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ESTIMATION OF DAILY LEAD UPTAKE IN CHILDREN AND RESULTING END-OF-MONTH BLOOD LEAD LEVELS

by

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SECTION 1

INTRODUCTION

Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) is responsible for establishing National Ambient Air Quality Standards (NAAQS's) and for reviewing them periodically to determine their adequacies on the basis of recent experience and research. In view of these responsibilities, the Strategies and Air Standards Division (SASD) of the Office of Air Quality Planning and Standards (OAQPS) is currently assessing health risks associated with alternative NAAQS's for lead. A staff paper[1] prepared by SASD describes a model for estimating lead uptake in children based on estimates of lead concentrations in air, food, and dirt; on estimates of the quantities of air, food, and dirt consumed by children; and estimates of the absorption of lead by the lungs and gut. PEI Associates, Inc. (PEI), has written a computer program, Multiyear Lead Uptake, which implements the SASD lead uptake model. The program provides daily lead uptake estimates for children in user-specified census tracts which may or may not be impacted by emissions from lead point sources. Children are grouped into cohorts according to age in a user-specified base year. The lead uptake estimates are month-specific and span the period from the birth of each group through the base year.

Multiyear Lead Uptake creates an output file which can be directly accessed by a second PEI program, Biokinetics, which determines end-of-the-month blood lead levels for each cohort from birth through the base year. This program is based on a four-compartment metabolic model developed by Harley and Kneip[2] which calculates lead concentrations in blood and selected organs based on daily lead uptake.

Section 2 of this report provides the formulas used by the Multiyear Lead Uptake Program to estimate lead uptake. The rationale behind these formulas is discussed in the staff paper and in Appendix A. User prompting statements and output format for this program are described in Section 3. Section 4 provides a brief description of the Biokinetics Program; Section 5 describes user prompting statements and program output. The results of a sensitivity analysis to determine the effects of varying input parameter values on program output are discussed in Section 6.

SECTION 2

ESTIMATION OF LEAD UPTAKE

The lead uptake model is intended to be applied to a group of census tracts specified by the user. These census tracts comprise the "study area." Within the study area, the model provides estimates of the daily average lead uptake of specific population cohorts. A cohort is defined as all children with a set of user-defined characteristics that reside in a particular census tract in a specified year and fall into one of seven age groups: 0 to 0.99 year, 1 to 1.99 years, 2 to 2.99 years, 3 to 3.99 years, 4 to 4.99 years, 5 to 5.99 years, and 6 to 6.99 years. Consequently, a study area with 100 census tracts would contain 700 cohorts.

The daily average lead uptake (TDLU) of each member of a particular cohort is assumed to be identical. The value of TDLU is calculated by the expression

$$TDLU = UPLUNG + UPDIET + UPDIRT, \tag{1}$$

where UPLUNG is the daily average lead uptake from the lungs, UPDIET is the daily average lead uptake related to diet, and UPDIRT is the daily average lead uptake related to dirt ingestion. Sections 2.1, 2.2, and 2.3 discuss how UPLUNG, UPDIET, and UPDIRT are estimated.

Table 1 lists the parameters which appear in the lead uptake model and the units in which each should be expressed. Recommended values for many of these variables are presented in Tables 2, 3, and 4 and in the text. A lower bound estimate of TDLU is determined by using only lower bound parameter values in the lead uptake model. An upper bound estimate of TDLU is determined by using only upper bound parameter values. If bounds have not been determined for a variable, a "best estimate" value is used in both cases.

Estimates of TDLU are determined on a monthly basis to reflect the ambient air lead data used by the model. These data consist of 12 monthly

