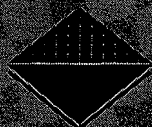


# Appendix 1: Household Form



AUSTRALIAN INSTITUTE OF  
**HEALTH & WELFARE**

In Confidence

## National Survey of Lead in Children Household Form

CCD	<input type="text"/>	<b>Address:</b> .....
Dwelling	<input type="text"/>	
Household number	<input type="text"/>	
Number of persons	<input type="text"/>	
Number of children aged 1 to 4 years	<input type="text"/>	
		<b>Further Identification:</b> .....

IF THE NEED  
ARISES, MAY WE  
TELEPHONE YOU?

Yes   
No

Telephone number

Best time(s) to call

Language for interview (if not English)

Date household form completed

Date of collection & interview

### Details of Calls

	1st Call	2nd Call	3rd Call	4th Call	5th Call
<b>Day</b>					
<b>Date</b>					
<b>Time Out</b>					
<b>Time In</b>					
<b>Total</b>					

Appointments for blood collection, etc.

.....

.....

.....

.....

.....

.....

.....

.....

A	B		C		D	E	F	G
<i>PNo</i>	<i>Name</i>		<i>Relationship</i>		<i>Sex</i>	<i>Age</i>	<i>Date of Birth</i>	<i>Marital Status</i>
	<b>What are the names of all the people who usually live here, starting with the head of the household?</b>  • Complete Columns C to N for each UR		<b>What is ..... relationship to the head of the household?</b>			<b>What was ..... age last birthday?</b>  <i>If less than 1 year old record as "0"</i>	<i>If aged 5 years or less</i>  <b>What was ..... date of birth?</b>  <i>Record as: dd/mm/yy</i>	<b>What is ..... marital status?</b>  Married = 1 De facto = 2 Separated = 3 Divorced = 4 Widowed = 5 Never married = 6
	Surname	Other names	To Head	Within Household	M = 1 F = 2			
01								
02								
03								
04								
05								
06								
07								
08								
09								
10								

<p><b>Scope Exclusions</b></p> <ul style="list-style-type: none"> <li>• ALL visitors</li> <li>• Overseas diplomats and members of non-Australian defence forces</li> <li>• All persons in households with no URs aged 1 to 4 (HF completed in error)</li> </ul>	<p><b>O. Household Type</b></p> <p><i>Interviewer: Tick Household Type on the basis of usual residents.</i></p> <p>Married or de facto couple living ONLY with their child(ren) aged 0 - 14 ..... <input type="checkbox"/> 4</p> <p>Married or de facto couple living ONLY with their child(ren) aged 0 - 14 and their unmarried child(ren) aged 15 or over ..... <input type="checkbox"/> 3</p> <p>One person living ONLY with his/her child(ren) aged 0 - 14 ..... <input type="checkbox"/> 7</p> <p>One person living ONLY with his/her child(ren) aged 0 - 14 and his/her unmarried child(ren) aged 15 or over ..... <input type="checkbox"/> 8</p> <p>All other households ..... <input type="checkbox"/> 9</p>	<p><b>P. Dwelling Location</b></p> <p><i>Interviewer: Is this building within 25 metres of any major road?</i></p> <p>Yes ..... <input type="checkbox"/> 1</p> <p>No (nothing further) ..... <input type="checkbox"/> 2</p> <p><i>Interviewer: Record the name(s) of this/these major road(s)</i></p> <p>Major road 1</p> <div style="border: 1px solid black; height: 30px; width: 100%;"></div> <p>Major road 2</p> <div style="border: 1px solid black; height: 30px; width: 100%;"></div>
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H	I	J	K	L	M	N
Aboriginal/ TSI Origin	Country of Birth	Year of Arrival	Age Left School	Educational Attainment	Income Group	Child Number
<b>Is anyone who usually lives here of Aboriginal or Torres Strait Islander Origin?</b>  No = 1 Aboriginal = 2 TSI = 3 Both = 4	<b>In which country was ..... born?</b>	<i>If born overseas</i>  <b>In what year did ..... arrive in Australia?</b>	<i>If aged 15 years or more</i>  <b>At what age did ..... leave school?</b>  Record Age Don't know =99 Still at school =98 Never went to school=97	<i>If aged 15 years or more AND left school</i>  <b>Has ..... completed a trade certificate, diploma, degree or any other educational qualification?</b>  <i>If yes, show PINK prompt card A and ask</i>  <b>Which of these best describes the highest qualification ..... has completed?</b>  Record Code	<i>If 15 years or older</i>  <i>Show GREEN prompt card B</i>  <b>Before tax is taken out, in which of these groups is ..... usual income from all sources?</b>  Record Code	<i>If aged 1 to 4 years old</i>  <b>Interviewer: number each child in this age group, starting at 1 and working down row by row</b>
01						
02						
03						
04						
05						
06						
07						
08						
09						
10						

**Q. Dwelling Structure**  
*Interviewer: Code best description of structure containing household*

Separate house .....  01

Semi-detached / row or terrace house / townhouse:

One storey .....  02

Two or more storeys .....  03

Flat attached to house .....  04

Other flat / unit / apartment:

One or two storeys .....  05

Three storeys .....  06

Four or more storeys .....  07

Caravan .....  08

Houseboat .....  09

Improvised home / campers out .....  10

House or flat attached to shops ...  11

**R. External Walls - Main Material**  
*Interviewer: Record the main material of the building's outside wall visible to you before interview*

Brick .....  1

Stone .....  2

Timber .....  3

Fibro cement or other synthetic board .....  4

Steel or aluminium .....  5

Concrete .....  6

Other (specify) .....  7

Not visible at time of visit .....  8

**S. External Walls - Condition of Paintwork**  
*Interviewer: Record the condition of the building's external paintwork visible to you before interview*

Severe chalking and/or peeling ...  1

Some chalking and/or peeling ....  2

No chalking or peeling .....  3

No paintwork .....  4

Not visible at time of visit .....  5

**T. Estimated Year Built**  
*Interviewer: Record your estimate of the year this dwelling was first built*

Year

# Response Reports

## 1. Interview

- Interview fully complete ...  1
- Interview partly complete
- part non-contact .....  2
- part refusal .....  3
- Interview not obtained  
(no questionnaire)
- full non-contact .....  4
- full refusal .....  5

## 2. Dust Samples

### a. Sample status

- Sample obtained .....  1
- Sample refused .....  2
- Sample not collectable .....  3

### b. Type of surface sampled

- Carpet / rug .....  1
- Wood .....  2
- Linoleum .....  3
- Ceramic tile .....  4
- Other (specify) .....  5

## 3. Soil Sample

- Sample obtained .....  1
- Sample refused .....  2
- Sample not collectable .....  3
- Sample not required  
(e.g. high rise, concrete  
surrounds) .....  4

## 4. Paint Sample

### a. Sample status

- Sample obtained .....  1
- Sample refused .....  2
- Sample not collectable .....  3
- Sample not required  
(no severe peeling  
or chalking) .....  4

### b. Paint source

- Window sill .....  1
- Skirting board .....  2
- Wall .....  3
- Other (specify) .....  4

## 5. Water Samples

### a. Sample status

- Sample obtained .....  1
- Sample refused .....  2
- Sample not collectable .....  3

### b. Number of samples

Number .....

### c. Type of samples

NB Do not collect bottled water

- Mains/town water .....  1
- Rainwater tank .....  2
- Dam water .....  3
- Bore water .....  4
- Other (specify) .....  6

### d. When collected

- First flush .....  1
- At visit .....  2
- Other (specify) .....  9

## 6. Blood Samples

- Full 4 ml sample obtained .....
- Sample obtained, less than 4 ml .....
- Sample not obtained, child unwilling .....
- Sample not obtained, parent refused .....
- Sample not obtained, non-contact .....
- Sample not attempted, other reason  
(Attach / record details) .....

	Child 1	Child 2	Child 3	Child 4
	<input type="checkbox"/> 11	<input type="checkbox"/> 21	<input type="checkbox"/> 31	<input type="checkbox"/> 41
	<input type="checkbox"/> 12	<input type="checkbox"/> 22	<input type="checkbox"/> 32	<input type="checkbox"/> 42
	<input type="checkbox"/> 13	<input type="checkbox"/> 23	<input type="checkbox"/> 33	<input type="checkbox"/> 43
	<input type="checkbox"/> 14	<input type="checkbox"/> 24	<input type="checkbox"/> 34	<input type="checkbox"/> 44
	<input type="checkbox"/> 15	<input type="checkbox"/> 25	<input type="checkbox"/> 35	<input type="checkbox"/> 45
	<input type="checkbox"/> 19	<input type="checkbox"/> 29	<input type="checkbox"/> 39	<input type="checkbox"/> 49
Child's ID number .....				





1. THE FIRST QUESTIONS ARE ABOUT CONTACT WITH POSSIBLE SOURCES OF LEAD.

HOW MANY CARS, MOTORBIKES, MOTOR SCOOTERS AND OTHER MOTOR VEHICLES DO MEMBERS OF THIS HOUSEHOLD HAVE?

Number .....  9  
 None ..... (Go to Q3)  9

2. (DOES IT/HOW MANY OF THESE) USE LEADED PETROL?

*Interviewer: Diesel does not contain lead.*

Number .....  9  
 None .....  9

3. DOES ANYBODY USUALLY SMOKE INSIDE THIS (specify dwelling type)?

Yes .....  1  
 No .....  2

4. DOES ANYONE IN YOUR HOUSEHOLD HAVE A DOG?

Yes .....  1  
 No .....  2

5. DOES ANYONE IN YOUR HOUSEHOLD HAVE A CAT?

Yes .....  1  
 No .....  2

6. DO YOU HAVE A VEGETABLE GARDEN HERE?

Yes .....  1  
 No .....  2

7. *Interviewer: Show PINK card C*

DOES ANYBODY LIVING HERE WORK IN ANY OF THESE JOBS?

Building trades ..... a  01  
 Any work in scrap metal industry ..... b  02  
 Any work involving removal of paint ..... c  03  
 Road construction or maintenance ..... d  04  
 Any work with batteries ..... e  05  
 Lead smelting ..... f  06  
 Lead mining ..... g  07  
 Any work with brass ..... h  08  
 Any work using solder ..... i  09  
 Manufacture of glass ..... j  10  
 Automotive repair ..... k  11  
 Panel beating ..... l  12  
 None of the above ..... m  13

8. *Interviewer: Show YELLOW card D*

DOES ANYBODY LIVING HERE DO ANY OF THESE FOR A HOBBY?

Home renovation involving removal of old paint ..... a  01  
 Making pottery or ceramics ..... b  02  
 Painting china ..... c  03  
 Staining glass ..... d  04  
 Playing games with lead models ..... e  05  
 Making sinkers for fishing ..... f  06  
 Shooting ..... g  07  
 Panel beating or spray painting of cars ..... h  08  
 Automotive repairs ..... i  09  
 None of the above ..... j  10

9. I WOULD NOW LIKE TO ASK YOU SOME QUESTIONS ABOUT THIS HOME.

IN WHAT MONTH AND YEAR WAS THIS (specify dwelling type) FIRST OCCUPIED BY YOUR HOUSEHOLD?

Month, year (mm/yy) [ ][ ] [ ][ ][ ][ ]

10. AS CLOSELY AS YOU CAN TELL, IN WHAT YEAR WAS THIS (specify dwelling type) FIRST BUILT?

Year [ ][ ][ ][ ]

11. Interviewer: Show BLUE card E

WHICH OF THESE BEST DESCRIBES THE GENERAL CONDITION OF THE INTERNAL PAINTWORK?

- Severe chalking and/or peeling ...  1
- Some chalking and/or peeling ...  2
- No chalking or peeling ...  3
- No paintwork ...  4

12. Interviewer: Show BLUE card E

WHICH OF THESE BEST DESCRIBES THE GENERAL CONDITION OF THE EXTERNAL PAINTWORK?

- Severe chalking and/or peeling ...  1
- Some chalking and/or peeling ...  2
- No chalking or peeling ...  3
- No paintwork ...  4

13. HAS ANY PAINT BEEN REMOVED AT THIS HOME DURING THE LAST 12 MONTHS?

- Yes ...  1
- No ... (Go to Q15)  2
- Don't know ... (Go to Q15)  3

14. DID YOUR CHILD(REN) CONTINUE TO LIVE HERE WHILE THE PAINT WAS BEING REMOVED?

- Yes ...  1
- No ...  2

15. Interviewer: Show WHITE card F

WHAT SOURCES OF WATER ARE USED IN THIS (specify dwelling type) FOR DRINKING AND COOKING?

- Mains / Town water ... a  1
- Rainwater tanks ... b  2
- Dams ... c  3
- Bores ... d  4
- Bottled water ... e  5
- Other (specify) ... f  6

[ ]

16. Sequence Guide

- If rainwater tanks used (Go to Q17)  1
- Otherwise ... (Go to Q18)  2

17. WHAT IS THE MAIN MATERIAL THAT THE ROOF OF THIS (specify dwelling type) IS MADE OF?

- Tiles ...  1
- Metal Sheeting ...  2
- Slate ...  3
- Fibro ...  4
- Other (specify) ...  5
- Don't know ...  6

[ ]

18. IS THIS (specify dwelling type)

- BEING PAID OFF BY SOMEONE IN THIS HOUSEHOLD? ...  1
- OWNED OUTRIGHT BY SOMEONE IN THIS HOUSEHOLD? ...  2
- RENTED BY SOMEONE IN THIS HOUSEHOLD? ...  3
- OCCUPIED RENT FREE? ...  4
- Other (specify) ...  5

[ ]

19. *Interviewer: Enter Child 1's name from HF*

20. THESE QUESTIONS ASK ABOUT (Child 1).

*Interviewer: Show GREEN card G*

HOW OFTEN DOES .... SUCK (HIS/HER) FINGERS OR THUMB?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

21. *Interviewer: Show GREEN card G*

HOW OFTEN DOES .... SUCK OR CHEW TOYS?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

22. *Interviewer: Show GREEN card G*

HOW OFTEN DO YOU FIND .... EATING SOIL?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

23. *Interviewer: Show WHITE card H*

IS .... USUALLY MINDED AWAY FROM HOME FOR MORE THAN HALF A DAY EACH WEEK IN ANY OF THESE LOCATIONS?

