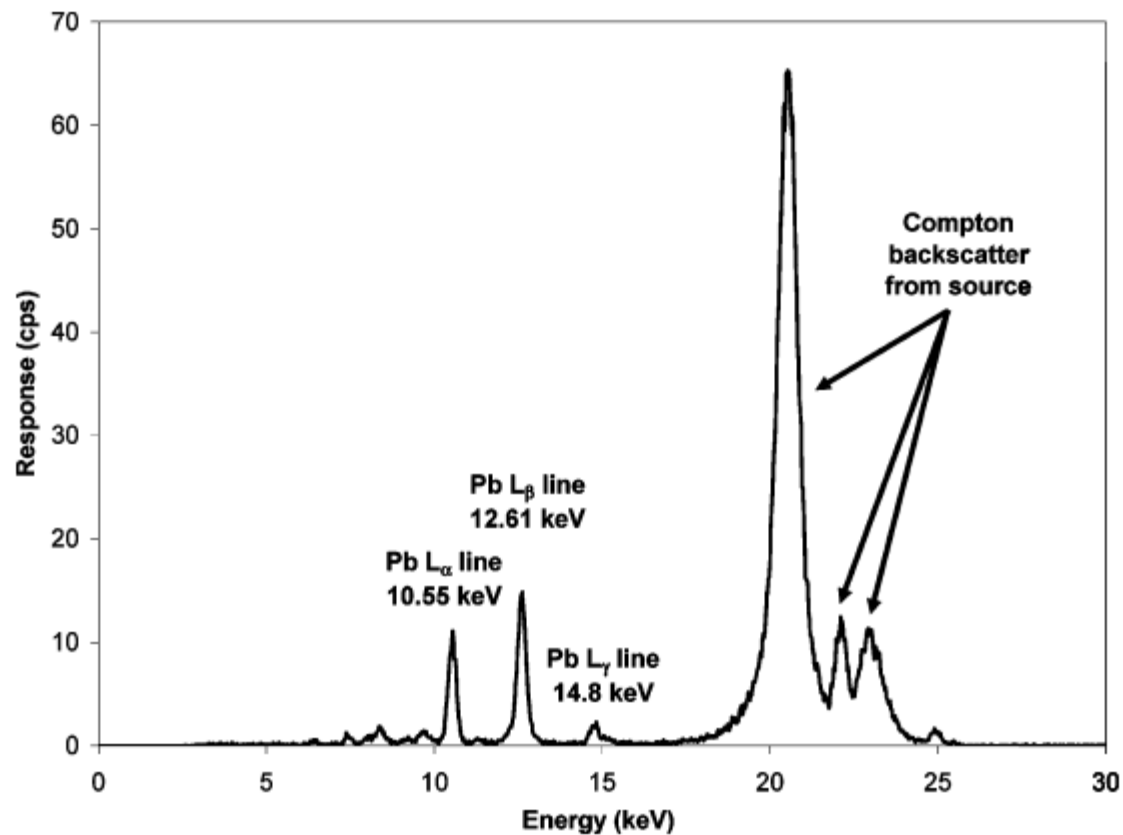
XRF Safety



XRF Function



XRF Spectrograph

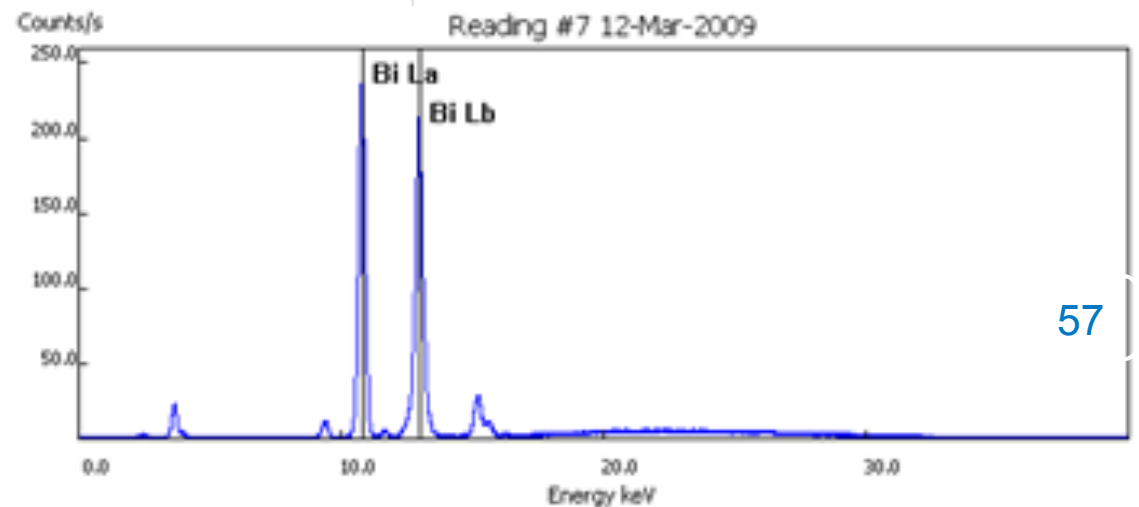
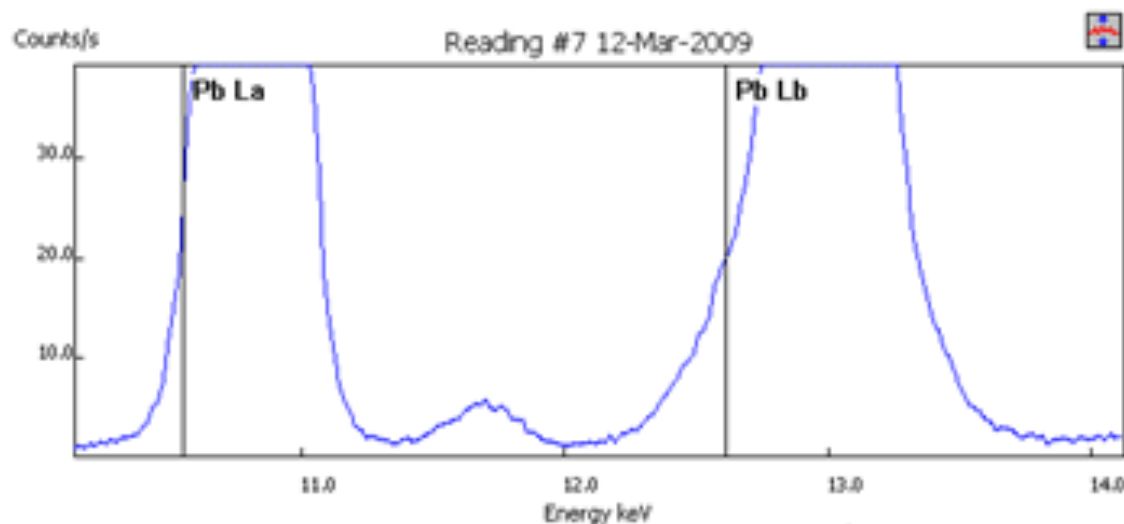


XRF spectrum of 1% lead in chocolate

XRF error for lead on a powdered sample



XRF originally gave result as ~1000 ppm, but lab read <0.37 ppm!



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XRF error for lead on a powdered sample



H 1																	He 2															
Li 3	Be 4																	B 5	C 6	N 7	O 8	F 9	Ne 10									
Na 11	Mg 12																	Al 13	Si 14	P 15	S 16	Cl 17	Ar 18									
K 19	Ca 20	Sc 21	Ti 22	V 23	Cr 24	Mn 25	Fe 26	Co 27	Ni 28	Cu 29	Zn 30	Ga 31	Ge 32	As 33	Se 34	Br 35	Kr 36															
Rb 37	Sr 38	Y 39	Zr 40	Nb 41	Mo 42	Tc 43	Ru 44	Rh 45	Pd 46	Ag 47	Cd 48	In 49	Sn 50	Sb 51	Te 52	I 53	Xe 54															
Cs 55	Ba 56																	Hf 72	Ta 73	W 74	Re 75	Os 76	Ir 77	Pt 78	Au 79	Hg 80	Tl 81	Pb 82	Bi 83	Po 84	At 85	Rn 86
Fr 87	Ra 88																															
Lanthanides 57-71		La 57	Ce 58	Pr 59	Nd 60	Pm 61	Sm 62	Eu 63	Gd 64	Tb 65	Dy 66	Ho 67	Er 68	Tm 69	Yb 70	Lu 71																
Actinides 89-103		Ac 89	Th 90	Pa 91	U 92	Np 93	Pu 94	Am 95	Cm 96	Bk 97	Cf 98	Es 99	Fm 100	Md 101	No 102	Lr 103																