TABLE 1. PARAMETERS IN LEAD UPTAKE MODEL

Parameter	Units	Definition
ABSDIET	a	Fraction of ingested diet-related lead which is absorbed by gut
ABSDIRT	a	Fraction of ingested dirt-related lead which is absorbed by gut
ABSLUNG	a	Fraction of inhaled lead which is absorbed through the lungs into the bloodstream
BACK	$\mu g/m^3$	Background air lead concentration
CRVAL	$\mu g/m^3$	Critical outdoor air lead concentration
DIRTCONS	g/day	Quantity of dirt consumed
DIRTIN ~~DUSTIN~~	$\mu g/g$	Lead concentration in indoor dust
DIRTST ~~DUSTST~~	$\mu g/g$	Lead concentration in street dust and soil
HOUT	hours/day	Time spent outdoors
INADIET	$\mu g/day$	Lead intake related to atmospheric lead which contaminates diet
INAIR	$\mu g/day$	Lead intake from air
INDIET	$\mu g/day$	Lead intake related to diet
INDIRT	$\mu g/day$	Lead intake from dirt
INMISC	$\mu g/day$	Dietary lead intake related to solder and miscellaneous sources (see text)
IORATIO	a	Ratio of indoor air lead concentration to outdoor air lead concentration
MULT	a	Multiplicative factor for adjusting SOURCEAQ
OUTAQ	$\mu g/m^3$	Outdoor air lead concentration
SOURCEAQ	$\mu g/m^3$	Air lead concentration related to point sources
TDLU	$\mu g/day$	Total daily lead uptake
UPDIET	$\mu g/day$	Lead uptake related to diet
UPDIRT	$\mu g/day$	Lead uptake from dirt
UPLUNG	$\mu g/day$	Lead uptake from lungs
VEHIC	$\mu g/m^3$	Air lead concentration related to motor vehicles
VRESP	m^3/day	Volume of air respired
WAQ	$\mu g/m^3$	Time-weighted air lead concentration
WDIRT	$\mu g/g$	Time-weighted concentration of lead in dirt

[a]Dimensionless.

TABLE 2. ESTIMATES FOR SELECTED PARAMETERS OF LEAD UPTAKE MODEL

Parameter[a]	Location	Bound	Age, years						
			0-0.99	1-1.99	2-2.99	3-3.99	4-4.99	5-5.99	6-6.99
ABSDIET	NA	Lower	0.42[c]	0.42[c]	0.30	0.30	0.30	0.30	0.18
		Upper	0.53[c]	0.53[c]	0.40	0.40	0.40	0.40	0.24
ABSDIRT	NA	b	0.3[c]	0.3	0.3	0.3	0.3	0.3	0.3
ABSLUNG	General	Lower	0.15[c]	0.15[c]	0.15	0.15	0.15	0.15	0.15
		Upper	0.30[c]	0.30[c]	0.30	0.30	0.30	0.30	0.30
	PS[d]	Lower	0.40	0.40	0.35[c]	0.30	0.30	0.30	0.30
		Upper	0.70	0.65	0.60[c]	0.60	0.55	0.55	0.50
DIRTCONS	NA	b	0.1[c]	0.1	0.1	0.1	0.1	0.1	0.1
HOUT	NA	Lower	1.0	1.0	2.0	2.0	2.0	2.0	2.0
		Upper	2.0	3.0	4.0	5.0	5.0	5.0	5.0
IORATIO	General	Lower	0.3[c]	0.3	0.3	0.3	0.3	0.3	0.3
		Upper	0.8[c]	0.8	0.8	0.8	0.8	0.8	0.8
	PS	b	0.3[c]	0.3	0.3	0.3	0.3	0.3	0.3
VRESP	NA	Lower	2.0	3.0	4.0[c]	4.0[c]	5.0	5.0	6.0
		Upper	3.0	5.0	5.0[c]	5.0[c]	7.0	7.0	8.0

[a]Defined in Table 1 and text.

[b]Best estimate. Lower and upper bounds not specified.

[c]Derived directly from lead criteria document.[3] Other values discussed in Appendix A.

[d]PS = near point source.

TABLE 3. YEAR-SPECIFIC ESTIMATES FOR VEHIC, INADIET, AND INMISC PARAMETERS OF LEAD UPTAKE MODEL

Year	VEHIC,[a] $\mu g/m^3$	INADIET,[a] µg/day	INMISC,[a] µg/day
1974	1.28	30.9	19.6
1975	1.24	29.8	19.6
1976	1.20	28.9	19.6
1977	1.15	27.8	19.6
1978	1.04	25.1	19.6
1979	0.86	20.8	19.6
1980	0.53	12.9	17.8
1981	0.48	11.5	16.2
1982	0.42	10.3	14.8
1983	0.37	9.0	12.5
1984	0.27	6.5	12.0
1985	0.18	4.5	11.3
1986	0.02	0.55	10.6
1987	0.02	0.36	10.1
1988	0.02	0.36	9.3
1989	0.01	0.36	8.2
1990	0.01	0.36	7.1
1991	0.01	0.19	6.8
1992	0.01	0.19	6.4
1993	0.01	0.19	6.0
1994	0.01	0.19	5.7
1995	0.01	0.19	5.7
1996	0.01	0.19	5.7
1997	0.01	0.19	5.7

[a]Defined in Table 1 and text.