- Yes .....  1
- No ..... (Go to Q30)  2

24. AT HOW MANY DIFFERENT ADDRESSES IS .... USUALLY MINDED AWAY FROM HOME FOR AT LEAST HALF A DAY A WEEK?

- Number .....  1
- One .....  1

25. FOR HOW MANY MONTHS HAS .... BEEN MINDED AWAY FROM HOME FOR AT LEAST HALF A DAY EACH WEEK?

- Number .....  99
- Less than one .....  99

26. *Interviewer: Show BLUE card E*

REFERRING TO THE GENERAL CONDITION OF THE INTERNAL PAINTWORK, (DOES THIS/DO ANY OF THESE) BUILDING(S) HAVE

- SEVERE CHALKING AND/OR PEELING .....  1
- SOME CHALKING AND/OR PEELING .....  2
- NO CHALKING OR PEELING .....  3
- NO PAINTWORK .....  4
- Don't know .....  5

27. *Interviewer: Show BLUE card E*

FOR THE GENERAL CONDITION OF THE EXTERNAL PAINTWORK, (DOES THIS/DO ANY OF THESE) BUILDING(S) HAVE

- SEVERE CHALKING AND/OR PEELING .....  1
- SOME CHALKING AND/OR PEELING .....  2
- NO CHALKING OR PEELING .....  3
- NO PAINTWORK .....  4
- Don't know .....  5

28. *Sequence Guide*

- If code 1 or 2 in either Q26 or Q27 ..... (Go to Q29)  1
- Otherwise ..... (Go to Q30)  2



29. AS CLOSELY AS YOU CAN TELL, (WAS THIS/WERE ANY OF THESE) BUILDING(S) BUILT BEFORE 1970?

Yes .....  1

No .....  2

30. HAS ..... LIVED ANYWHERE ELSE IN THE LAST SIX MONTHS?

Yes .....  1

No ..... (Go to Q42)  2

31. DID (HE/SHE) LIVE THERE FOR AT LEAST THREE MONTHS OUT OF THE SIX?

Yes .....  1

No ..... (Go to Q42)  2

32. IN WHAT MONTH AND YEAR DID ..... MOVE IN TO THAT ADDRESS?

Month, year (mm/yy)

33. IN WHAT MONTH AND YEAR DID ..... MOVE OUT FROM THERE?

Month, year (mm/yy)

34. AS CLOSELY AS YOU CAN TELL, IN WHAT YEAR WAS THAT BUILDING FIRST BUILT?

Year .....

35. *Interviewer: Show BLUE card E*

WHICH OF THESE BEST DESCRIBES THE GENERAL CONDITION OF THE INTERNAL PAINTWORK THERE?

Severe chalking and/or peeling ...  1

Some chalking and/or peeling ...  2

No chalking or peeling ...  3

No paintwork ...  4

36. *Interviewer: Show BLUE card E*

WHICH OF THESE BEST DESCRIBES THE GENERAL CONDITION OF THE EXTERNAL PAINTWORK THERE?

Severe chalking and/or peeling ...  1

Some chalking and/or peeling ...  2

No chalking or peeling ...  3

No paintwork ...  4

37. HAS ANY PAINT BEEN REMOVED FROM THAT BUILDING DURING THE LAST 12 MONTHS?

Yes .....  1

No ..... (Go to Q39)  2

Don't know ..... (Go to Q39)  3

38. DID ..... CONTINUE TO LIVE THERE WHILE THE PAINT WAS BEING REMOVED?

Yes .....  1

No .....  2

39. WHAT WAS THE MAIN MATERIAL OF THE EXTERNAL WALLS OF THAT BUILDING?

Brick .....  1

Stone .....  2

Timber .....  3

Fibro cement or other synthetic board .....  4

Steel or aluminium .....  5

Concrete .....  6

Other (specify) .....  7

Don't know .....  8

40. DID THAT BUILDING HAVE A VEGETABLE GARDEN?

Yes .....  1

No .....  2

Don't know .....  3

41. WAS THAT BUILDING WITHIN 25 METRES OF A MAJOR ROAD?

- Yes .....  1
- No .....  2
- Don't know .....  3

42. AND NOW SOME OTHER HEALTH-RELATED QUESTIONS ABOUT .....

HAS .... EVER HAD MEASLES?

- Yes .....  1
- No .....  2

43. HAS .... EVER BEEN GIVEN ANY INJECTIONS AGAINST MEASLES?

- Yes .....  1
- No .....  2
- Don't know .....  3

44. *Interviewer: Were records produced?*

- Yes .....  1
- No .....  2

45. DOES ..... EAT BEEF LAMB AND/OR PORK?

- Yes .....  1
- No .....  2

46. DOES ..... EAT CHICKEN AND/OR FISH?

- Yes .....  1
- No .....  2

47. IS .... TAKING ANY VITAMIN OR MINERAL SUPPLEMENTS?

- Yes .....  1
- No ..... (Go to Q49)  2

48. COULD YOU PLEASE SHOW ME THE PACKAGING SO THAT I CAN WRITE DOWN THE SUPPLEMENT'S NAME?

Number of packages produced ... a

Product 1  b

Product 2  c

Product 3  d

Product 4  e

49. *Interviewer:*

- Blood consent form signed (Go to Q50)  1
- Otherwise ..... (Go to Q51)  2

50. *Interviewer:*

- 4 ml sample obtained .....  1
- Less than 4ml sample obtained ...  2
- No sample obtained .....  3

51. *Sequence Guide*

- One child only in household ..... (Go to Q162)  1
- Otherwise ..... (Go to Q52)  2

52. *Interviewer: Enter Child 2's name from HF*

[Empty box for name entry]

53. THESE QUESTIONS ASK ABOUT (Child 2).

*Interviewer: Show GREEN card G*

HOW OFTEN DOES ..... SUCK (HIS/HER) FINGERS OR THUMB?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

54. *Interviewer: Show GREEN card G*

HOW OFTEN DOES ..... SUCK OR CHEW TOYS?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

55. *Interviewer: Show GREEN card G*

HOW OFTEN DO YOU FIND ..... EATING SOIL?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

56. *Interviewer: Show WHITE card H*

IS ..... USUALLY MINDED AWAY FROM HOME FOR MORE THAN HALF A DAY EACH WEEK IN ANY OF THESE LOCATIONS?

- Yes .....  1
- No .....  2 *(Go to Q65)*

57. AT HOW MANY DIFFERENT ADDRESSES IS ..... USUALLY MINDED AWAY FROM HOME FOR AT LEAST HALF A DAY A WEEK?

- Number .....
- One .....  1

58. FOR HOW MANY MONTHS HAS ..... BEEN MINDED AWAY FROM HOME FOR AT LEAST HALF A DAY EACH WEEK?

- Number .....
- Less than one .....  99

59. *Sequence Guide*

- Child 1 minded elsewhere (code 1 in Q23) ..... *(Go to Q60)*  1
- Otherwise ..... *(Go to Q61)*  2

60. (IS THIS/ARE ALL OF THESE) ADDRESS(ES) THE SAME AS FOR (child 1 name)?

- Yes ..... *(Go to Q65)*  1
- No .....  2

61. *Interviewer: Show BLUE card E*

REFERRING TO THE GENERAL CONDITION OF THE INTERNAL PAINTWORK, (DOES THIS/DO ANY OF THESE) BUILDING(S) HAVE

- SEVERE CHALKING AND/OR PEELING .....  1
- SOME CHALKING AND/OR PEELING .....  2
- NO CHALKING OR PEELING .....  3
- NO PAINTWORK .....  4
- Don't know .....  5

62. *Interviewer: Show BLUE card E*  
 FOR THE GENERAL CONDITION OF THE EXTERNAL PAINTWORK, (DOES THIS/DO ANY OF THESE) BUILDING(S) HAVE

- SEVERE CHALKING AND/OR PEELING .....  1
- SOME CHALKING AND/OR PEELING .....  2
- NO CHALKING OR PEELING .....  3
- NO PAINTWORK .....  4
- Don't know .....  5

63. *Sequence Guide*

- If code 1 or 2 in either Q61 or Q62 ..... (Go to Q64)  1
- Otherwise ..... (Go to Q65)  2

64. AS CLOSELY AS YOU CAN TELL, (WAS THIS/WERE ANY OF THESE) BUILDING(S) BUILT BEFORE 1970?

- Yes .....  1
- No .....  2

65. HAS ..... LIVED ANYWHERE ELSE IN THE LAST SIX MONTHS?

- Yes .....  1
- No ..... (Go to Q79)  2

66. DID (HE/SHE) LIVE THERE FOR AT LEAST THREE MONTHS OUT OF THE SIX?

- Yes .....  1
- No ..... (Go to Q79)  2

67. *Sequence Guide*

- Child 1 lived elsewhere 3 months or more (code 1 in Q31) (Go to Q68)  1
- Otherwise ..... (Go to Q69)  2

68. IS THIS ADDRESS THE SAME AS FOR (Child 1 name)?

- Yes ..... (Go to Q79)  1
- No .....  2

69. IN WHAT MONTH AND YEAR DID ..... MOVE IN TO THAT ADDRESS?

Month, year (mm/yy)

70. IN WHAT MONTH AND YEAR DID ..... MOVE OUT FROM THERE?

Month, year (mm/yy)

71. AS CLOSELY AS YOU CAN TELL, IN WHAT YEAR WAS THAT BUILDING FIRST BUILT?

Year .....

72. *Interviewer: Show BLUE card E*

WHICH OF THESE BEST DESCRIBES THE GENERAL CONDITION OF THE INTERNAL PAINTWORK THERE?

- Severe chalking and/or peeling ...  1
- Some chalking and/or peeling ...  2
- No chalking or peeling .....  3
- No paintwork .....  4

73. *Interviewer: Show BLUE card E*

WHICH OF THESE BEST DESCRIBES THE GENERAL CONDITION OF THE EXTERNAL PAINTWORK THERE?

- Severe chalking and/or peeling ...  1
- Some chalking and/or peeling ...  2
- No chalking or peeling .....  3
- No paintwork .....  4

74. HAS ANY PAINT BEEN REMOVED FROM THAT BUILDING DURING THE LAST 12 MONTHS?

- Yes .....  1
- No ..... (Go to Q76)  2
- Don't know ..... (Go to Q76)  3

75. DID ..... CONTINUE TO LIVE THERE WHILE THE PAINT WAS BEING REMOVED?

- Yes .....  1
- No .....  2



76. WHAT WAS THE MAIN MATERIAL OF THE EXTERNAL WALLS OF THAT BUILDING?

- Brick .....  1
- Stone .....  2
- Timber .....  3
- Fibro cement or other synthetic board .....  4
- Steel or aluminium .....  5
- Concrete .....  6
- Other (*specify*) .....  7
- 
- Don't know .....  8

77. DID THAT BUILDING HAVE A VEGETABLE GARDEN?

- Yes .....  1
- No .....  2
- Don't know .....  3

78. WAS THAT BUILDING WITHIN 25 METRES OF A MAJOR ROAD?

- Yes .....  1
- No .....  2
- Don't know .....  3

79. AND NOW SOME OTHER HEALTH-RELATED QUESTIONS ABOUT .....  
HAS .... EVER HAD MEASLES?

- Yes .....  1
- No .....  2

80. HAS .... EVER BEEN GIVEN ANY INJECTIONS AGAINST MEASLES?

- Yes .....  1
- No .....  2
- Don't know .....  3

81. *Interviewer:* Were records produced?

- Yes .....  1
- No .....  2

82. DOES .... EAT BEEF, LAMB AND/OR PORK?

- Yes .....  1
- No .....  2

83. DOES .... EAT CHICKEN AND/OR FISH?

- Yes .....  1
- No .....  2

84. IS .... TAKING ANY VITAMIN OR MINERAL SUPPLEMENTS?

- Yes .....  1
- No .....  2 (*Go to Q86*)

85. COULD YOU PLEASE SHOW ME THE PACKAGING SO THAT I CAN WRITE DOWN THE SUPPLEMENT'S NAME?

- Number of packages produced ... a
- Product 1  
 b
- Product 2  
 c
- Product 3  
 d
- Product 4  
 e

86. *Interviewer:*

- Blood consent form signed (*Go to Q87*)  1
- Otherwise ..... (*Go to Q88*)  2

87. *Interviewer:*

- 4 ml sample obtained .....  1
- Less than 4ml sample obtained ...  2
- No sample obtained .....  3

88. *Sequence Guide*

- 2 children only in household ..... (*Go to Q162*)  1
- Otherwise ..... (*Go to Q89*)  2

89. *Interviewer: Enter Child 3's name from HF*

90. THESE QUESTIONS ASK ABOUT (Child 3).

*Interviewer: Show GREEN card G*

HOW OFTEN DOES .... SUCK (HIS/HER) FINGERS OR THUMB?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

91. *Interviewer: Show GREEN card G*

HOW OFTEN DOES .... SUCK OR CHEW TOYS?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

92. *Interviewer: Show GREEN card G*

HOW OFTEN DO YOU FIND .... EATING SOIL?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

93. *Interviewer: Show WHITE card H*

IS ..... USUALLY MINDED AWAY FROM HOME FOR MORE THAN HALF A DAY EACH WEEK IN ANY OF THESE LOCATIONS?

- Yes .....  1
- No ..... (Go to Q102)  2

94. AT HOW MANY DIFFERENT ADDRESSES IS ..... USUALLY MINDED AWAY FROM HOME FOR AT LEAST HALF A DAY A WEEK?

- Number .....
- One .....  1

95. FOR HOW MANY MONTHS HAS ..... BEEN MINDED AWAY FROM HOME FOR AT LEAST HALF A DAY EACH WEEK?

- Number .....
- Less than one .....  99

96. *Sequence Guide*

- Child 1 minded elsewhere (code 1 in Q23) ..... (Go to Q97)  1
- Child 2 minded elsewhere (code 2 in Q60) ..... (Go to Q97)  2
- Otherwise ..... (Go to Q98)  3

97. (IS THIS/ARE ALL OF THESE) THE SAME ADDRESSES AS FOR

*Interviewer: Read out children's names as applicable.*

- (Child 1 name)'s ... (Go to Q102)  1
- (Child 2 name)'s ... (Go to Q102)  2
- No .....  3

98. *Interviewer: Show BLUE card E*

REFERRING TO THE GENERAL CONDITION OF THE INTERNAL PAINTWORK, (DOES THIS/DO ANY OF THESE) BUILDING(S) HAVE

- SEVERE CHALKING AND/OR PEELING .....  1
- SOME CHALKING AND/OR PEELING .....  2
- NO CHALKING OR PEELING .....  3
- NO PAINTWORK .....  4
- Don't know .....  5

99. *Interviewer: Show BLUE card E*  
 FOR THE GENERAL CONDITION OF THE EXTERNAL PAINTWORK, (DOES THIS/DO ANY OF THESE) BUILDING(S) HAVE SEVERE CHALKING AND/OR PEELING .....  1  
 SOME CHALKING AND/OR PEELING .....  2  
 NO CHALKING OR PEELING .....  3  
 NO PAINTWORK .....  4  
 Don't know .....  5

100. *Sequence Guide*  
 If code 1 or 2 in either Q98 or Q99 ..... (Go to Q101)  1  
 Otherwise ..... (Go to Q102)  2

101. AS CLOSELY AS YOU CAN TELL, (WAS THIS/WERE ANY OF THESE) BUILDING(S) BUILT BEFORE 1970?  
 Yes .....  1  
 No .....  2

102. HAS ..... LIVED ANYWHERE ELSE IN THE LAST SIX MONTHS?  
 Yes .....  1  
 No ..... (Go to Q116)  2

103. DID (HE/SHE) LIVE THERE FOR AT LEAST THREE MONTHS OUT OF THE SIX?  
 Yes .....  1  
 No ..... (Go to Q116)  2

104. *Sequence Guide*  
 Child 1 lived elsewhere 3 months or more (code 1 in Q31)(Go to Q105)  1  
 Child 2 lived elsewhere 3 months or more (code 1 in Q66)(Go to Q105)  2  
 Otherwise ..... (Go to Q106)  3

105. IS THIS ADDRESS THE SAME AS  
*Interviewer: Read out names as applicable.*  
 (Child 1 name)'s? ... (Go to Q116)  1  
 (Child 2 name)'s? ... (Go to Q116)  2  
 No .....  3

106. IN WHAT MONTH AND YEAR DID ..... MOVE IN TO THAT ADDRESS?  
 Month, year (mm/yy)

107. IN WHAT MONTH AND YEAR DID ..... MOVE OUT FROM THERE?  
 Month, year (mm/yy)

108. AS CLOSELY AS YOU CAN TELL, IN WHAT YEAR WAS THAT BUILDING FIRST BUILT?  
 Year .....

109. *Interviewer: Show BLUE card E*  
 WHICH OF THESE BEST DESCRIBES THE GENERAL CONDITION OF THE INTERNAL PAINTWORK THERE?  
 Severe chalking and/or peeling ...  1  
 Some chalking and/or peeling .....  2  
 No chalking or peeling .....  3  
 No paintwork .....  4

110. *Interviewer: Show BLUE card E*  
 WHICH OF THESE BEST DESCRIBES THE GENERAL CONDITION OF THE EXTERNAL PAINTWORK THERE?  
 Severe chalking and/or peeling ...  1  
 Some chalking and/or peeling .....  2  
 No chalking or peeling .....  3  
 No paintwork .....  4

111. HAS ANY PAINT BEEN REMOVED FROM THAT BUILDING DURING THE LAST 12 MONTHS?  
 Yes .....  1  
 No ..... (Go to Q113)  2  
 Don't know ..... (Go to Q113)  3

112. DID ..... CONTINUE TO LIVE THERE WHILE THE PAINT WAS BEING REMOVED?  
 Yes .....  1  
 No .....  2

113. WHAT WAS THE MAIN MATERIAL OF THE EXTERNAL WALLS OF THAT BUILDING?

- Brick .....  1
- Stone .....  2
- Timber .....  3
- Fibro cement or other synthetic board .....  4
- Steel or aluminium .....  5
- Concrete .....  6
- Other (*specify*) .....  7
- 
- Don't know .....  8

114. DID THAT BUILDING HAVE A VEGETABLE GARDEN?

- Yes .....  1
- No .....  2
- Don't know .....  3

115. WAS THAT BUILDING WITHIN 25 METRES OF A MAJOR ROAD?

- Yes .....  1
- No .....  2
- Don't know .....  3

116. AND NOW SOME OTHER HEALTH-RELATED QUESTIONS ABOUT .....

HAS .... EVER HAD MEASLES?