Factors that May Affect XRF Algorithms

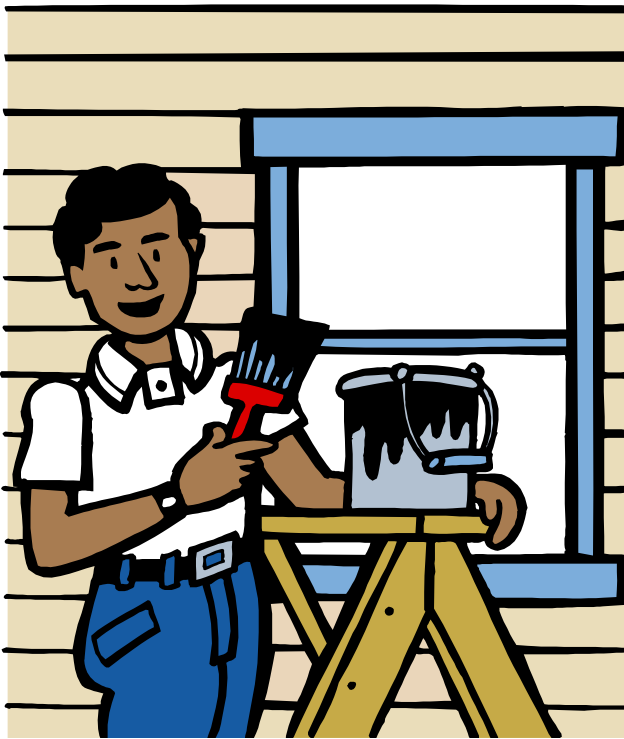


XRF output vary

- By the inverse square of the distance to the element
- Exponentially relative to matrix density
- Exponentially relative to elemental X-ray energy emission
- Exponentially relative to element location in sample matrix
- Exponentially relative to beam filtering and energy
- With X-ray beam distribution
- Orders of magnitude relative to sample uniformity

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If Lead Exposure Hazards are Identified:



- Property Owner notification
- Property Owner requirement letter with abatement options

Local Enforcement Authority: “Lead Safe” Work Practices



- “Lead Safe” work practices are required for any remodeling activity in any pre-1978 structure. *(Title 17, CA Code of Regulations, sec. 36050)*
- Authority to issue a cease and desist order to anyone creating a lead hazard and issue \$1,000 fine. *(Health and Safety Code Section 105256)*

Clearance Inspection



- Even if a medical case is closed, the property closure does not occur until the lead hazards have been addressed.
- Case address remains open to follow-up until clearance is achieved.

When is it Lead-Based Paint?



- In CA surface coatings on pre-1978 structures are presumed lead-based paint unless a quantitative test shows otherwise. (Title 17, CA Code of Regulations, section 35043)
- Work on pre-1978 housing should assume lead-based paint and use all pertinent lead-safe work practices.
- A qualitative “swab” test does not refute the presumption that pre-1978 dwellings and public buildings have lead-based paint.



Who Can Collect Samples?



- If quantitative tests are taken to determine presence of lead, testing must be done by a State certified Inspector/Assessor, Sampling Technician, or Project Monitor.
- The CDPH Lead-Related Construction (LRC) Program within the Childhood Lead Poisoning Prevention Branch (CLPPB) certifies individuals to identify and safely remediate lead-based paint and lead hazards in California residential and public buildings as well as their surrounding property.