TABLE 4. LOWER AND UPPER BOUND ESTIMATES FOR LEAD CONCENTRATION IN STREET DUST AND SOIL AND IN INDOOR DUST

		Lead concentration, μg/g			
		Street dust and soil (DIRTST)		Indoor dust (DIRTIN)	
OUTAQ[a]	Bound[b]	General	Near point source	General	Near point source
0	L	5	20	5	20
	U	30	300	30	100
0.2	L	40	80	70	70
	U	150	550	200	400
0.3	L	60	125	100	250
	U	250	600	250	600
0.4	L	100	200	200	300
	U	350	700	300	650
0.5	L	150	350	250	450
	U	450	800	400	700
0.6	L	200	450	300	550
	U	600	1000	500	750
0.7	L	250	550	350	600
	U	650	1150	600	800
0.8	L	300	650	450	650
	U	950	1300	700	900
1.0	L	500	750	525	800
	U	1150	1450	875	1150
1.25	L	600	850	625	1050
	U	1250	1600	1000	1400
1.5	L	700	1000	750	1200
	U	1400	1750	1150	1700
1.75	L	775	1075	800	1350
	U	1450	1950	1200	1900

[a]Outdoor lead concentration, μg/m^3.

[b]L = lower, U = upper.

average (January through December) air lead concentration values for each census tract. Section 2.4 describes a computer program developed by PEI that calculates TDLU values based on an input file consisting of monthly average air lead values spanning a user-specified 7-year exposure period.

2.1 DAILY LEAD UPTAKE FROM LUNGS

The daily average lead uptake from the lungs, UPLUNG, is estimated by the formula

$$UPLUNG = (INAIR)(ABSLUNG) \qquad (2)$$

where INAIR is the average daily intake of air lead by respiration and ABSLUNG is the fraction of respired air lead which is absorbed into the blood stream. Table 2 lists lower and upper bound estimates of ABSLUNG recommended for use with the lead uptake computer program. These estimates appear in the lead staff paper[1] and are based on analyses by Chan and Lippman,[4] Davidson and Osburn,[5] and Phalen et al.[6] ABSLUNG is assumed to increase near point sources where large particles are more prevalent. Consequently, the bounds for point source locations provided in Table 2 are larger than those for general urban locations. A location is assumed to be near a point source whenever the value of SOURCEAQ exceeds a specified critical value (CRVAL). SOURCEAQ is discussed below.

INAIR is estimated by the formula

$$INAIR = (WAQ)(VRESP) \qquad (3)$$

where WAQ is the time-weighted air lead concentration and VRESP is the air volume respired per day. Table 2 lists lower and upper bounds for VRESP for the seven age groups as determined by Ferdo,[7] ICRP,[8] and the Nutrition Foundation.[9]

WAQ is estimated by the formula

$$WAQ = (1/24)[(HOUT)(OUTAQ) + (24 - HOUT)(IORATIO)(OUTAQ)] \qquad (4)$$

where OUTAQ is the average ambient (i.e., outdoor) air lead concentration determined for the census tract for the specified month, and HOUT is the average number of hours spent outdoors per day. IORATIO is the ratio of indoor air lead concentration to outdoor air lead concentration. Table 2 lists values of HOUT by age group as determined by the lead staff[1] and by Pope.[10] The lower and upper bound values for IORATIO are 0.30 and 0.80, respectively, for general urban/rural locations. These are the bounds suggested for indoor microenvironments by the lead criteria document.[3] For locations near point sources where large particles are more prevalent and infiltration into homes is lower, a single "best" estimate of 0.3 is considered appropriate for IORATIO. A location is assumed to be near a point source whenever the value of SOURCEAQ exceeds CRVAL.

OUTAQ is estimated as

$$OUTAQ = (MULT)(SOURCEAQ) + BKGD. \quad (5)$$

SOURCEAQ is the point-source-related component of the ambient lead concentration and is taken from a user-supplied input file specific to the point source(s) being considered, the control scenario hypothesized, and the year. Within this file, SOURCEAQ values are indexed by census tract and month.

MULT is a user-specified multiplicative factor by which SOURCEAQ values can be adjusted to simulate regulatory impacts on point-source emissions. MULT values are year-specific.

BKGD is estimated by the expression

$$BKGD = VEHIC + ADD. \quad (6)$$

VEHIC represents the year-specific contribution of motor vehicles to ambient lead concentrations. Table 3 lists recommended values for VEHIC. ADD is an additive factor which can be used to account for background air lead concentrations not associated with point sources or motor vehicles. ADD values are not year-specific.