- Yes .....  1
- No .....  2

117. HAS .... EVER BEEN GIVEN ANY INJECTIONS AGAINST MEASLES?

- Yes .....  1
- No .....  2
- Don't know .....  3

118. *Interviewer:* Were records produced?

- Yes .....  1
- No .....  2

119. DOES .... EAT BEEF, LAMB AND/OR PORK?

- Yes .....  1
- No .....  2

120. DOES .... EAT CHICKEN AND/OR FISH?

- Yes .....  1
- No .....  2

121. IS .... TAKING ANY VITAMIN OR MINERAL SUPPLEMENTS?

- Yes .....  1
- No ..... (*Go to Q123*)  2

122. COULD YOU PLEASE SHOW ME THE PACKAGING SO THAT I CAN WRITE DOWN THE SUPPLEMENT'S NAME?

Number of packages produced ... a

Product 1  
 b

Product 2  
 c

Product 3  
 d

Product 4  
 e

123. *Interviewer:*

- Blood consent form signed (*Go to Q124*)  1
- Otherwise ..... (*Go to Q125*)  2

124. *Interviewer:*

- 4 ml sample obtained .....  1
- Less than 4ml sample obtained ...  2
- No sample obtained .....  3

125. *Sequence Guide*

- 3 children only in household ..... (*Go to Q162*)  1
- Otherwise ..... (*Go to Q126*)  2



126. *Interviewer:* Enter Child 4's name from HF

127. THESE QUESTIONS ASK ABOUT (Child 4).

*Interviewer:* Show GREEN card G

HOW OFTEN DOES .... SUCK (HIS/HER) FINGERS OR THUMB?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

128. *Interviewer:* Show GREEN card G

HOW OFTEN DOES .... SUCK OR CHEW TOYS?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

129. *Interviewer:* Show GREEN card G

HOW OFTEN DO YOU FIND .... EATING SOIL?

- Every day .....  1
- More than once a week .....  2
- Less than once a week .....  3
- Never .....  4

130. *Interviewer:* Show WHITE card H

IS .... USUALLY MINDED AWAY FROM HOME FOR MORE THAN HALF A DAY EACH WEEK IN ANY OF THESE LOCATIONS?

- Yes .....  1
- No ..... (Go to Q139)  2

131. AT HOW MANY DIFFERENT ADDRESSES IS .... USUALLY MINDED AWAY FROM HOME FOR AT LEAST HALF A DAY A WEEK?

- Number .....  1
- One .....  1

132. FOR HOW MANY MONTHS HAS .... BEEN MINDED AWAY FROM HOME FOR AT LEAST HALF A DAY EACH WEEK?

- Number .....  1
- Less than one .....  99

133. *Sequence Guide*

- Child 1 minded elsewhere (code 1 in Q23) ... (Go to Q134)  1
- Child 2 minded elsewhere (code 2 in Q60) ... (Go to Q134)  2
- Child 3 minded elsewhere (code 3 in Q97) ... (Go to Q134)  3
- Otherwise ... (Go to Q135)  4

134. (IS THIS/ARE ALL OF THESE) ADDRESSES THE SAME AS FOR

*Interviewer:* Read out names as applicable.

- (Child 1 name)'s ... (Go to Q139)  1
- (Child 2 name)'s ... (Go to Q139)  2
- (Child 3 name)'s ... (Go to Q139)  3
- No .....  4

135. *Interviewer:* Show BLUE card E

REFERRING TO THE GENERAL CONDITION OF THE INTERNAL PAINTWORK, (DOES THIS/DO ANY OF THESE) BUILDING(S) HAVE

- SEVERE CHALKING AND/OR PEELING .....  1
- SOME CHALKING AND/OR PEELING .....  2
- NO CHALKING OR PEELING .....  3
- NO PAINTWORK .....  4
- Don't know .....  5

136. *Interviewer: Show BLUE card E*  
 FOR THE GENERAL CONDITION OF THE EXTERNAL PAINTWORK, (DOES THIS/DO ANY OF THESE) BUILDING(S) HAVE
- SEVERE CHALKING AND/OR PEELING .....  1
  - SOME CHALKING AND/OR PEELING .....  2
  - NO CHALKING OR PEELING .....  3
  - NO PAINTWORK .....  4
  - Don't know .....  5

137. *Sequence Guide*

- If code 1 or 2 in either Q135 or Q136 ..... (Go to Q138)  1
- Otherwise ..... (Go to Q139)  2

138. AS CLOSELY AS YOU CAN TELL, (WAS THIS/WERE ANY OF THESE) BUILDING(S) BUILT BEFORE 1970?

- Yes .....  1
- No .....  2

139. HAS ..... LIVED ANYWHERE ELSE IN THE LAST SIX MONTHS?

- Yes .....  1
- No ..... (Go to Q153)  2

140. DID (HE/SHE) LIVE THERE FOR AT LEAST THREE MONTHS OUT OF THE SIX?

- Yes .....  1
- No ..... (Go to Q153)  2

141. *Sequence Guide*

- Child 1 lived elsewhere 3 months or more (code 1 in Q31) (Go to Q142)  1
- Child 2 lived elsewhere 3 months or more (code 1 in Q66) (Go to Q142)  2
- Child 3 lived elsewhere 3 months or more (code 1 in Q103) (Go to Q142)  3
- Otherwise ..... (Go to Q143)  4

142. IS THIS ADDRESS THE SAME AS FOR

*Interviewer: Read out names as applicable.*

- (Child 1 name)'s? ... (Go to Q153)  1
- (Child 2 name)'s? ... (Go to Q153)  2
- (Child 3 name)'s? ... (Go to Q153)  3
- No .....  4

143. IN WHAT MONTH AND YEAR DID ..... MOVE IN TO THAT ADDRESS?

Month, year (mm/yy)

144. IN WHAT MONTH AND YEAR DID ..... MOVE OUT FROM THERE?

Month, year (mm/yy)

145. AS CLOSELY AS YOU CAN TELL, IN WHAT YEAR WAS THAT BUILDING FIRST BUILT?

Year .....

146. *Interviewer: Show BLUE card E*

WHICH OF THESE BEST DESCRIBES THE GENERAL CONDITION OF THE INTERNAL PAINTWORK THERE?

- Severe chalking and/or peeling .....  1
- Some chalking and/or peeling .....  2
- No chalking or peeling .....  3
- No paintwork .....  4

147. *Interviewer: Show BLUE card E*

WHICH OF THESE BEST DESCRIBES THE GENERAL CONDITION OF THE EXTERNAL PAINTWORK THERE?

- Severe chalking and/or peeling .....  1
- Some chalking and/or peeling .....  2
- No chalking or peeling .....  3
- No paintwork .....  4

148. HAS ANY PAINT BEEN REMOVED FROM THAT BUILDING DURING THE LAST 12 MONTHS?

- Yes .....  1
- No ..... (Go to Q153)  2
- Don't know ..... (Go to Q153)  3

149. DID ..... CONTINUE TO LIVE THERE WHILE THE PAINT WAS BEING REMOVED?

- Yes .....  1
- No .....  2

150. WHAT WAS THE MAIN MATERIAL OF THE EXTERNAL WALLS OF THAT BUILDING?

- Brick .....  1
- Stone .....  2
- Timber .....  3
- Fibro cement or other synthetic board .....  4
- Steel or aluminium .....  5
- Concrete .....  6
- Other (specify) .....  7
- 
- Don't know .....  8

151. DID THAT BUILDING HAVE A VEGETABLE GARDEN?

- Yes .....  1
- No .....  2
- Don't know .....  3

152. WAS THAT BUILDING WITHIN 25 METRES OF A MAJOR ROAD?

- Yes .....  1
- No .....  2
- Don't know .....  3

153. AND NOW SOME OTHER HEALTH-RELATED QUESTIONS ABOUT .....

HAS .... EVER HAD MEASLES?

- Yes .....  1
- No .....  2

154. HAS .... EVER BEEN GIVEN ANY INJECTIONS AGAINST MEASLES?

- Yes .....  1
- No .....  2
- Don't know .....  3

155. *Interviewer:* Were records produced?

- Yes .....  1
- No .....  2

156. DOES .... EAT BEEF, LAMB AND/OR PORK?

- Yes .....  1
- No .....  2

157. DOES .... EAT CHICKEN AND/OR FISH?

- Yes .....  1
- No .....  2

158. IS .... TAKING ANY VITAMIN OR MINERAL SUPPLEMENTS?

- Yes .....  1
- No ..... *(Go to Q160)*  2

159. COULD YOU PLEASE SHOW ME THE PACKAGING SO THAT I CAN WRITE DOWN THE SUPPLEMENT'S NAME?

- Number of packages produced ... a
- Product 1  b
- Product 2  c
- Product 3  d
- Product 4  e

160. *Interviewer:*

- Blood consent form signed *(Go to Q161)*  1
- Otherwise ..... *(Go to Q162)*  2

161. *Interviewer:*

- 4 ml sample obtained .....  1
- Less than 4ml sample obtained ...  2
- No sample obtained .....  3

162. *Interviewer:* (during editing) please rate the cleanliness of the household.

- Very dirty .....  1
- Dirtier than average .....  2
- Average .....  3
- Cleaner than average ...  4
- Very clean .....  5

163. No more questions.

# National Survey of Lead in Children

## Consent Form for Blood Collection

### Section 1. Name and address of parent or legal guardian giving consent.

Given names of parent / legal guardian

Surname of parent / legal guardian



Contact address

Suburb

State

Post Code




### Section 2. Children aged 1 to 4 years covered by this form.

Given name of Child 1

Surname of Child 1



Given name of Child 2

Surname of Child 2



Given name of Child 3

Surname of Child 3



Given name of Child 4

Surname of Child 4



I agree that a representative of the Australian Institute of Health and Welfare (AIHW) may take a sample of approximately 4 ml of blood from the child or children aged 1 to 4 years listed above.

(Tick below if agreed)

I authorise the AIHW to send a copy of the results of the testing to my family doctor (complete name and address details below).

I understand that the AIHW will inform me of the results of blood lead testing, and whether these results require any action to be taken.

I authorise the AIHW to notify the results to the Health Department in this State or Territory if my child's blood lead level is found to exceed 15µg/dL.

Signature of parent / legal guardian

### Complete this section only if you also want us to send results to your family doctor

Name of doctor

Address of doctor

Suburb

State

Post Code



# Appendix 3:

## Text of Prompt Cards

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A

1. Bachelor degree or higher
  2. Trade qualification/apprenticeship
  3. Certificate or diploma
  4. Other
- 

B

TOTAL INCOME FROM ALL SOURCES  
BEFORE tax or anything else was taken out

	Weekly	Yearly
01.	\$ Less than 58	\$ Less than 3001
02.	\$ 58 - 96	\$ 3001 - 5000
03.	\$ 97 - 154	\$ 5001 - 8000
04.	\$ 155 - 230	\$ 8001 - 12,000
05.	\$ 231 - 308	\$ 12,001 - 16,000
06.	\$ 309 - 385	\$ 16,001 - 20,000
07.	\$ 386 - 481	\$ 20,001 - 25,000
08.	\$ 482 - 577	\$ 25,001 - 30,000
09.	\$ 578 - 673	\$ 30,001 - 35,000
10.	\$ 674 - 769	\$ 35,001 - 40,000
11.	\$ 770 - 961	\$ 40,001 - 50,000
12.	\$ 962 - 1154	\$ 50,001 - 60,000
13.	\$ 1155 - 1346	\$ 60,001 - 70,000
14.	\$ More than 1346	\$ More than 70,000

Note: You do not have to answer this question if you do not wish to.

---

C

01. Building trades
  02. Any work in scrap metal industry
  03. Any work involving removal of paint
  04. Road construction or maintenance
  05. Any work with batteries
  06. Lead smelting
  07. Lead mining
  08. Any work with brass
  09. Any work using solder
  10. Manufacture of glass
  11. Automotive repair
  12. Panel beating
  13. None of the above
- 

D

01. Home renovation involving removal of old paint
  02. Making pottery or ceramics
  03. Painting china
  04. Staining glass
  05. Playing games with lead models
  06. Making sinkers for fishing
  07. Shooting
  08. Panel beating or spray painting of cars
  09. Automotive repairs
  10. None of the above
- 

E

*Please note:*

*Chalking is when paint becomes powdery and brushes off easily*

*Peeling means sections of paint falling off.*

*Minor cracking does not count as chalking or peeling.*

1. Severe chalking and/or peeling
2. Some chalking and/or peeling
3. No chalking or peeling
4. No paintwork

---

F

1. Mains/ Town water
  2. Rainwater tanks
  3. Dams
  4. Bores
  5. Bottled water
  6. Other (please specify)
- 

G

1. Every day
  2. More than once a week
  3. Less than once a week
  4. Never
- 

H

Any Informal Care, for example:

01. Relative's home
02. Friend's home
03. Babysitter's home
04. Any other informal care away from home

Any Formal Care, for example:

05. Family day care
06. Occasional care centre
07. Long day care centre
08. Kindergarten
09. Pre-school
10. Any other formal care away from home

# Appendix 4:

## Notes on children with high blood lead levels

These notes describe the circumstances of each child whose blood lead level was greater than or equal to 0.73  $\mu\text{mol/L}$ . Cases are discussed here in descending order of the children's blood lead concentration.

The notes include amounts and concentrations of lead in environmental samples from the children's homes. Because the collection methods used in this survey may not correspond exactly with those of other surveys, findings from a random sample of homes are summarised in Table 35 in the 'Results' section of this report.