<http://www.cdph.ca.gov/programs/CLPPB/Pages/LRCNav.aspx>

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Definitions of Lead Hazard and Lead-Based Paint



“Lead hazard” means deteriorated lead-based paint, lead contaminated dust, lead contaminated soil, disturbing lead-based paint or presumed lead-based paint without containment, or any other nuisance which may result in persistent and quantifiable lead exposure. (Title 17, California Code Of Regulations, Division 1, Chapter 8, §35037)

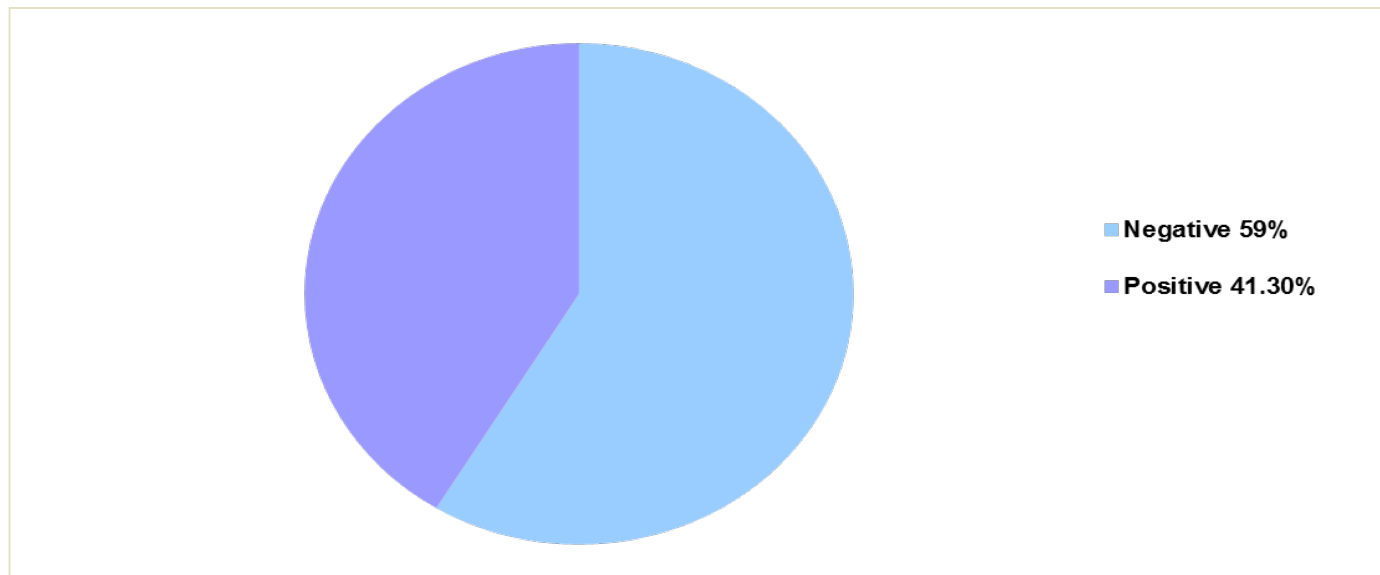
“Lead-based paint” means paint or other surface coatings that contain an amount of lead equal to, or in excess of:

- (a) one milligram per square centimeter (1.0 mg/cm²); or
- (b) half of one percent (0.5%) by weight. (Title 17, California Code Of Regulations, Division 1, Chapter 8, §35033)

