

Public Health Response to Childhood Lead Exposure Resulting from an Occupational Source

Sheila Higgins RN, BSN, MPH, COHN-S, NC Division of Public Health

Denise Michaud MPH, RD, LDN, IBCLC, RLC, Caldwell County Health
Department

Ed Norman, MPH NC Division of Public Health

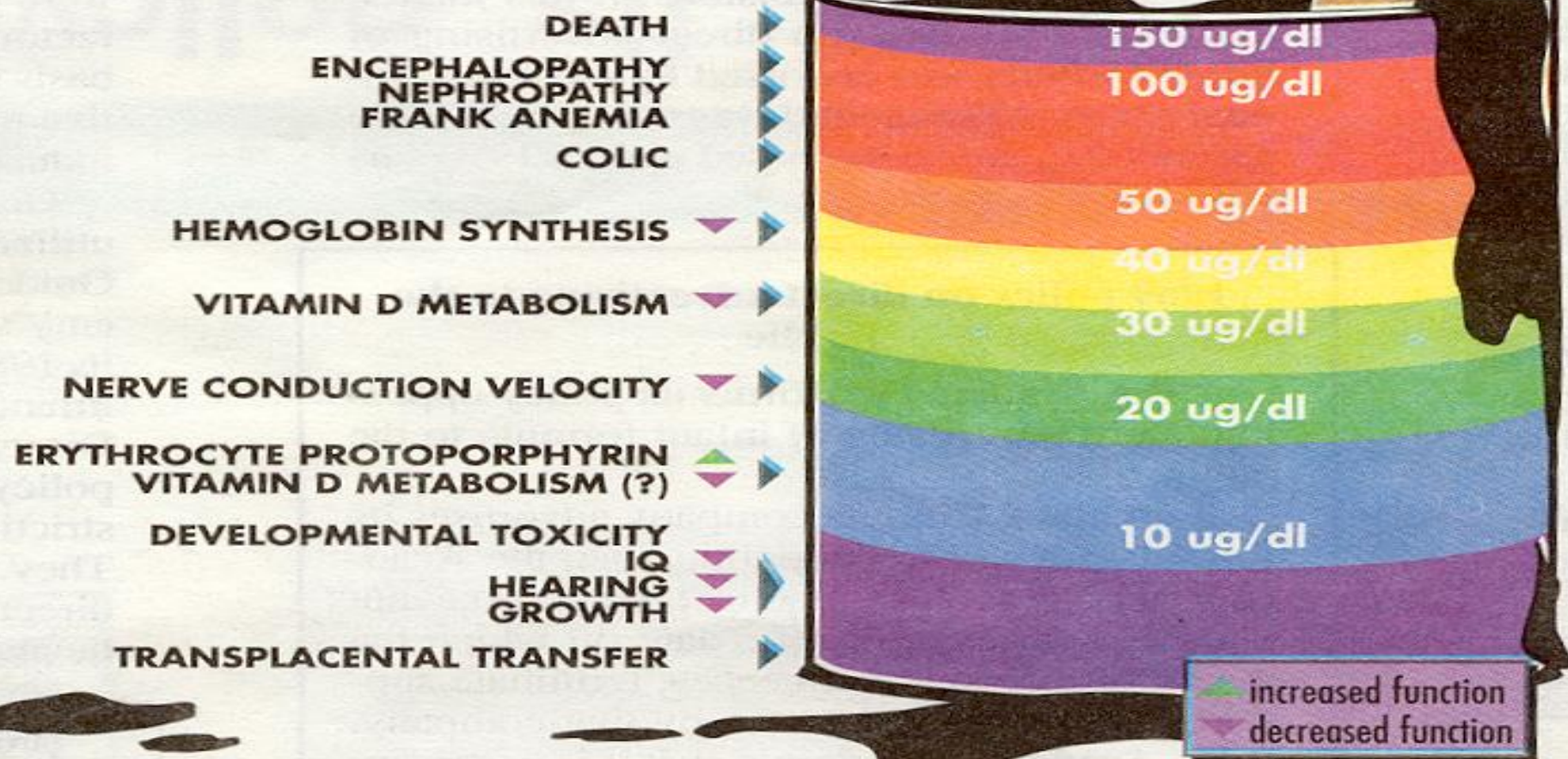
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NC Childhood Lead Poisoning Prevention Program