As paint specimens were collected only from the 30% of homes where paint was in poor condition, the present data on lead levels in paint in Australian homes are very incomplete. Paint in poor condition is a risk factor for high blood lead level, and specimens were collected from 14 of the 25 (56%) homes of the 27 children described below. One of the 14 paint specimens was too small to be analysed. The laboratory reported 'The paint layers from any one flake ranged from 3 to 13 with an average of 7–8. The total thickness of the paint layers in the flakes ranged from 400 to 1500 microns with the individual paint layers ranging from 20–350 microns. Lead was found to occur mostly in the bottom 3 layers of a painted sequence ... Leaded paint layers ranged from 30–300 microns.'

Solubility of lead in paint specimens was measured for five residences where lead concentration in paint exceeded 10,000 mg/kg (1%).

Lead from different sources may be characterised by the variations in the relative abundance of its four isotopes. Where lead in a child's blood has come predominantly from one source, the relative abundance of these isotopes in blood and in the source is similar. Relative abundances are usually expressed as ratios  $^{206}\text{Pb}/^{204}\text{Pb}$  and as  $^{207}\text{Pb}/^{204}\text{Pb}$ ; the former varies more widely and is thus a better discriminant.

The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in leaded petrol has not been studied definitively, but it ranges from 16.4 to 16.5 in New South Wales and the Australian Capital Territory. In Queensland lead from a different source is used, and the ratio is in the range 17.6 to 17.8. Ratios for other States are not known (Gulson B 1995 pers. comm.). The notes identify the States of residence of the children as New South Wales or Queensland where relevant. For reasons of confidentiality, States of residence are not identified in other cases.



## Case 1

The two youngest children of a large family were surveyed. The family had a low income, and was living in a 1925 (interviewer estimate) or 1910 (resident estimate) timber house in a rural area. Water was supplied by tanks which drained a metal roof. There were two old cars which used leaded petrol, there was a vegetable garden, and the family had both dogs and cats. People smoked in the house, which was rated by the interviewer as very dirty.

The elder child, aged 3 years, had a blood lead level of 0.51  $\mu\text{mol/L}$ , and the younger child, aged 15 months, had a blood lead level of 1.58  $\mu\text{mol/L}$ , the highest found. The only difference between answers regarding the children was that the elder child was described as never found eating soil, the younger as being found eating soil every day.

With parental permission, the State health authority was notified, and conducted its own tests for lead. Concentrations in water samples at four sites were all below 5  $\mu\text{g/L}$ . Soil sampling near the front door yielded 22 mg/kg lead, the sandpit yielded 9 mg/kg lead, and roof gutter sludge yielded 155 mg/kg lead.

Survey environmental measurements, which became available only later, were 2.71  $\mu\text{g}$  lead in the floor wipe tissue, 7.39  $\mu\text{g/L}$  lead in water, 60 mg/kg lead in soil, and 952 mg/kg in paint. All measurements were at the upper ends of the respective distributions.

Both the  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio (18.93) and the  $^{207}\text{Pb}/^{204}\text{Pb}$  (15.66) in the child's blood were the highest the CSIRO laboratory has found in Australian residents and substantially above the ratios in all the environmental specimens. Accounting for the isotopic composition of the blood requires a source with ratios at least as high as those in the blood. One such source would be soil not sampled by the survey; as this report was written there was no information on the geology of this part of Australia which might explain the findings. An alternative source would be materials made from lead mined in the United States.

The ratios in the floor wipes and in soil were closer than those in paint and in water, but still considerably different from those in blood.

Pending further examination of local soils, which is being arranged, it is considered likely that this child's very high blood lead level resulted primarily from eating soil, with contributions from many other risk factors.

## Case 2

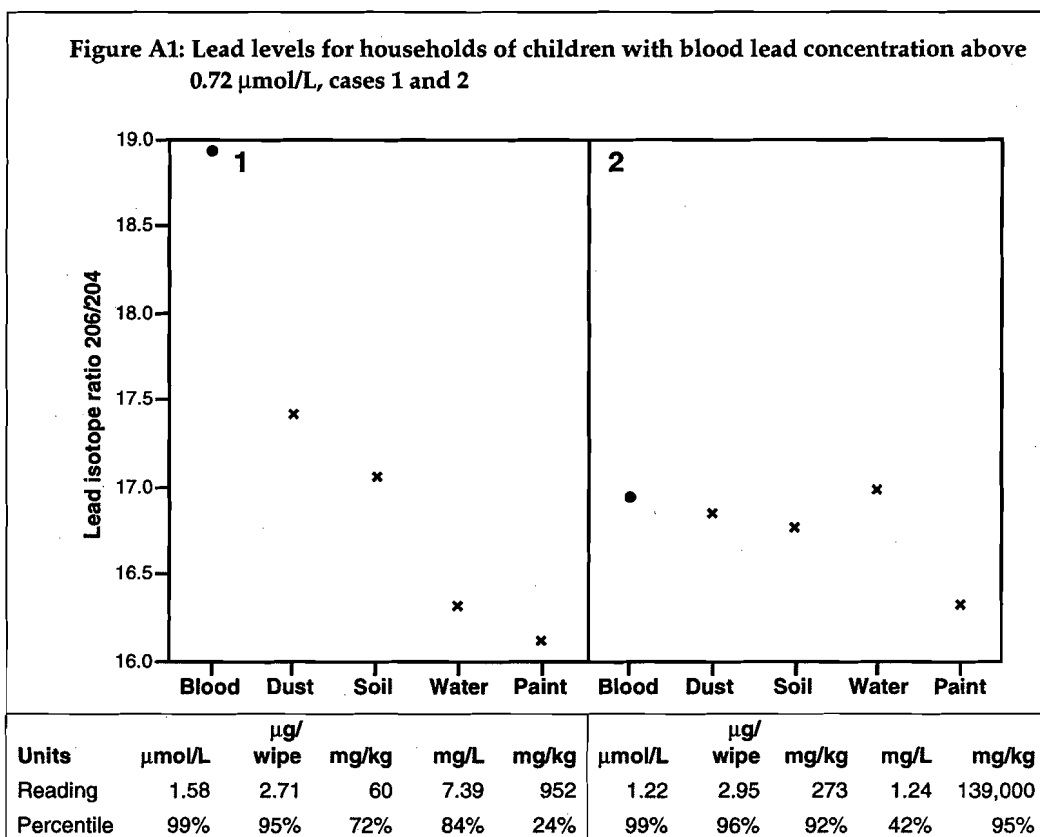
Both children in the family were surveyed. The family had an above-average income and was living in a 1920 (interviewer estimate) or 1912 (resident estimate) brick house on a major road in a capital city. The road carried 31,000 vehicles per day. The house was rated by the interviewer as very clean.

Interview information, later elaborated by the mother, was that the family car used unleaded petrol, there were two dogs which came indoors, and the parents occasionally used lead in hobbies, making stained glass or lead sinkers. The internal paintwork was rated as severe chalking or peeling; parts of the home had been renovated, but not recently, and the children's bedroom was one area that had not been renovated.

The elder child, aged 3.5 years, had a blood lead level of 0.49  $\mu\text{mol/L}$ . The younger child, aged 21 months, had a blood lead level of 1.22  $\mu\text{mol/L}$ . The elder child had no risk factors. The younger child was described as found eating soil more than once a week.

Environmental samples yielded 2.95  $\mu\text{g}$  lead in the floor wipe tissue, 1.24  $\mu\text{g/L}$  lead in water, 273  $\text{mg/kg}$  lead in soil, and 139,000  $\text{mg/kg}$  (13.9%) lead in paint. The high level in the floor wipe was despite the cleanliness of the house, and this indicates that the dust had a very high lead concentration, hence that paint was the source. The lead in the paint specimen was 65% soluble. However the  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in paint (16.32) was substantially below that in the other environmental specimens (soil 16.76, water 16.99, dust wipe 16.85) and in the child's blood (16.94). The source of lead in the child's blood may thus have been soil or dust which contained soil. It may also have been paint other than that sampled, the location of which was not recorded by the interviewer.

Both the family and the family doctor responded very rapidly to notification. Although permission to notify the State health authority had not been given initially, it was supplied promptly.



### Case 3

An only child aged 13 months lived in a brick house built in 1985 (interviewer estimate) or 1982 (resident estimate) in a provincial city. The house was rated by the interviewer as very clean. There was some chalking or peeling of external paint. From 1992 until January 1995 the family had lived in a house built in 1900 in a capital city, and the parents had renovated that house during that time, including when the mother was pregnant and after the child was born. Internal paint there was described as showing severe chalking or peeling, and external paintwork as showing some chalking or peeling. The child sucked fingers or thumb and toys every day, and was found eating soil more than once a week.

The professional parents were well aware of the effects of lead, and on receipt of advice of the child's blood lead level of  $1.20 \mu\text{mol/L}$ , had themselves tested, to discover that their blood lead levels were  $0.2$  and  $0.3 \mu\text{mol/L}$ .

They also arranged for the child to see a paediatrician, who arranged testing for iron status as well, to discover the child was iron-deficient (haematocrit in the study specimen was 40). Some dietary changes were made.

The child's blood lead level was measured again 10 weeks after the survey, as  $0.8 \mu\text{mol/L}$ .

Environmental sampling results were:

dust wipe	$0.06 \mu\text{g}$ lead
water	$1.56 \mu\text{g/L}$ lead

The paint specimen was insufficient for analysis, and the soil specimen appears to have been lost, but as the exposure to lead almost certainly occurred in the previous home, this was not pursued.

### Case 4

The 2.5-year-old youngest child in a large, low-income family was surveyed. The family lived in a rented fibro-cement house built in 1960 (interviewer estimate) or 1955 (resident estimate) in what had been agricultural land on the outskirts of Sydney. There was some peeling of internal paint, but none externally. There was a pet dog, and people smoked inside the house. The interviewer rated the house as very dirty.

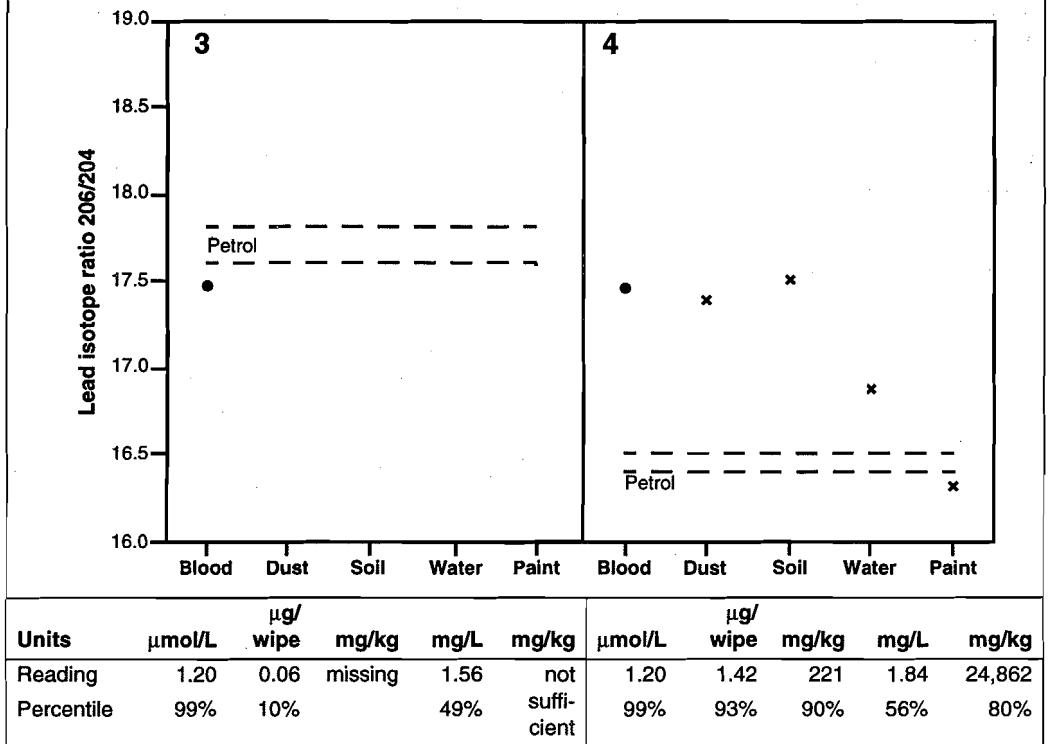
The child had a blood lead level of  $1.20 \mu\text{mol/L}$ . The only apparent risk factor pertaining to the child was being found eating soil every day.

The lead levels in dust ( $1.42 \mu\text{g}$ ), paint ( $25,000 \text{ mg/kg}$ ) and soil ( $221 \text{ mg/kg}$ ) were all high. The lead in the paint specimen was 55% soluble. Lead in water ( $1.84 \mu\text{g/L}$ ) was normal.  $^{206}\text{Pb}/^{204}\text{Pb}$  ratios were similar in blood (17.46), dust wipe (17.38) and soil (17.50), and much higher than in paint (16.32) and in water (16.87).

The source of the lead appears to have been soil.

Permission to notify the State health authority was not given at interview, but the mother telephoned the Institute on receipt of advice of the lead level. The condition of the paint was discussed, and because there might have been an obligation on the part of the public housing authority, it was suggested the State health authority be notified. Written permission to do this was requested and promised, but was never received.

**Figure A2: Lead levels for households of children with blood lead concentration above 0.72  $\mu\text{mol/L}$ , cases 3 and 4**



## Case 5

The elder two of three children of parents who migrated to Australia during the 1980s were included in the survey. The family rented a brick house built in 1928 (interviewer estimate) or 1915 (resident estimate) in a middle-distance suburb of Sydney. The house, into which they moved in January 1995, was rated as dirtier than average but there were no obvious problems with paintwork. The family had lived at the previous address for a short period only. They had one car which used leaded fuel.

The eldest child, aged 4 years, had a blood lead level of 0.59  $\mu\text{mol/L}$ , and no personal risk factors. The second child, aged just over 2 years, had a blood lead level of 1.18  $\mu\text{mol/L}$ . This child was described as found eating soil less than once a week.

The lead level in water was notably high at 42.14  $\mu\text{g/L}$ . Lead levels in dust (0.61  $\mu\text{g}$ ) and soil (101  $\text{mg/kg}$ ) were in the highest quartile. There was no paint specimen.  $^{206}\text{Pb}/^{204}\text{Pb}$  ratios were similar in blood (16.74), dust (16.78) and soil (16.61), and the ratio in water (16.11) was much lower.

Because of the short time the family had spent at the current address, the source of the high lead level cannot be identified with certainty. With parental permission, the case was notified to the State health authority.