Lead Hazards in CA



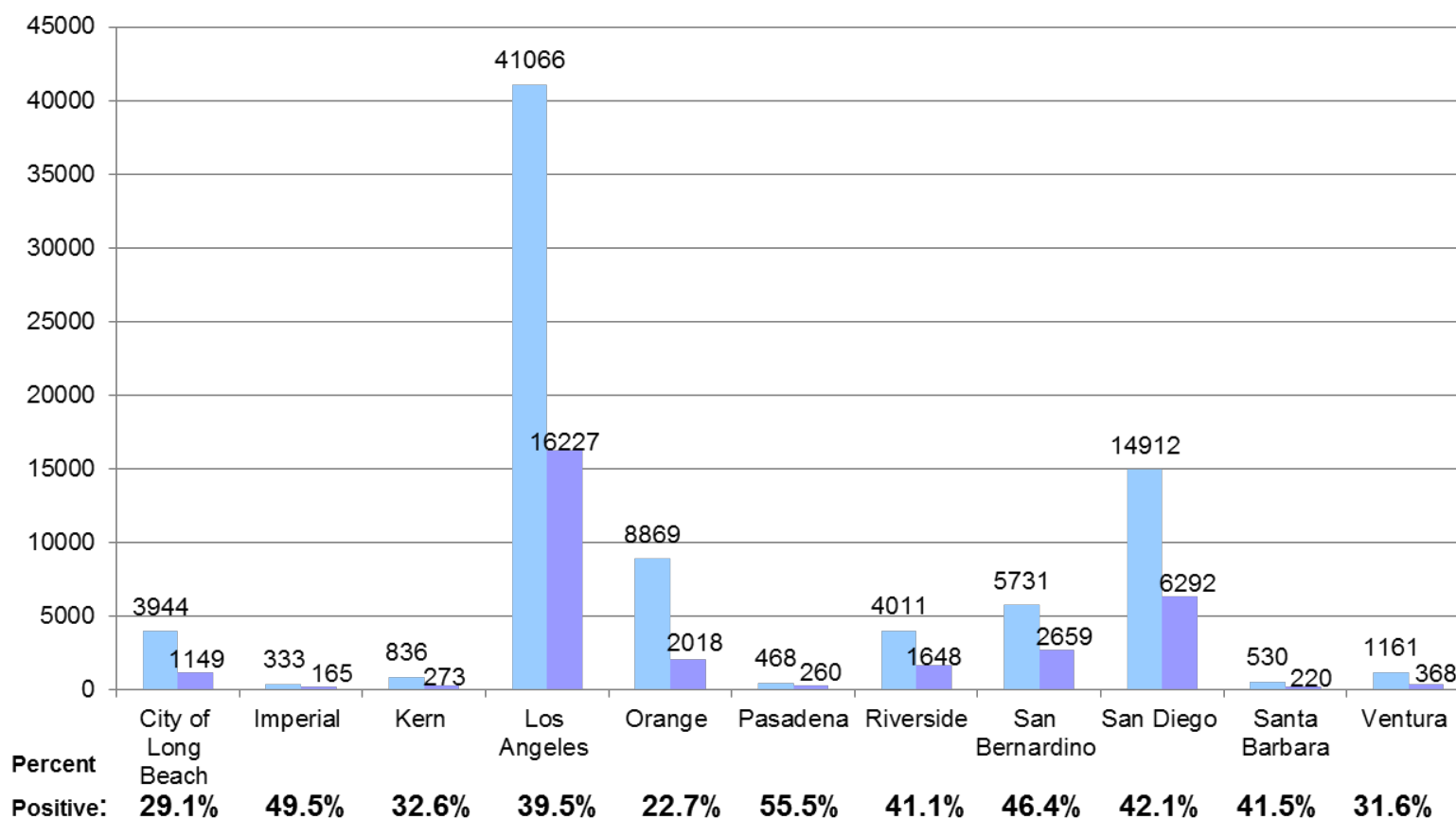
- Total Number of Lead Evaluations performed- 121,953
(includes EP's, other agencies and private consultants)
- Total Number of positives- 50,419



*Preliminary Analysis of Data from Jan 1997 through June 2013 from LEAD

*LEAD: LEAD EVALUATION AND ABATEMENT DATABASE

Regional Hazards in Southern California



*Preliminary Analysis of Data from Jan 1997 through June 2013 from LEAD

*LEAD: LEAD EVALUATION AND ABATEMENT DATABASE



State and County Resources



- California Lead Poisoning Prevention Branch
<http://www.cdph.ca.gov/programs/CLPPB/Pages/default.aspx>
- County Childhood Lead Poisoning Prevention Program
<http://www.cdph.ca.gov/programs/CLPPB/Pages/CLPPPIndex.aspx>
- Lead Related Construction Program
<http://www.cdph.ca.gov/programs/CLPPB/Pages/LRCNav.aspx>
- Occupational Lead Poisoning Prevention Program
www.cdph.ca.gov/programs/olppp

Federal Resources



- CDC - www.cdc.gov/nceh/lead/
- Recalls - www.cdc.gov/nceh/lead/recalls/
- EPA - www.epa.gov/lead/
- US Consumer Product Safety Commission - <http://www.cpsc.gov/about/cpsia/sect101.html>

Food and Drug Resources



- California Food and Drug Branch – Lead in Candy
<http://www.cdph.ca.gov/programs/Pages/FDB%20Lead%20In%20Candy%20Program.aspx>
- US Food and Drug Administration – <http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ChemicalContaminantsMetalsNaturalToxinsPesticides/ucm077904.htm>

Questions?