- Statewide surveillance of childhood blood lead exposure (CDC-funded)
- >160,000 children are tested each year (Medicaid required)
- Primarily 1- & 2-year-olds and older if never tested (up to age 6)
- >1,000 children with elevations (≥ 5 $\mu\text{g}/\text{dL}$) annually

INORGANIC LEAD:

The Lowest Observed Effects in Children

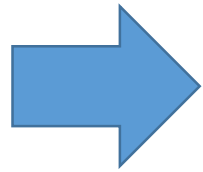


The chart shows the effects of lead contamination at various levels. The levels in this diagram do not necessarily indicate the lowest levels at which lead exerts an effect. These are the levels at which studies have adequately demonstrated an effect.

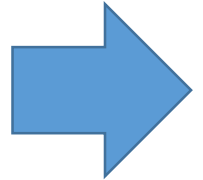
Multi-tiered approach to follow-up:

- 5-9 $\mu\text{g}/\text{dL}$ (clinical)
- 10-19 $\mu\text{g}/\text{dL}$ (environmental voluntary)
- ≥ 20 $\mu\text{g}/\text{dL}$ (environmental mandatory)
- Collaborative investigation by state & local health department (regional field staff & local registered environmental health specialists)
- Statutory enforcement to address residential lead hazards

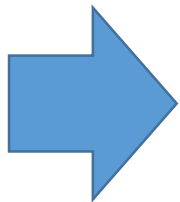
“Take home” lead exposure:



Lead dust settles on worker’s skin, hair, clothing and boots



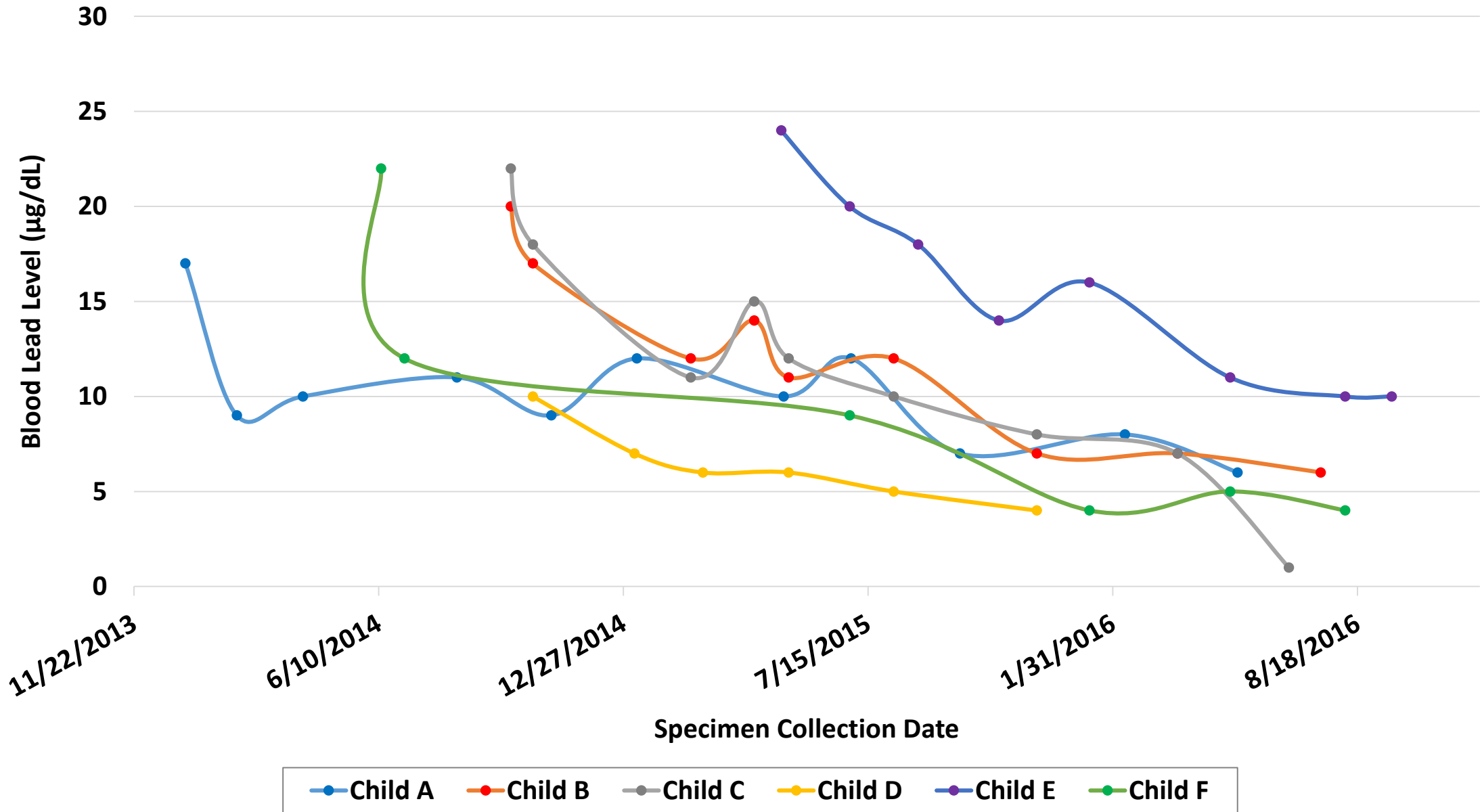
Residues can be transferred from the worker to personal vehicle, interior of home, family laundry if hygiene is poor