## Case 6

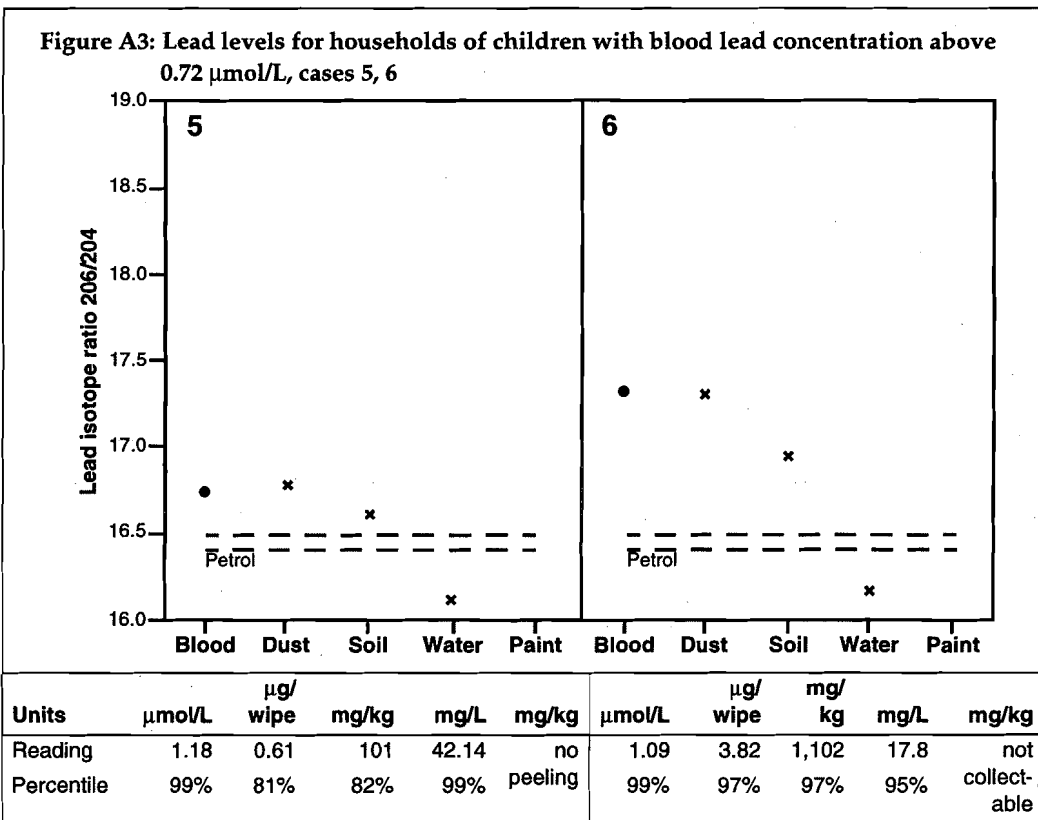
Both children in a low-income family living in a brick semi-detached house on a major road in an inner suburb of Sydney were included in the survey. The traffic count was 44,000 vehicles per day.

The interviewer estimated that the house had been built in 1920, the resident gave 1930. The house was rated as dirtier than average, and there was some chalking or peeling of interior paint only. There had been some renovations but the children had not lived at the house during them. The family had a pet dog.

The elder child, aged 4.5 years, became upset and no blood specimen was taken. The younger child, aged 3, had a blood lead level of  $1.09 \mu\text{mol/L}$ . This child sucked fingers and thumb and toys but less than once a week.

Environmental sampling yielded dust wipe  $3.82 \mu\text{g}$  lead, soil lead  $1102 \text{ mg/kg}$ , and water lead  $17.8 \mu\text{g/L}$ , all values being high but not indicating a single source of lead. There was no paint specimen.  $^{206}\text{Pb}/^{204}\text{Pb}$  ratios in blood (17.32) and in dust wipe (17.31) were very close, and much higher than those in soil (16.94) and in water (16.16). Dust appears to be the immediate source of the lead in the child's blood, but its ultimate source is uncertain.

The State health authority was notified.



## Case 7

Two immigrant families shared a house on the intersection of two major roads with traffic counts of 20,000 and 24,000 vehicles per day in an inner suburb of Sydney. One family had a young child. The house was built in 1910 (interviewer estimate) or 1895 (resident estimate). There was little external paintwork; the internal paint was described as showing severe chalking or peeling. Cleanliness was rated as average.

The interview was conducted through an interpreter. The 1-year-old child was stated as having no risk factors except eating soil less than once a week. The blood lead level was 1.02  $\mu\text{mol/L}$ .

Permission to notify the State health authority was not obtained at interview. As the letter advising the family of the blood test results was in English, follow-up was arranged through an interpreter service, but nothing more was heard.

Lead measurement in environmental samples did not disclose a source of the child's high blood lead level. They were:

dust sample	0.61 $\mu\text{g}$ lead
water lead	6.79 $\mu\text{g/L}$
soil lead	1,325 mg/kg
lead in paint	693 mg/kg.

Isotopic studies showed the  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in blood as 16.88. This was close to the value of 16.92 in the dust wipe, but some distance from the values of 16.34 in paint, 17.10 in water, and 17.34 in soil. The source of the lead in the dust remains undetermined.

## Case 8

A very large family, the sixth and seventh children of which were included in the survey, had lived in a fibro-cement house in a provincial city since December 1994. For the preceding eight months they had lived in a 1980 home with paintwork in good condition.

The present house was built in 1965 (interviewer estimate) or 1970 (resident estimate). In the home there was some chalking or peeling of internal paintwork. There were two cars which used leaded fuel, and there was a pet dog. Cleanliness was rated as average.

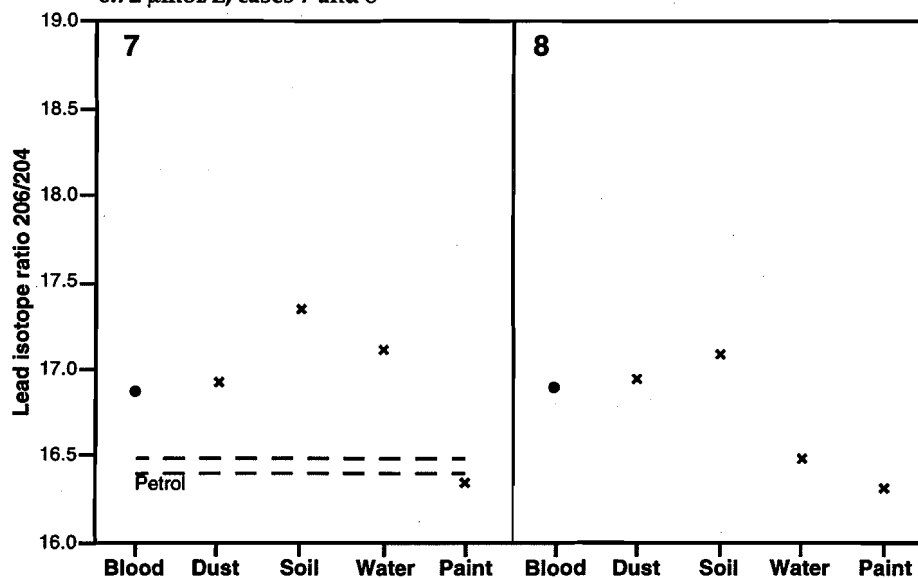
The sixth child, aged 3.5 years, had a blood lead level of 0.68  $\mu\text{mol/L}$ . This child did not have any personal risk factors. The seventh child, aged 2 years, had a blood lead level of 1.01  $\mu\text{mol/L}$ . This child was described as being found eating soil every day.

Lead in the dust wipe (0.67  $\mu\text{g}$ ), and its levels in water (8.47  $\mu\text{g/L}$ ) and soil (78 mg/kg) were all in the highest quartile, but these values do not point to any single source. Lead in a paint sample was 994 mg/kg. The  $^{206}\text{Pb}/^{204}\text{Pb}$  isotope ratios in blood (16.88) and dust wipe (16.94) were similar, and much higher than those in water and paint, but lower than that in soil (17.09).

With parental permission, the State health authority was notified.



Figure A4: Lead levels for households of children with blood lead concentration above 0.72  $\mu\text{mol/L}$ , cases 7 and 8



Units	$\mu\text{mol/L}$	$\mu\text{g/wipe}$	$\text{mg/kg}$	$\text{mg/L}$	$\text{mg/kg}$	$\mu\text{mol/L}$	$\mu\text{g/wipe}$	$\text{mg/kg}$	$\text{mg/L}$	$\text{mg/kg}$
Reading	1.02	0.61	1,325	6.79	693	1.01	0.67	78	8.47	994
Percentile	99%	81%	98%	83%	20%	99%	84%	77%	87%	25%

### Case 9

A family with one child living in an outer suburb of a capital city was surveyed. They had lived in their brick house, built in 1985 (interviewer estimate) or 1986 (resident estimate) since July 1994. Survey documents describe the house as having no interior or exterior paintwork. The family used tank water for drinking and cooking. The roof was tiled. The home was rated cleaner than average.

The 18-month-old child had a blood lead level of 0.97  $\mu\text{mol/L}$ . The child was described as sucking toys every day and being found eating soil more than once a week.

Environmental lead findings reflect the recent construction of the house. Lead in the dust wipe was 0.24  $\mu\text{g}$ , in tank water the level was 2.28  $\mu\text{g/L}$ , and in soil it was 3  $\text{mg/kg}$ . The  $^{206}\text{Pb}/^{204}\text{Pb}$  isotope ratio in blood (17.98) was unusually high, higher than in soil (17.70), and much higher than in the dust wipe (16.98) and in water (16.87). There was no paint specimen. No risk factors were apparent, and as permission to notify was not given, the source of the high blood lead level remains unidentified.

### Case 10

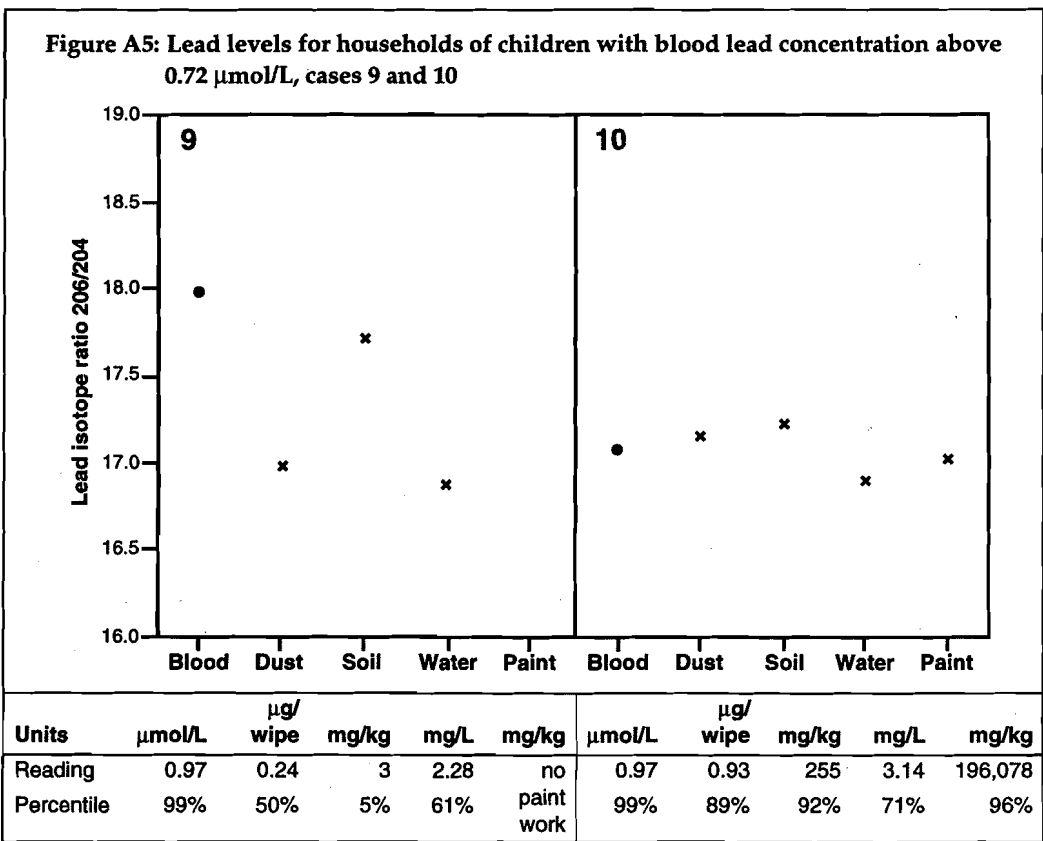
The youngest two of four children from a family which lived in a small village on a country road were included in the survey. The interviewer assessed the road as major, but the traffic count was only 2,100 vehicles per day.

Water was piped some distance from a town. Their timber house was estimated as built in 1960 (interviewer estimate) or 1945 (resident estimate). There was some peeling of both internal and external paint. There had been some renovation within the previous 12 months and the children had continued to live in the house during that time. The house was rated as of average cleanliness. Two vehicles owned by the family used leaded petrol.

The third child, aged just under 3 years, had a blood lead level of 0.55  $\mu\text{mol/L}$ . This child was described as sucking her thumb more than once a week. The fourth child, aged just under 2 years, had a blood lead level of 0.97  $\mu\text{mol/L}$ . This child sucked his fingers and thumb less than once a week. Both children were described as sucking or chewing toys, and eating dirt, every day.

In this household, floor dust (0.93  $\mu\text{g}$ ) and soil (255  $\text{mg/kg}$ ) lead findings were comparatively high. A paint sample yielded 196,000  $\text{mg/kg}$  (19.6%) lead, 77% soluble. The lead concentration in water (3.14  $\mu\text{g/L}$ ) was unremarkable. The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in the paint sample was 17.02, close to that in blood (17.07). Paint is thus the likely source of the high blood lead level.

With parental permission, the State health authority was notified.



## Case 11

Two children in a large family in Broken Hill were included in the survey. They lived in a brick house built in 1950 (both estimates) with some chalking or peeling of external paintwork but no chalking or peeling internally. The house was described as cleaner than average. There were several occupational and hobby risk factors, and there had been renovation within the past 12 months.

A 4-year-old child had a blood lead level of 0.92  $\mu\text{mol/L}$ , as measured for the Broken Hill Environmental Lead Centre. A 2.5-year-old child had a blood lead level of 0.87  $\mu\text{mol/L}$ , similarly measured. Both children sucked toys but had no other personal risk factors.

The floor wipe yielded 1.43  $\mu\text{g}$  lead in house dust, and soil lead was 88 mg/kg. The lead concentration in water was 0.38  $\mu\text{g/L}$ , and comparatively low. These specimens were lost before they could be tested for lead isotope composition. The paint specimen was unsuitable for analysis, as it turned out to consist mainly of unpainted brick.

In both children the high blood lead levels appear to be related to the Broken Hill environment generally. Permission to notify the New South Wales Health Department was not given, but as the findings were already known to the Broken Hill Environmental Lead Centre, this did not need to be pursued.

## Case 12

A family with one child aged 2 years and 9 months lived in a timber house built in 1965 (interviewer estimate) or 1960 (resident estimate) in Brisbane. There were several occupational risk factors, there was a pet dog, and there had been home renovations since the family moved there in September 1994. The house was described as of average cleanliness.

The child, who had a blood lead level of 0.92  $\mu\text{mol/L}$ , had lived at the house during the renovations, and was also cared for at a place with severe chalking or peeling of both interior and exterior paint. He sucked toys more than once a week, and was found eating soil less than once a week.

House dust lead was very high at 2.0  $\mu\text{g}$  on the wipe. Water lead was also high at 26.71  $\mu\text{g/L}$ . In contrast, soil lead was relatively low, at 29 mg/kg. A paint flake yielded 3,296 mg/kg lead. However, the  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in this paint specimen was 16.12, well below the ratio of 16.59 in the child's blood. Renovations may explain the high lead level, and it is possible that the paint sample was not representative. Peeling paint at the place where the child was cared for is another possible source, but there are no specimens to show this. The low isotope ratio in blood of 16.59 is not compatible with a contribution from lead in Brisbane petrol.