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CDPH Childhood Lead Poisoning Prevention Branch:

<http://www.cdph.ca.gov/programs/CLPPB/>

(510) 620-5600

Extra Slides



Take-home Messages (1)



- Prevention is the best approach to lead exposure
- Low levels of lead can cause developmental delay and organ damage
- Toddlers and children in publicly funded programs and those in older neighborhoods and housing are considered most at risk

Take-home Messages (2)



- Most common exposure is from lead-contaminated paint, dust, or soil
- Other sources need to be considered
 - Cultural
 - Occupational
 - Hobbies

Take-home Messages (3)



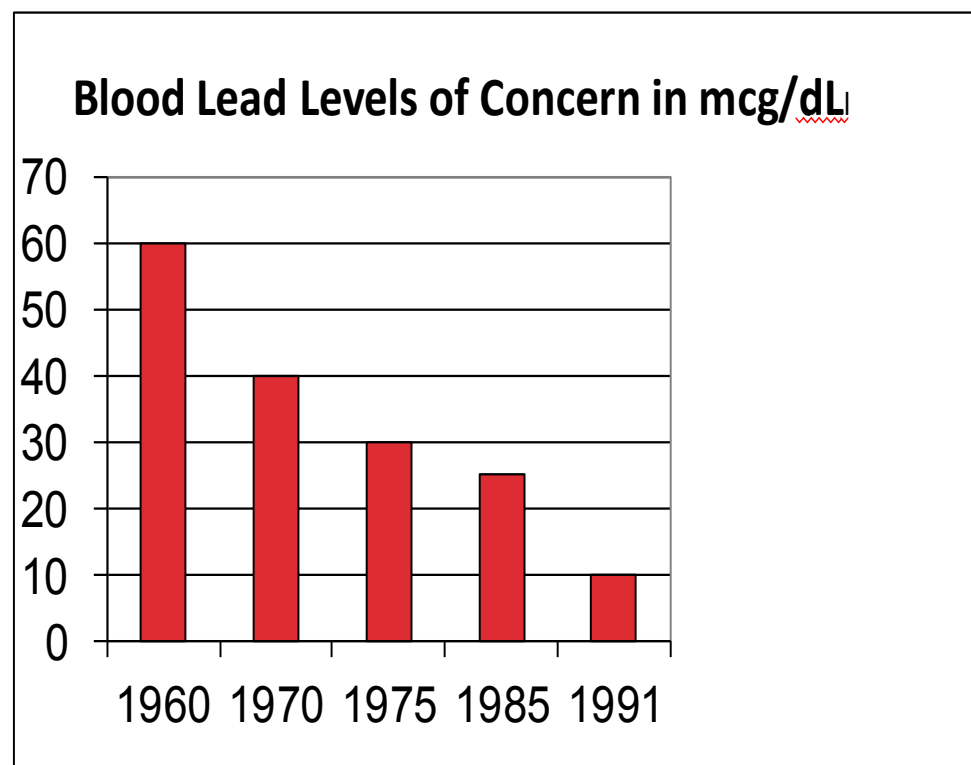
- **Testing of at-risk children is the best method of early detection**
- **All Exposure is Cumulative**
- CLPPPs can provide resources for the primary care provider

History of Centers for Disease Control and Prevention (CDC) Blood Lead “Levels of Concern” in the US