Family members may be exposed to residues, especially children



Blood Lead Levels ($\mu\text{g}/\text{dL}$) for Children Exposed to Lead from Parents' Occupations, 1/3/2014 to 9/15/2016



Caldwell County Health Department

Environmental Health

Family #1 (3 yo)

- September 2014 – 1st EBL investigation
- June 2015 – PCP requested follow-up eval (EBL 5/15 – 10µg/dl; EBL 7/15 12µg/dl; venous)

Family #2 (2 yo, 3 yo, 5 yo)

- EBL investigation refused by father (Oct 2014)
- CLP (confirmed lead poisoning) investigation August 2015

Family #3 (1 yo, 2 yo)

- Multiple contact attempts to offer EBL investigation (May 2015); successful contact July 2015; investigation August 2015

Family #1

Sample location	Results (ug/ft ²)
Door mat (front door)	15
Carpet (front door)	20
Cloth sofa cushion	32
Fiberglass tub bottom	<10
Father's tennis shoe (wears to and from work)	360
Laundry room floor (front of dryer)	12
Driver's seat of father's car	340
Driver's floor board carpet (father's car)	300

Note: dust sampling; standard used 40 µg/ft²

Family #2

Sample location	Results ($\mu\text{g}/\text{ft}^2$)
Driver's seat (father's car)	53
Driver's floor board (father's car)	1400
Father's tennis shoe	320
Father's car floor mat	570
Father's car seat	75
Room #5 child's bedroom sill	<10
Foyer floor	26
Kitchen floor	<10

Note: dust sampling; standard used $40 \mu\text{g}/\text{ft}^2$

Family #3

Sample location	Results ($\mu\text{g}/\text{ft}^2$)
Father's shoe	20
Laundry room floor	25
Floor at front door	18
Van driver's seat	720
Van driver's floor mat	160
Male child's car seat	24
Female child's car seat	15
Kitchen floor	<10

Note: dust sampling; standard used $40 \mu\text{g}/\text{ft}^2$

“A ha” moment: a moment of sudden insight or discovery (the employment connection)