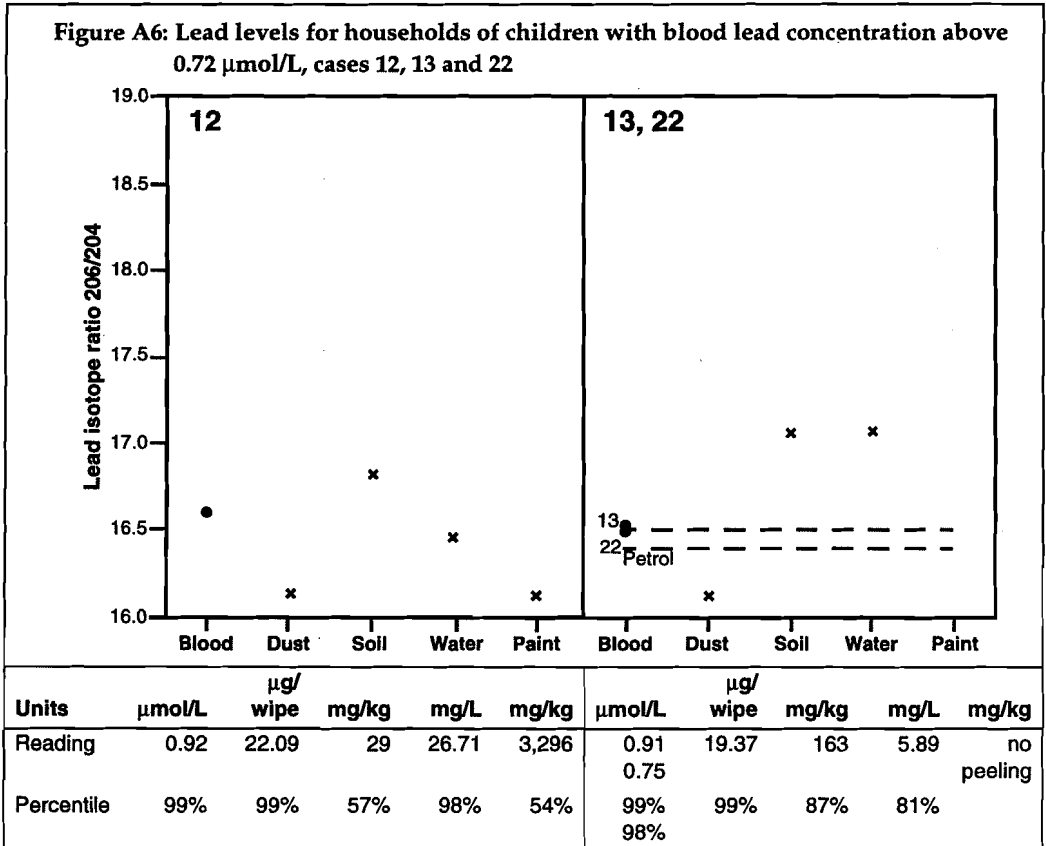
The family moved to another home one week after interview but follow-up was possible because the State health authority had, with parental permission, been notified.

### Case 13

Both children in the family were included. The family lived in a brick house built in 1920 (interviewer estimate) or 1914 (resident estimate) in an inner suburb of Sydney. The house had recently been renovated, and one of the parents also painted china as a hobby, although not at the home. There were no pets, and only a small vegetable garden. No history of risk factors was obtained for either child.

The elder child, aged 3, had a blood lead level of 0.91  $\mu\text{mol/L}$ , and the 15-month-old second child had a blood lead level of 0.75  $\mu\text{mol/L}$ . The parents responded rapidly to advice of the blood lead levels and accepted that renovation was the most likely cause of the high readings.

Environmental sample results became available only later. The dust wipe gathered 19.37  $\mu\text{g}$  lead, a very high amount. Lead in soil was 163  $\text{mg/kg}$  and in water was 5.89  $\mu\text{g/L}$ . No paint sample was collected. The two children had similar  $^{206}\text{Pb}/^{204}\text{Pb}$  ratios in blood of 16.52 and 16.49, but these ratios were very different from those in the dust wipe (16.13, a low reading in this city) and in soil and water (both 17.07). The isotope ratios in blood suggest a mixed contribution from lead in soil and in dust, some of the latter lead having originated in petrol.



## Case 14

See Case 11.

## Case 15

A 1-year-old child living in the outer suburbs of a capital city was included in the survey. The rented brick house built in 1955 (interviewer estimate) or 1960 (parent) had some chalking or peeling of internal paint, and severe chalking or peeling of external paint. Some renovation had been done while the child lived there. The house was rated as of average cleanliness.

The child sucked or chewed his toys every day, and was found eating soil more than once a week. His blood lead level was  $0.82 \mu\text{mol/L}$ . The household dust sample yielded  $0.37 \mu\text{g}$  lead, lead in soil was  $165 \text{ mg/kg}$ , and in water was  $1.59 \mu\text{g/L}$ . The lead concentration in paint was  $54,124 \text{ mg/kg}$ , and soluble lead was  $56,364 \text{ mg/kg}$  in another part of the specimen; that is, all the lead may have been soluble. The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in lead on the dust wipe was 16.73, close to but still below the 16.82 ratio in the child's blood. Ratios in soil (16.41), water (16.34) and paint (16.04) were much lower.

Both the State health authority and the family doctor were notified of the findings.

## Case 16

An only child living in a timber house in an inner suburb of a city was included in the survey. The family had moved there in April 1994. The house, rated as dirtier than average, was assessed by the interviewer as having been built in 1950 and by the family as having been built in 1930. The interior paint was rated as showing severe chalking and/or peeling and the exterior paint as showing some chalking and/or peeling. Automotive repairs was listed as a hobby of the adult occupants, and the family car used leaded petrol.

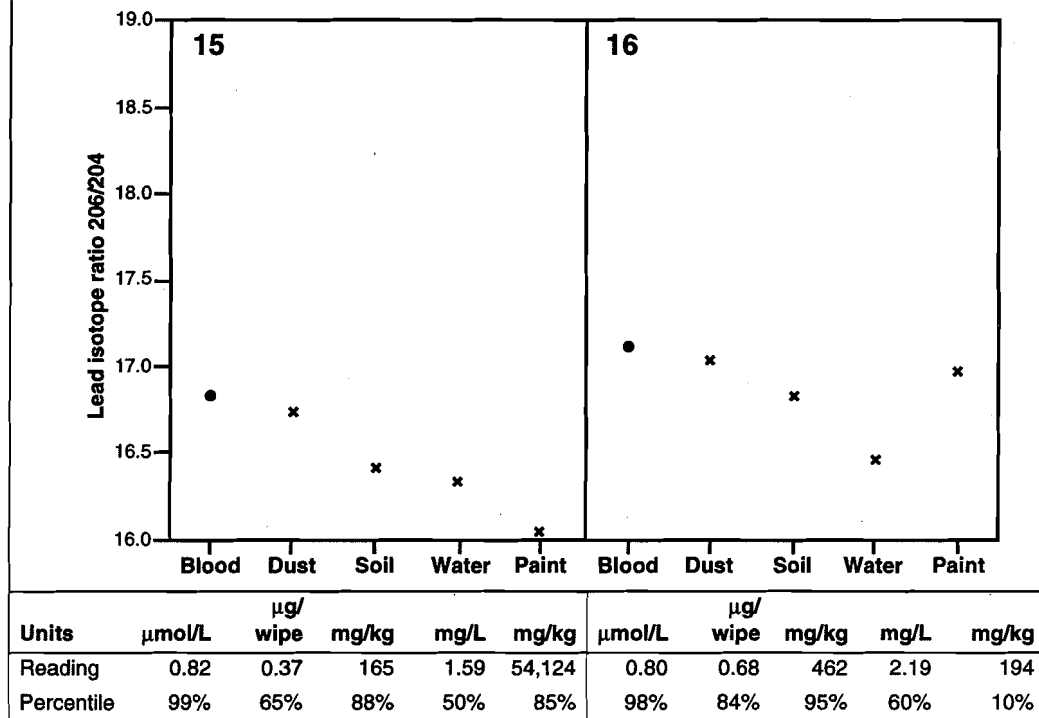
The 2-year-old child had a blood lead level of  $0.80 \mu\text{mol/L}$ . She was described as sucking her thumb less than once a week and her toys every day. There were no other risk factors relating to her.

The dust wipe yielded  $0.68 \mu\text{g}$  lead. Lead concentrations were  $462 \text{ mg/kg}$  in soil,  $2.19 \mu\text{g/L}$  in water, and  $194 \text{ mg/kg}$  in paint. The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in the dust wipe (17.03) was close to that in the child's blood (17.11). Ratios in soil and in water were much lower.

Permission was given to notify the family doctor but not the State health authority.



Figure A7: Lead levels for households of children with blood lead concentration above 0.72  $\mu\text{mol/L}$ , cases 15 and 16



## Case 17

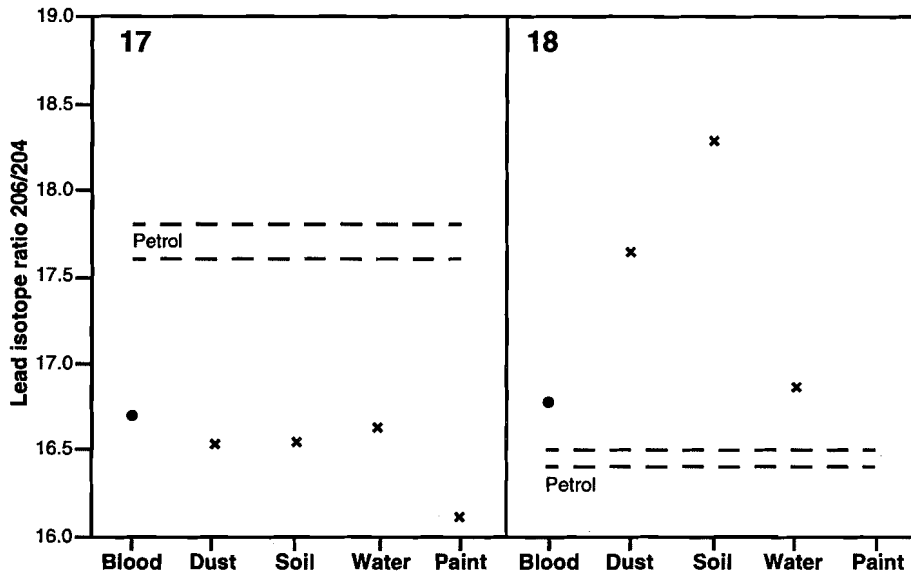
The younger of two children of a family living in a timber house in a southern Queensland township was included in the survey. The house was estimated by the interviewer to have been built in 1900; the residents' estimate was 1910. There was chalking and/or peeling of the exterior paint only. There had been renovation in the last 12 months and the children had lived there during that time. House cleanliness was assessed as average.

The father worked in automotive repair.

The child, aged 1.5 years, sucked his fingers or thumb and his toys every day. His blood lead level was 0.78  $\mu\text{mol/L}$ . The sample of floor dust yielded 0.78  $\mu\text{g}$  lead. The lead levels in soil (1,261  $\text{mg/kg}$ ) and water (8.45  $\mu\text{g/L}$ ) were also not especially high. The lead concentration in paint was 18,519  $\text{mg/kg}$ , of which 78% was soluble. The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in blood was 16.70. This was a little higher than those in water (16.63), soil (16.54) and in the dust wipe (16.53), but well above that in the paint specimen (16.11). A possible explanation is that the lead came predominantly from water, soil or dust, with a contribution from Queensland petrol.

The State health authority was notified.

Figure A8: Lead levels for households of children with blood lead concentration above 0.72  $\mu\text{mol/L}$ , cases 17 and 18



Units	$\mu\text{mol/L}$	$\mu\text{g/wipe}$	$\text{mg/kg}$	$\text{mg/L}$	$\text{mg/kg}$	$\mu\text{mol/L}$	$\mu\text{g/wipe}$	$\text{mg/kg}$	$\text{mg/L}$	$\text{mg/kg}$
Reading	0.78	0.89	1,261	8.45	18,519	0.77	0.16	9	3.61	no
Percentile	98%	88%	97%	87%	78%	98%	32%	25%	74%	peeling

### Case 18

All three children in a low-income family living since 1993 in a newly built home in a newly developed and previously rural area of a provincial New South Wales city were included in the survey. The interviewer rated the house as cleaner than average. There was one car which used leaded petrol.

The 4.5-year-old eldest child had a blood lead level of 0.14  $\mu\text{mol/L}$ , and the 3.5-year-old second child had a blood lead level of 0.24  $\mu\text{mol/L}$ , but the 14-month-old youngest child had a blood lead level of 0.77  $\mu\text{mol/L}$ . The youngest child had been found eating soil, but less than once a week.

The family doctor responded to the notification. It was agreed that the history did not indicate any obvious source of lead. On being informed that authority to notify the State health authority had not been given, he volunteered to approach the parents and the authority. He does not appear to have done so.

The environmental specimens became available later. The dust wipe yielded 0.16  $\mu\text{g}$  lead, the soil specimen 9  $\text{mg/kg}$  lead, and the water specimen 3.61  $\mu\text{g/L}$  lead. The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in the child's blood was 16.77. This was close to the ratio in water (16.86) but well below those in the dust wipe (17.64) and in soil (18.28).

Because of the great differences in blood lead levels within the family, and the low environmental levels, the lead measurements were repeated on leftover whole blood.

The result (from Royal Prince Alfred Hospital) was 0.69  $\mu\text{mol/L}$ . It remains possible that this specimen was contaminated at the time of collection, but it was not possible for the survey to arrange collection of a second blood specimen from the child to check this possibility.

## Case 19

The 2.5-year-old second of three children in a family was included; the youngest child was aged 8 months. The family lived in a large country town, in a house built in 1978 (interviewer estimate) or 1973 (resident estimate). There were two family vehicles; both used leaded petrol. Parents smoked, there were pet cats and dogs, and there was a vegetable garden. The house was of average cleanliness. No risk factors relating to the child were identified at interview.

The child had a blood lead level of 0.76  $\mu\text{mol/L}$ . With parental permission this was notified to the State health authority, which sent a scientific officer to investigate. The mother then initiated contact with the Institute.

These discussions revealed that the home was next door to a disused drive-in theatre. The scientific officer thought this was not a likely source of lead.

The father was an electrician who worked for a fertiliser manufacturing company which did handle lead products. Although there was no proof that he handled lead in his work, it was suggested by the scientific officer that his work clothes be washed away from the home.

The scientific officer also learnt from the mother that all three children frequently visited grandparents who were renovating their home. This was viewed as another possible source of lead.

Four children from the property next door were included in the survey. Their blood lead levels ranged from 0.30 to 0.45  $\mu\text{mol/L}$ .

Environmental lead results were:

dust sample 0.85  $\mu\text{g}$  lead  
soil sample 51 mg/kg lead  
water sample 118.80  $\mu\text{g/L}$  lead

When questioned about household plumbing, the mother reported that a new mixer tap had been only recently installed at the time of the survey.

There was no paint specimen. The  $^{206}\text{Pb}/^{204}\text{Pb}$  isotope ratio in blood (16.86) was close to that in the dust wipe (16.75) but much higher than those in water (16.56) and in soil (16.49). The ultimate source of the lead in the dust is not apparent.