In initial applications of the lead uptake model, the value of SOURCEAQ was estimated for the geographic centroid of each census tract by the Industrial Source Complex (ISC) dispersion model using emissions data for lead point sources and local meteorological data. Values of SOURCEAQ were also calculated by the ISC model for receptor points on a radial grid surrounding each point source. Use of these radial grids permitted estimates of SOURCEAQ to be made at receptor points that were closer to the sources than any of the census tract centroids.

Values for MULT were determined by dividing the maximum SOURCEAQ value permitted under a given scenario by the largest "as is" or baseline SOURCEAQ value determined by the ISC. The latter value was always associated with a radial grid receptor point rather than with a geographic centroid. If, for example, the maximum SOURCEAQ value permitted after certain emission controls are implemented is 0.25 $\mu g/m^3$ and the largest baseline SOURCEAQ value determined by ISC is 0.40 $\mu g/m^3$, then MULT = 0.25/0.40 = 0.625. This MULT value is then multiplied by the SOURCEAQ value for each census tract centroid as indicated by Equation 5.

Where appropriate, the impacts on lead exposure of two or more point sources can be considered simultaneously. In these cases, source-specific MULT values can be used to adjust the baseline SOURCEAQ values associated with each source. The resulting source-specific SOURCEAQ values can then be added together to yield a SOURCEAQ value for each census tract representing the combined contribution of all point sources.

2.2 DAILY LEAD UPTAKE RELATED TO DIET

The formula used to estimate UPDIET, the average daily lead uptake related to diet, is

$$\text{UPDIET} = (\text{INDIET})(\text{ABSDIET}) \qquad (7)$$

where INDIET is the average daily intake of lead from the diet and ABSDIET is the fraction of lead consumed which is absorbed through the gut into the bloodstream. Table 2 lists lower and upper bounds for ABSDIET by age group as estimated in the staff paper. INDIET is estimated as

$$\text{INDIET} = \text{INADIET} + \text{INMISC}. \qquad (8)$$

INADIET is the average daily dietary lead intake related to the deposition of atmospheric lead on food surfaces before and during processing. INMISC is the average daily dietary lead intake related to solder in canned foods, to water distribution systems, to soil lead, and to undetermined sources. Table 3 lists year-specific "best estimates" for INADIET and INMISC which reflect the downward trend expected in lead levels found in food and water (Appendix A).

2.3 DAILY LEAD UPTAKE RELATED TO DIRT

The average daily lead uptake related to dirt is estimated as

$$UPDIRT = (INDIRT)(ABSDIRT) \tag{9}$$

where INDIRT is the average daily intake of lead through ingestion of dirt and ABSDIRT is the fraction of ingested lead which is absorbed through the gut into the blood stream. The staff paper estimates ABSDIRT to be 0.30. INDIRT is estimated by the formula

$$INDIRT = (WDIRT)(DIRTCONS) \tag{10}$$

where DIRTCONS is the average quantity of dirt consumed during the period each day when a child is active. This period is assumed to have a duration of 12 hours. WDIRT is the time-weighted lead concentration of the dirt. The staff paper recommends a value of 0.1 g/day for DIRTCONS.[1] WDIRT is estimated by the formula

$$WDIRT = (1/12)[(HOUT)(DIRTST) + (12 - HOUT)(DIRTIN)]. \tag{11}$$

DIRTST is the lead concentration of street dust and soil. DIRTIN is the lead concentration of indoor dust. DIRTST and DIRTIN vary with the ambient air lead concentration (OUTAQ) and reflect whether or not the census tract is considered to be significantly impacted by a point source. Point source impact is assumed to occur if the value of SOURCEAQ exceeds CRVAL. Table 4 lists values of DIRTST and DIRTIN for both nonimpacted and impacted census tracts according to OUTAQ value. These estimates were also obtained from the lead staff paper. Interpolation is used to determine DIRTST and DIRTIN values for OUTAQ values not appearing in the table.

2.4 THE MULTIYEAR LEAD UPTAKE PROGRAM

Sections 2.1 through 2.3 discuss how a TDLU valve is estimated for a single cohort for a given month. The Multiyear Lead Uptake Program calculates month-by-month TDLU values by cohort from birth through a user-specified last year of exposure (LYOE). A separate output table presents estimates for each individual census tract; the individual cohorts within each census tract are identified according to age at the begining of the LYOE. The number of children in each cohort is also indicated. These population data are obtained from an input data file provided by the user. Section 3 discusses the user prompting statements and output format of the Multiyear Uptake Program.