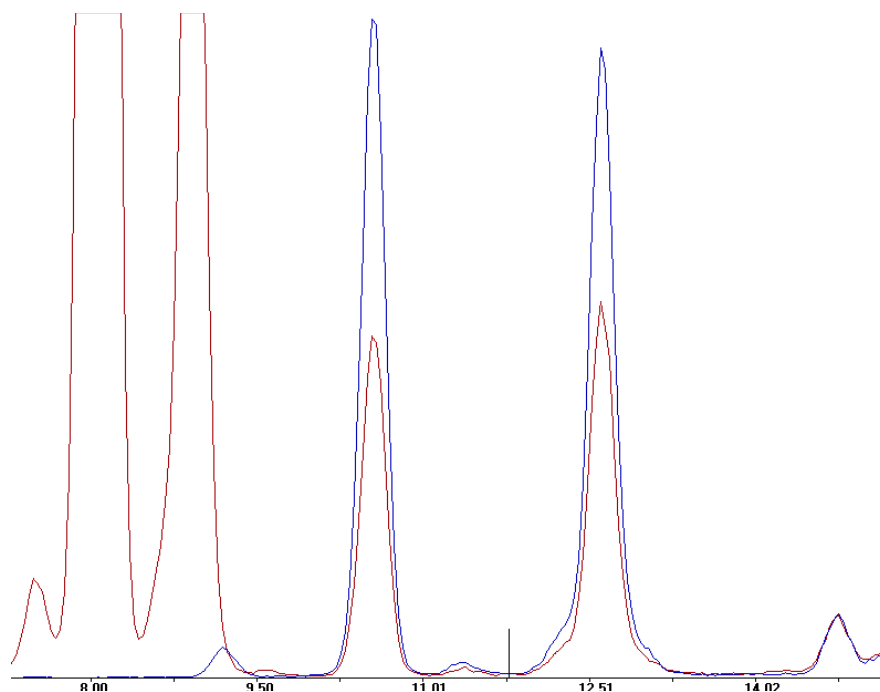


CDC’s historic “Level of Concern” steadily decreased over time

- Lead in paint banned in 1977 and became effective March 1978
- Leaded gasoline phase out complete in mid 1990’s for on-road vehicles

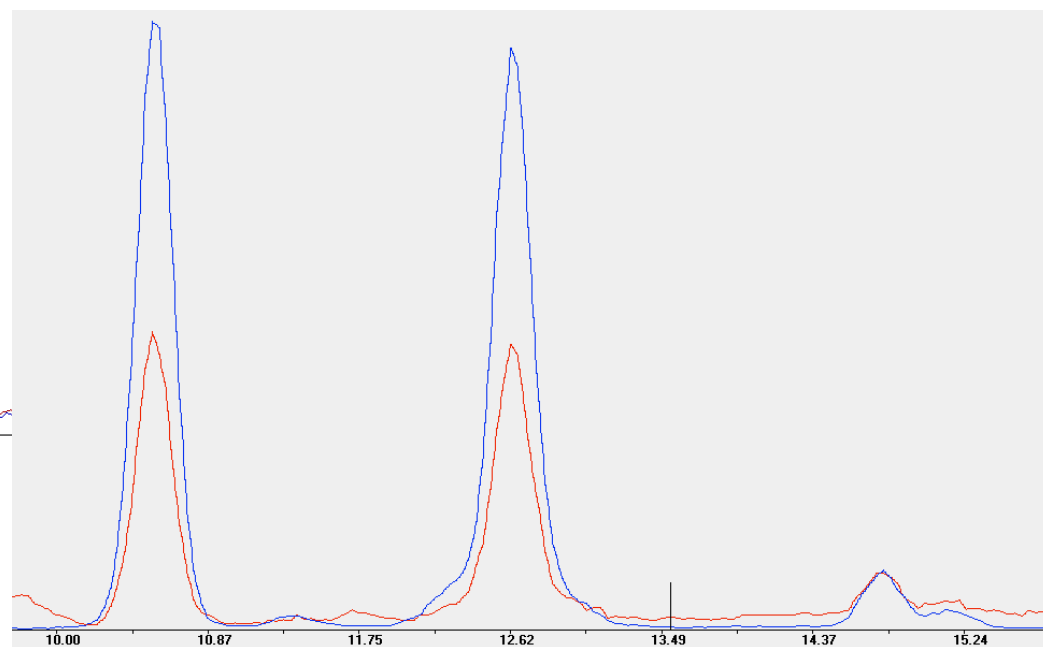


Copper, Lead, and Arsenic Inter-element XRF Monkey Business



Blue= Pb only, Red= Cu Alloy with Pb

Adapted from Fundamental XRF Technology Overview,
presentation by Dr. Bruce J. Kaiser, Chief Scientist, Bruker AXS
2009