## Case 20

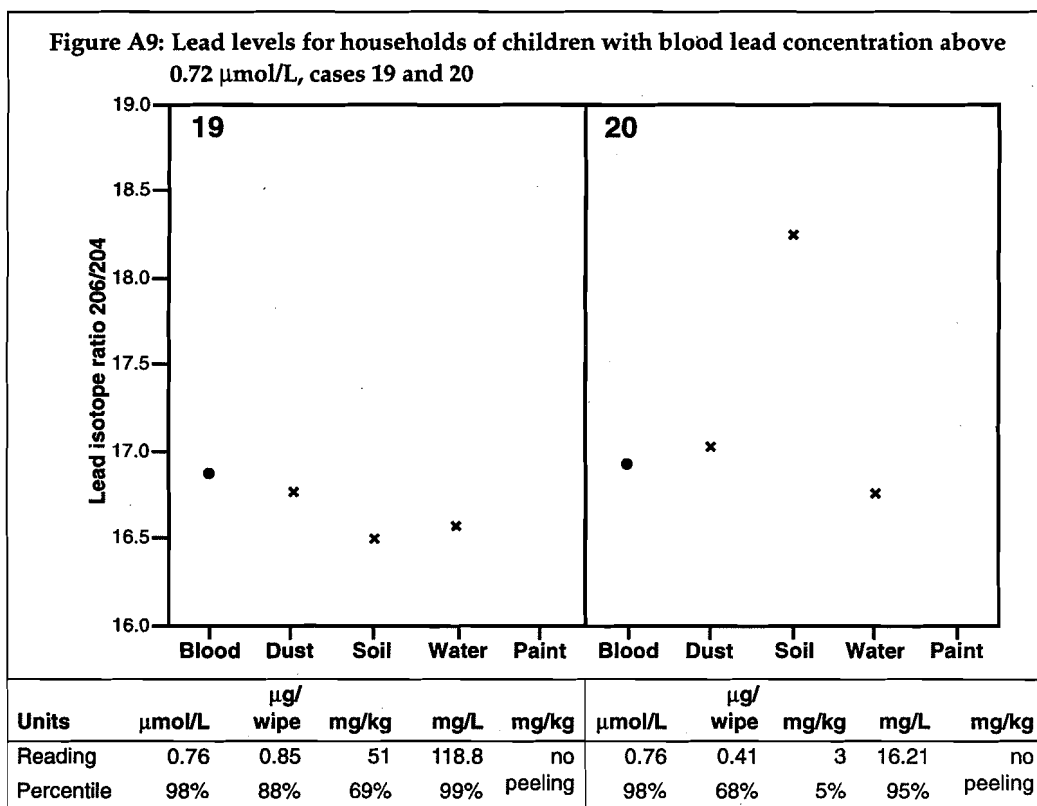
The youngest two of three children in a family were included in the survey. The home had been built in 1993 (both estimates) on what had formerly been a rifle range, on the outskirts of a capital city. Some repainting had been done since occupation, but that should not have influenced lead levels in the children, who had lived there during this time. There were no other risk factors relating to the household, which was recorded as of average cleanliness.

The elder child studied, aged 4.5 years, had a blood lead level of 0.76  $\mu\text{mol/L}$ . This child was a thumb-sucker, but no other risk factors were identified at interview. No specimen was obtained from the youngest child, aged 2.5 years.

There was 0.41  $\mu\text{g}$  lead in the dust wipe. Concentrations of lead in soil were 3  $\text{mg/kg}$  and in water 16.21  $\mu\text{g/L}$ . No paint sample was taken. The  $^{206}\text{Pb}/^{204}\text{Pb}$  isotope ratio in the child's blood (16.92) was close to that in the dust wipe (17.02) and only a little different from that in water (16.75), but very different from that in soil (18.24).

The source of the high blood lead level is dust, but the ultimate source of the lead is not apparent from this information.

Permission to notify the State health authority was not given.



## Case 21

Until December 1994, a single-child low-income family had lived in a home built in 1960 with some chalking or peeling of internal paintwork. They had then moved to a 1960 (both estimates) weatherboard house in the outer suburbs of Sydney. This house had no problems with the internal paintwork but some chalking or peeling of external paintwork. Cleanliness was assessed as average. There were five vehicles, four of which used unleaded petrol, and automotive repair and panel beating were listed as both occupational and hobby exposures.

There were no risk factors relating to the child, who was 18 months old at the time of the survey. The blood lead level was 0.76  $\mu\text{mol/L}$ .

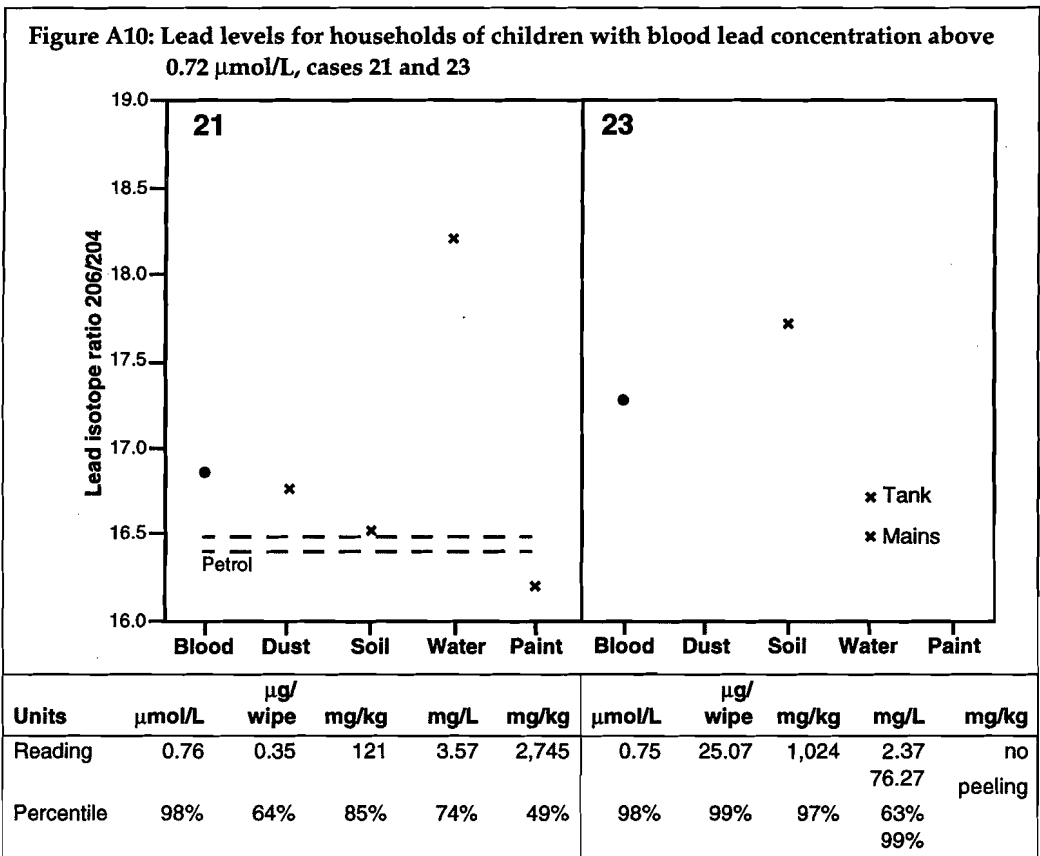
The dust wipe yielded 0.35  $\mu\text{g}$  lead. Concentrations of lead in soil (121  $\text{mg/kg}$ ) in water (3.57  $\mu\text{g/L}$ ) and in paint (2,745  $\text{mg/kg}$ ) were not notably high. The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in the child's blood was 16.86. This was close to that in the dust wipe (16.76). Ratios in soil (16.52) and paint (16.19) were lower. In the water specimen the ratio was much higher (18.20).

The source of the high blood lead level is dust.

The family doctor was notified but permission to notify the State health authority was not given.

## Case 22

See Case 13.





### Case 23

Until January 1995, a single-child family had lived in a 1988 home. They then moved to a 1958 brick house (both estimates) in a country town. As well as using town water, the household used tank water collected from a metal roof. Parental hobbies were said to include home renovation (but none had been done at either home), staining glass, and panel beating or spray painting (neither of the two vehicles used leaded petrol). The house was rated as very dirty.

The 3.5-year-old child had no risk factors. His blood lead level was  $0.75 \mu\text{mol/L}$ .

The dust wipe yielded  $25.07 \mu\text{g}$  lead, the highest obtained at time of writing. Soil lead was high at  $1,024 \text{ mg/kg}$ , but there was no paint specimen. The mains water yielded  $76.27 \mu\text{g/L}$  lead, but rainwater only  $2.37 \mu\text{g/L}$  lead. The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratios were 16.48 in tank water, 16.70 in mains water, 17.27 in the child's blood and 17.70 in soil. The lead in the child's blood seems to have come from more than one source.

Both family doctor and the State health authority were notified.

### Case 24

All three children of a family were included in the survey. They lived with a relative in a 1980 (both estimates) brick house in a large country town in New South Wales. The house was rated as dirtier than average. The one vehicle used leaded petrol, and there were smokers in the household.

The 4-year-old eldest child had no risk factors but was not at home at time of collection. The 3-year-old second child sucked fingers and thumb, and also toys, less than once a week, and had a blood lead level of  $0.62 \mu\text{mol/L}$ . The 18-month-old youngest child sucked fingers and thumb, and also toys, more than once a week, and had a blood lead level of  $0.75 \mu\text{mol/L}$ .

Environmental testing found  $0.53 \mu\text{g}$  lead on the floor wipe,  $28 \text{ mg/kg}$  lead in soil and  $14.63 \mu\text{g/L}$  lead in water. There was no paint specimen. The  $^{206}\text{Pb}/^{204}\text{Pb}$  isotope ratio in blood was 16.95, higher than the 16.37 in water, but less than the 17.15 in the dust wipe and much less than the 17.91 in soil. Again a mixture of sources is suggested.

Permission to notify the State health authority was not given.

### Case 25

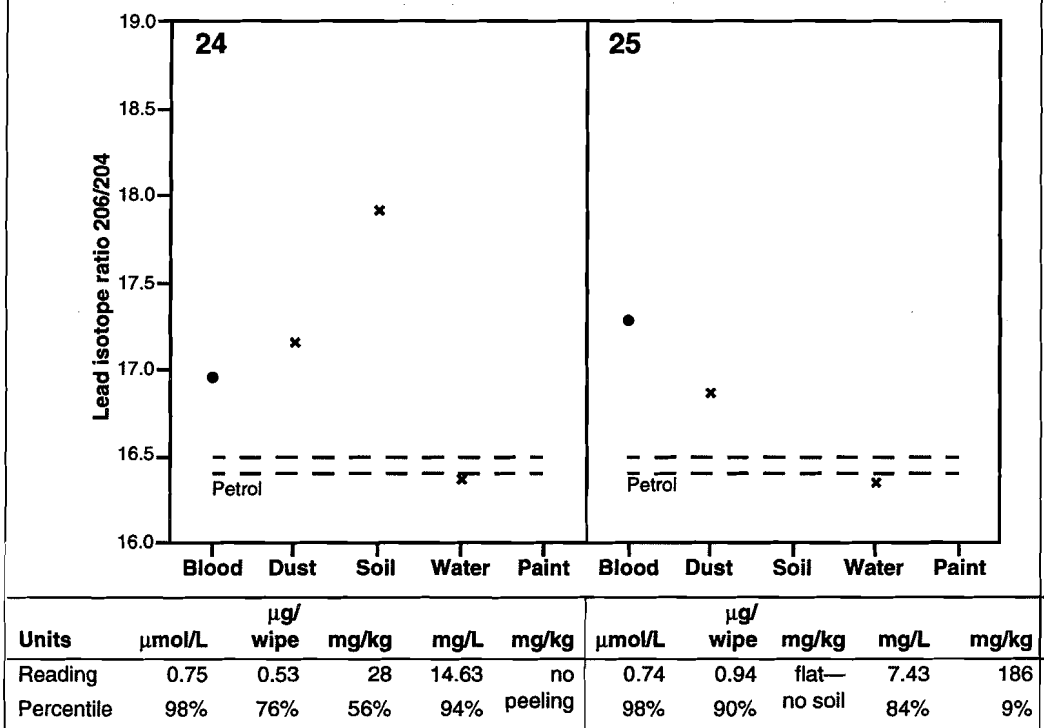
A 4.5-year-old only child lived with his parents in a three-storey block of flats on a major road (traffic count not available) in the middle suburbs of Sydney. One parent was a recent migrant from South-East Asia. The brick building with no external paintwork was estimated to have been built in 1970 (interviewer) or 1965 (resident). There was some chalking or peeling of internal paint. The flat was rated as cleaner than average.

The child was said to suck fingers or thumb, and toys, every day, and to be found eating soil every day. The blood lead level was  $0.74 \mu\text{mol/L}$ .

The house dust wipe yielded  $0.94 \mu\text{g}$  lead. The concentration of lead in water was  $7.43 \mu\text{g/L}$  and in a paint flake was  $186 \text{ mg/kg}$ . No soil specimen was collected. The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio was 17.27 in the child's blood, 16.85 in the dust wipe and 16.33 in water. Neither dust nor water can be major contributors to the blood lead.

The State health authority was notified.

Figure A11: Lead levels for households of children with blood lead concentration above 0.72  $\mu\text{mol/L}$ , cases 24 and 25



## Case 26

A 3-year-old child lived with his Middle-Eastern immigrant parents and two much older siblings in a middle suburb of Sydney. The parents and the oldest child had arrived in Australia 20 years ago. The fibro-cement house was estimated to have been built in 1935 (interviewer) or 1922 (resident). The house was rated as cleaner than average, and the internal paint was in good condition. There was no external paint. There were smokers in the household.

There were no risk factors relating to the child, whose blood lead level was 0.73  $\mu\text{mol/L}$ .

The house dust wipe yielded 0.73  $\mu\text{g}$  lead. The soil lead concentration was 1,778  $\text{mg/kg}$ , and the water concentration 8.67  $\mu\text{g/L}$ . There was no paint specimen. The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in the child's blood (16.33) was the same as in the water specimen and very close to that in one soil specimen (16.31). It was also within the range found in petrol. Ratios in the dust wipe (16.67) and in another soil specimen (16.09) were very different. Soil and/or petrol appear to be the major contributors to the lead in blood.

The State health authority was notified.