Recommendations, Results and Next Steps



- EH offered extra training to fathers on personal hygiene and cleaning
- LHD tested mothers of all three families and they were negative
- LHD partnered with NC DPH to work with employer
- LHD offered testing for household members of all company employees
 - Letter (English and Spanish) to workers requesting names and contact information for household member voluntary BLL testing
 - Copies of letter and OSHA Quick Card (take-home exposure) provided to employer Safety Coordinator for distribution
 - Result: one contact (family member)

Note: All three families had limited English proficiency so utilized interpreters from local health department

Occupational and Environmental Epidemiology Branch (OEEB): Protect people from harmful environmental exposures

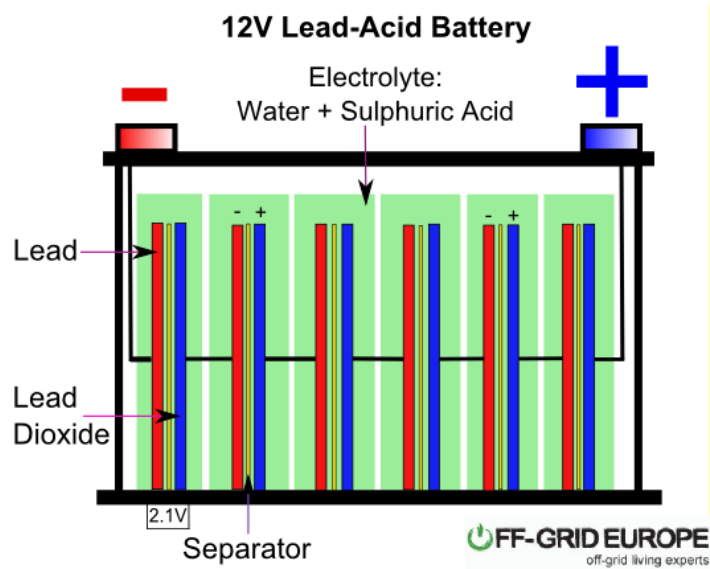
Assess and advise

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graph TD; A[Assess and advise] --> B[Provide industrial hygiene support to LHD]; B --> C[Increase knowledge of environmental hazards and implement risk reduction strategies];
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Provide industrial hygiene support to LHD

Increase knowledge of environmental hazards
and implement risk reduction strategies

Lead acid battery recycling plant



Overview of response:

- Referral from Caldwell County Health Dept. 7/30/15
- LHD/OEEB tour of workplace 9/30/15
- Recommendation report to plant manager 10/21/15
- Follow up with tools and best practices Oct – Jan