Blue= Pb only, Red= Cu Alloy with Pb and As

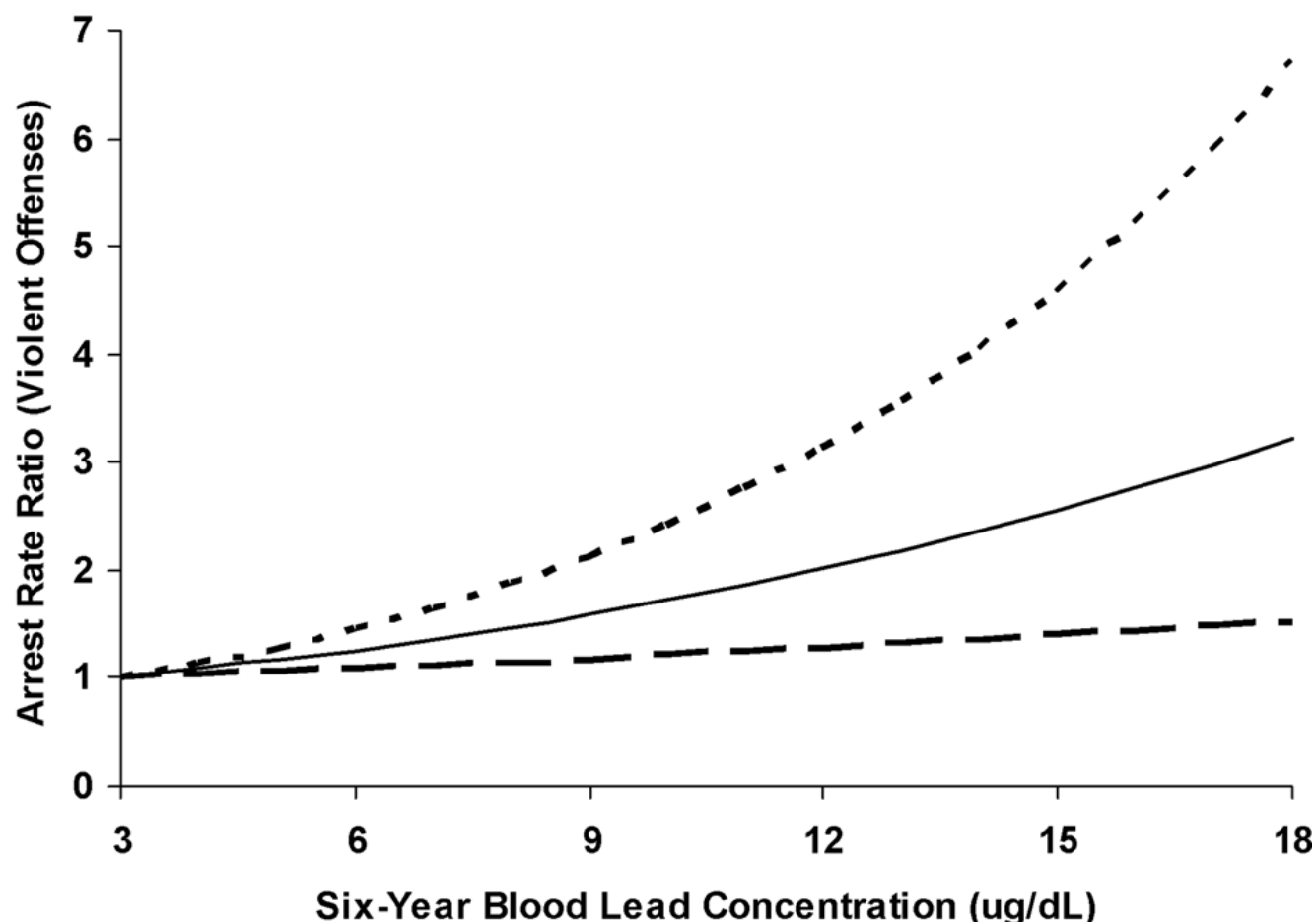
Handheld XRF Factors Affecting Detection Limits



Detection Limits depend on:

- Excitation Energy
 - Determines count rate
 - Filters will reduce background
- Spot size – field of view
 - Larger gives higher count rate
 - Smaller gives lower count rate
- Detector Performance
 - Resolution
 - Peak to background
 - Count rate

Association of Childhood Blood Lead with Violent Crime Arrests



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