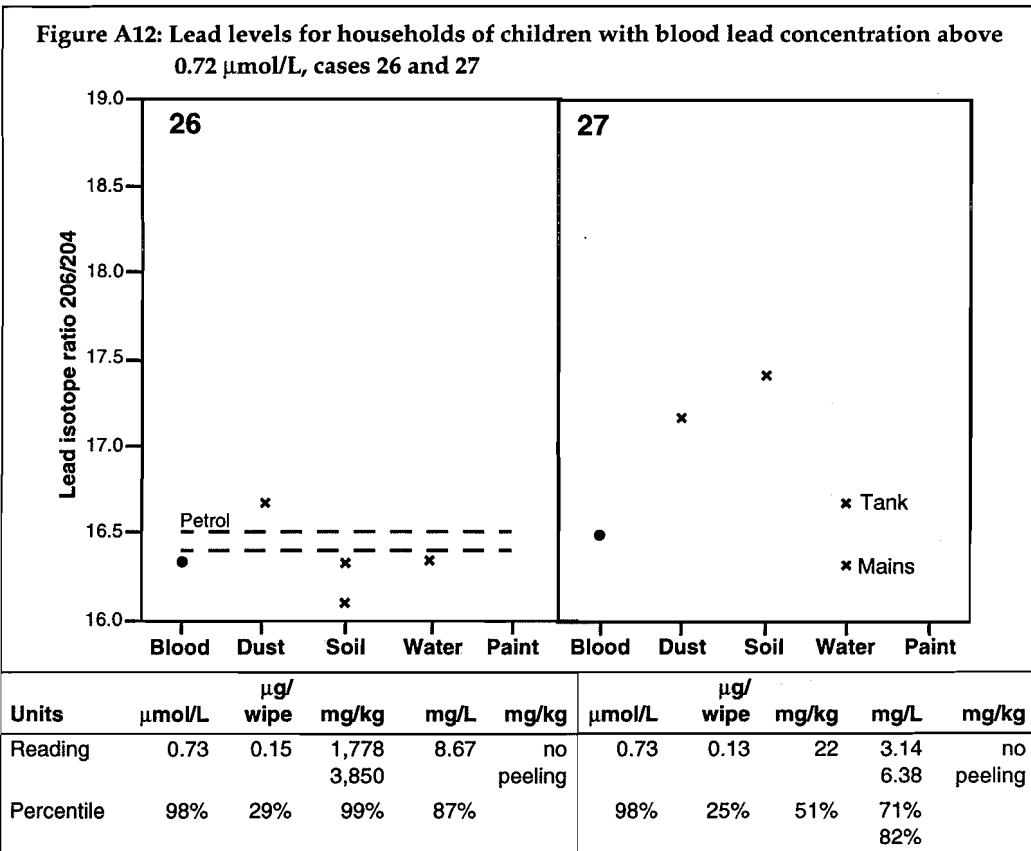
## Case 27

Both children of a family living in a brick house in a small country town were included in the survey. The house was built in 1975 (both estimates), all paint was in good condition, and cleanliness was rated as average. As well as town water, the family used tank water collected from a metal roof. Hobbies included automotive repairs and making sinkers for fishing. The house was on a main road which had been a major highway before the town was bypassed. No current or previous traffic count was available.

The elder child, aged 3.5 years, sucked fingers or thumb every day, and was found eating soil less than once a week. The blood lead level was  $0.73 \mu\text{mol/L}$ . The younger child, aged 21 months, sucked fingers or thumb every day, and was found eating soil more than once a week. The blood lead level was  $0.29 \mu\text{mol/L}$ .

There was  $0.13 \mu\text{g}$  lead on the dust wipe,  $22 \text{ mg/kg}$  lead in soil,  $6.38 \mu\text{g/L}$  in mains water and  $3.14 \mu\text{g/L}$  in tank water. The  $^{206}\text{Pb}/^{204}\text{Pb}$  ratio in the blood from the elder child was 16.50, between those in town water (16.32) and in tank water (16.68). The ratios in the dust wipe (17.16) and in soil (17.42) were much higher. No individual sample accounts for the elevated blood lead in this child. A contribution from lead in petrol has to be considered.

Both family doctor and State health authority were notified.



# Appendix 5: Details of sampling and estimation

## Classification of census districts

Census Collector Districts (CDs) were classified as non-remote or remote using the Australian Standard Geographic Classification definition of Section of State (SOS) as follows:

0. Major urban: all urban centres with a population of 100,000 and over.
1. Other urban: all urban centres with a population of 1,000 to 99,999.
2. Bounded locality: all localities with a population of 200 to 999.
3. Rural balance: the remainder of the State or Territory.
4. Migratory: off-shore areas and migratory.

All CDs in SOS categories 0, 1 and 2 were classified as non-remote. So were CDs in category 3 which are also in Capital City Statistical Divisions. CDs in SOS category 3, but not in Capital City Statistical Divisions, were classified as remote. The SOS category 4 contains mainly people who are in transit and was regarded as being out-of-scope for this survey.

## Sample design constraints

The sample design chosen was area-based, with randomly selected CDs. In remote areas, for logistic reasons, whole CDs were to be surveyed, with a sampling fraction of 1 in 250 (0.4%). In other areas, one-third of each sampled CD was to be surveyed, so the sampling fraction required was 3 in 250 (1.2%).

To ensure availability of interviewers outside major centres, the CDs selected needed to be geographically related to the CDs currently used in the ABS Labour Force Survey (LFS), for which ABS already had contracted with local interviewers.

To avoid problems of respondent burden or any other interference with the LFS, ABS wished the survey to avoid CDs currently in the LFS or likely to be in it in the near future.

# Sampling for the Labour Force Survey

It is necessary to outline the complex process of CD selection for the Labour Force Survey (LFS). Regions within each State and Territory are split up into a number of strata which cover the whole State without any overlap. Each stratum is made up of a number of CDs with approximately 300 dwellings in each. Each CD is divided into clusters of between six and eight dwellings, and the number of clusters in each CD is known.

The CDs within each stratum are sorted in geographic serpentine order, that is starting in the north-east corner of the stratum, moving west until the boundary is met, then south to the next CD below and moving east until the border is met, and so on.

The number of clusters to be sampled within any State is determined. Then the sample of CDs is selected from a random start, by moving forward in the list of CDs by the appropriate number of clusters. The probability of selecting a CD thus depends on the number of dwellings in the CD and the State sampling fraction.

In sparsely settled areas, an extra stage of selection is used. Each stratum is split up into Primary Selection Units (PSUs) each consisting of a number of geographically close CDs. The number of CDs in a PSU varies across States and regions, and in some cases all the CDs in a single PSU could potentially be in the LFS sample.

Where a CD is selected by LFS and is in a PSU, the CD one behind and eligible for the National Survey of Lead in Children (NSLC) frame would usually also be in the same PSU. As many of the PSUs had the majority of CDs selected by LFS, it was decided that the CD behind could come from a different PSU.

## Selection of current survey sample

The stratification used was based on operational requirements and not intended to yield estimates at the 'remote' level.

The CDs used in any LFS survey vary in a regular fashion. So that CDs in the LFS would not be not affected by this survey, it was decided to restrict the frame of CDs for this survey to those one behind (in the opposite direction to which the LFS rotation occurs) each LFS CD, unless that CD itself was also in the LFS. In this way, a CD chosen for the present survey could not currently be selected in the LFS, and would not be rotated into it in the near future.

The sampling strategy for the LFS also differs from that of this survey. CDs are selected for the LFS with likelihood in proportion to their population, taking into account which State or Territory they are in. The LFS is designed to provide State estimates as well as national estimates and hence the sampling fractions vary from State to State. There were 3,668 eligible CDs identified in the stratum of 24,593 non-remote CDs. Before CDs were chosen from this frame, the unequal probability of selection of CDs for the LFS was reversed (see below). All eligible CDs thus had an equal chance of selection, and 296 (1.20%) of them were selected for the survey.

Similarly, there were 376 eligible CDs identified in the stratum of 3,080 remote CDs; 13 of them (0.42%) were selected for the survey.



It was later discovered that the 433 CDs in Hobart, in Darwin, and in the growth areas of the Australian Capital Territory were incorrectly included in the population of 24,593 CDs used to calculate the number of non-remote CDs to be sampled. The number of CDs in this stratum should have been 24,160, and the sample should have been 290, or 2% less than that identified. Interviewers were being offered appointment and blood collection contracts being arranged when this became known to the Institute, and no corrective action was taken.

Special selection arrangements applied to Hobart and Darwin, the capital cities where the population is too low to support a CD stage of selection. These arrangements also applied to the growth areas of the Australian Capital Territory where there were insufficiently accurate population counts to enable a CD stage of selection. In these areas, a 0.4% (1 in 250) sample was obtained by dividing the 433 CDs into 2,452 blocks from which 10 were selected.

## Probability of selection

As stated above, CDs are chosen for the LFS with an unequal probability of selection. To ensure an equal probability of selection, the CDs on the frame for the NSLC were assigned a probability of selection that would counterbalance the original LFS probability of selection.

Let  $P(LFS)_k$  be the probability that a CD of rank 'k' is selected in LFS, where rank identifies the order of rotation of CDs in the LFS. A CD with rank 'k-1' is the CD behind the CD with rank 'k' where the CDs are in the same State and stratum. Let  $P(NLFS)_{k-1}$  be the probability that a CD of rank 'k-1' is not selected in LFS.

Then  $P(NLFS)_{k-1} = 1 - P(LFS)_{k-1}$

and the probability that  $CD_{k-1}$  is on the NSLC frame is:

$$P(frame)_{k-1} = P(LFS)_k \times P(NLFS)_{k-1}$$

For the NSLC all CDs are required to have the sample probability of selection. However, the probability of a CD being on the sample frame is associated with it being one behind the current CD in the LFS. If  $N^t$  is the total number of CDs and  $n^s$  is the number of CDs required in the sample, then the probability of selection in the NSLC is  $n^s/N^t$ . We then need to solve the following:

$$P(survey)_{k-1} = P(frame)_{k-1} \times f_{k-1} = n^s/N^t$$

where  $f_{k-1}$  is the factor to be applied to the probability of a CD being on the frame to ensure that the CDs in the survey have an equal chance of selection. Therefore:

$$f_{k-1} = n^s/N^t \times 1 / (P(frame)_{k-1})$$

For example, let  $N^t = 10$ , and  $n^s = 2$ , so that the probability of selection in the survey is 0.2. Assume the LFS has currently selected four CDs, so that the frame for NSLC selections also consists of four CDs, each one behind an LFS CD. Call these CDs A, B, C and D and allocate each a probability of being on the frame ( $P(frame)_{k-1}$ ) as in Table A1.

**Table A1: Example of the process of selection of CDs for the survey**

Selection	$P(\text{frame})_{k-1}$		$f_{k-1}$	Cumulative $f_{k-1}$
A	1/10	0.100	2	2
B	1/100	0.010	20	22
C	1/150	0.007	30	52
D	1/200	0.005	40	92

$$P(\text{survey})_{k-1} = f_{k-1} / (\sum f)$$

$$\text{skip} = \sum f / n^s = 92 / 2 = 46$$

A start at the beginning of A would result in C and D being selected.

## Estimation

Demographic projections of the number of 1- to 4-year-old children of each sex were calculated by the Australian Bureau of Statistics (Table A2). These were used to derive estimates for the Australian population of the number and proportion of 1- to 4-year-old children with a particular property, for example a blood lead level greater than or equal to 0.49  $\mu\text{mol/L}$ .

Let  $y_{h,k}$  be an indicator variable for the  $k^{\text{th}}$  respondent of the  $h^{\text{th}}$  stratum for the quantity of interest, so that  $y_{h,k} = 1$  if the respondent satisfies the criterion of interest, and  $y_{h,k} = 0$  if the respondent does not satisfy the criterion. We also need:

$h$  stratum identifier with a different value for each state by sex combination

$N$  total number of 1- to 4-year-olds in Australia

$N_h$  number of 1- to 4-year-olds in stratum (see Table A2)

$y_h$  sum of the  $y_{(h,k)}$  for the 1- to 4-year-olds in the stratum, i.e.

$$y_h = \sum_{k=1}^{n_k} y_{h,k}$$

$n_h$  number of 1- to 4-year-olds in the strata that the value of the indicator variable is known for, i.e. set to either 0 or 1

$s_h^2$  the sample variance of the values  $y_{h,k}$ , that is the variance of the survey responses for each State by sex strata, given by:

$$s_h^2 = \frac{1}{n_k - 1} \left\{ \sum_{k=1}^{n_h} (y_{h,k}^2) - \frac{1}{n_h} \left[ \sum_{k=1}^{n_h} (y_{h,k}) \right]^2 \right\}$$

The estimated number of children is:

$$\hat{y} = \sum_h \frac{N_h}{n_h} y_h$$

with variance:

$$\hat{Var}(\hat{y}) = \sum_h \frac{N_h^2}{n_h} y_h \left(1 - \frac{n_h}{N_h}\right) s_h^2$$

where the summation over  $h$  is across the State by sex strata.

The estimated proportion of all children is:

$$\hat{p} = \frac{1}{N^2} \sum_h \frac{N_h}{n_h} y_h$$

with variance:

$$\begin{aligned} \hat{Var}(\hat{p}) &= \frac{1}{N^2} \sum_h \frac{N_h^2}{n_h} \left(1 - \frac{n_h}{N_h}\right) s_h^2 \\ &= \frac{1}{N^2} \hat{Var}(\hat{y}) \end{aligned}$$

**Table A2: Estimated number of 1- to 4-year-old children by sex and State or Territory**

<b>State</b>	<b>Males</b>	<b>Females</b>
New South Wales	179,678	171,210
Victoria	131,105	124,165
Queensland	97,735	92,109
Western Australia	40,760	38,654
South Australia	51,500	48,964
Tasmania	13,925	13,400
Australian Capital Territory	6,913	6,757
Northern Territory	9,285	8,814
<b>Australia</b>	<b>530,901</b>	<b>504,073</b>

*Source:* Australian Bureau of Statistics projections, February 1995.

# Appendix 6: Problems with the collection and transport of blood

This Appendix has been included in the report because the National Survey of Lead in Children was the first in Australia to attempt to collect specimens nationwide for analysis in one laboratory. The notes that follow may be of great use in future such surveys.

The Royal North Shore Hospital (RNSH) laboratory noted that 61 specimens from the Sydney region were delivered at ambient temperature. Of those sent by air, 249 specimens were shipped and received at ambient temperature, and a further 221 were shipped with cooling but received at ambient temperature. These numbers represented more than one-third of the airfreighted specimens.

Collection of blood from young children is difficult, and it was to be expected that specimen volume would be limited in some instances. There were nine specimens for which there was insufficient blood for any analysis at RNSH (three of these specimens were sufficient for analysis by ICPMS at Royal Prince Alfred Hospital), and one specimen which could not be analysed due to being fully haemolysed. For a further five specimens for which blood lead level was measured, there was insufficient volume remaining to measure the haematocrit. There were 34 more specimens with volumes estimated at less than 0.5 mL.

Other problems included:

- One specimen was recorded on the Household Form as collected but neither it nor the request form arrived at Royal North Shore Hospital; no explanation was ever obtained. An apology was sent to the parents.
- Staff at one laboratory analysed three specimens and sent the results without specimens to Royal North Shore Hospital. This was rapidly detected by laboratory management and there was no recurrence. The measurements were accepted into the analysis.
- One collector forgot to label tubes containing three specimens collected from two households on the same day. Blood lead levels in these three unlabelled specimens were measured as 0.25, 0.26, and 0.27  $\mu\text{mol/L}$ , so all three were allotted the value of 0.26 for purposes of analysis. Letters of apology were sent to the parents.
- Two collectors sent six and one blood specimens for analysis in tubes other than those supplied. As individual kits were supplied for blood collection, this implies

that all materials used for these seven collections were likely to have been non-standard, and in particular had not been tested for freedom from lead. Nonetheless, the results of analysis were accepted.

- One batch of specimens did not arrive at the Royal North Shore Hospital laboratory until four days after it was sent from Hobart; the package was correctly addressed, and the despatching laboratory had, as requested, alerted the hospital that the batch was in transit. No explanation of how it went astray was ever obtained from the airline. These specimens were all haemolysed on receipt.
- The laboratory received 16 request forms unaccompanied by specimens. In these instances no specimen had actually been collected, but the form had been completed in anticipation.
- In 89 other cases information on the blood tube was either incomplete or different from that on the request form.

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