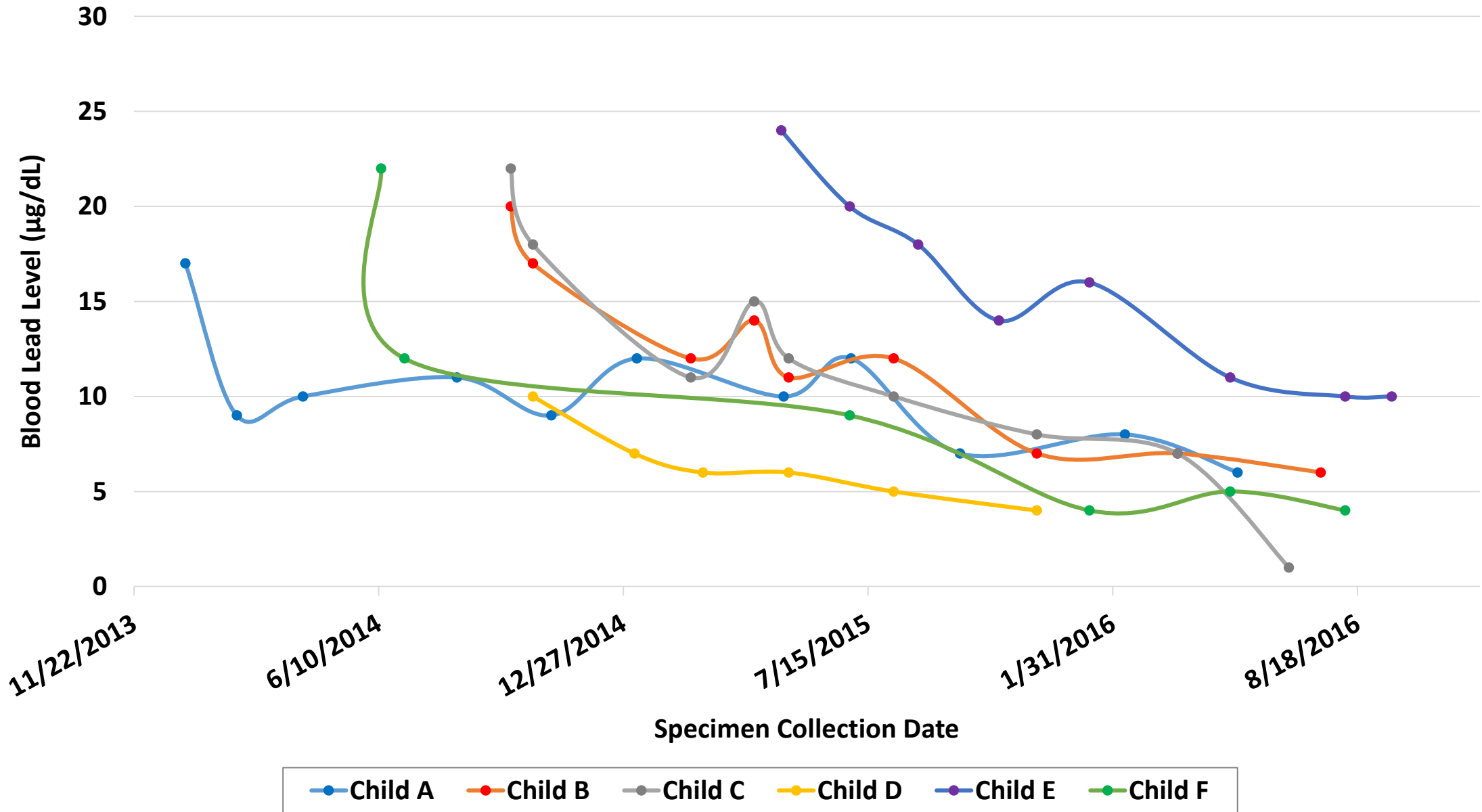
Hierarchy of Controls

Controls	Gaps	Recommendations
Substitution (less toxic substance)	N/A	
Engineering controls (e.g. ventilation)	Yes	Baseline air sampling & possible local ventilation, new locker rooms, hot water for washing
Work practices (e.g. good hygiene)	Yes	Better hygiene practices during break and end of shift
Administrative controls (e.g. policies/training)	Yes	Development of a protective personal hygiene policy
Personal protective equipment (e.g. hearing protection, respirators)	Yes	Written respiratory program for respirator use

Outcome

- Feedback to local health director 1/15/16
- LHD referred workplace to NC OSHA 3/18/16
- Inspection conducted by NC OSHA 3/23/16
- 14 violations, \$9,400 in fines 7/18/16
- Childhood lead levels trending down

Blood Lead Levels ($\mu\text{g}/\text{dL}$) for Children Exposed to Lead from Parents' Occupations, 1/3/2014 to 9/15/2016



Industry types contributing to high adult blood leads $\geq 10 \mu\text{g}/\text{dL}$ in NC, 2015

NAICS	Industry title
335912	Primary Battery Manufacturing
331491	Nonferrous Metal Rolling, Drawing and Extruding
238320	Painting and Wallcovering Contractors (home renovation)
713990	All Other Amusement and Recreation Industries (shooting ranges)
332312	Fabricated Structural Metal Manufacturing
237310	Highway, Street and Bridge Construction (bridge blasting/painting)