A second program, Biokinetics, uses the month-by-month daily lead uptake estimates from the Multiyear program to calculate end-of-month blood lead concentrations from birth through the LYOE for each cohort. The program implements the model described in Section 4. Section 5 discusses the user prompting statements and output format of the Biokinetics program. Section 6 discusses the results of a sensitivity analysis which evaluated the effects on program output of varying program input values.

SECTION 3

USER PROMPTING AND OUTPUT FORMAT OF THE MULTIYEAR LEAD UPTAKE PROGRAM

Appendix B contains a listing of the Multiyear Lead Uptake Program. Figure 1 lists the series of prompting statements by which the program elicits instructions, parameter values, and labeling information from the user.

The user first enters the name of the study area or principal point source as a means of labeling the area to which the lead uptake estimates apply. Next the user enters the name of the control scenario to which the estimates apply. Responses to these two prompts are used solely to label output tables.

The program next requests whether lower or upper bound estimates are to be determined. The program then asks for information as to which population subgroups are to be included in the uptake estimates. Note that the user can include children from any of six demographic subgroups defined according to presence of lead-based paint in housing (yes or no), housing condition (sound or unsound), and potential for indirect or secondary occupation lead exposure (yes or no). The program also asks if the population age groups are to be further subdivided. If the answer is yes, the user can specify what fraction of each age group should be included in the lead uptake determination. This allows the user to focus on the effects of age-related factors (e.g., pica) on lead uptake.

In response to the next prompting, the user enters the name of a user-created file which contains values for all input parameters other than SOURCEAQ and population. This file is referred to as the "Arrays" file. Section 2 contains recommended values for this file.

The user next enters the name of a user-created file which contains population data for each of the six demographic groups by age group and census tract for the study area under consideration. This file also must list 12 values (January through December) of SOURCEAQ for each census tract. These SOURCEAQ values are the monthly average air lead concentration from sources in

```
+------------------------------------------------------------+
:                                                            :
:                                                            :
:             COHORT MULTI-YEAR LEAD UPTAKE PROGRAM          :
:         Calculates daily uptake by month over lifetime     :
:              For selected children age 0-6 years           :
:                                                            :
:                                                            :
:                          01-06-1986                        :
:             Strategies and Air Standards Division          :
:                                                            :
:                                                            :
+------------------------------------------------------------+

SPECIFICATIONS FOR THIS ANALYSIS:
Enter name of study area or principal point source (in CAPS):
?
Enter name of control scenario to be analyzed (in CAPS):
?
Lower(0) or upper(1) bound estimate?
Press (Shift-PrtSc) to print these specifications.
Then press 'ENTER' to continue:

SPECIFICATIONS CONTINUED:

Which of the following population groups should be included in this
analysis?  If more than one, group populations will be added.
(Note: LPH = lead-painted house;  SOE = secondary occupational exposure)
    Children in LPH\unsound, with SOE (Y/N)?
    Children in LPH\unsound, no SOE (Y/N)?
    Children in LPH\sound, with SOE (Y/N)?
    Children in LPH\sound, no SOE (Y/N)?
    Children in non-LPH, with SOE (Y/N)?
    Children in non-LPH, no SOE (Y/N)?
Should child groups be further subdivided for this analysis(Y/N)?


Press (Shift-PrtSc) to print these specifications.
Then press 'ENTER' to continue:
```

Figure 1. User prompting statements of the Multiyear Lead Uptake Program. (continued)

```
SPECIFICATIONS CONTINUED:

Enter name of input (Arrays) file in DOS format:

Enter name of input (AQ) file in DOS format:
Enter name of output file in DOS format:


Enter last year of exposure (4 digits): 1980
This program uses  a set of 1974-1997 background values for motor vehicles.
Do you want to substitute a set of rural background values (Y/N) ?
    Year  1974 ?
    Year  1975 ?
    Year  1976 ?
    Year  1977 ?
    Year  1978 ?
    Year  1979 ?
    Year  1980 ?
Should background values be used to indicate critical values
    above which point source impact is assumed (Y/N) ?
Enter alternate AQ critical value (ug/cu.m.) above which
    point source impact should be assumed:
    Year  1974 ?
    Year  1975 ?
    Year  1976 ?
    Year  1977 ?
    Year  1978 ?
    Year  1979 ?
    Year  1980 ?
Enter additive background factor (other than vehicles) to adjust AQ:
Enter multiplicative factors to adjust AQ by year:
    Year  1974 ?
    Year  1975 ?
    Year  1976 ?
    Year  1977 ?
    Year  1978 ?
    Year  1979 ?
    Year  1980 ?
 Press  Shift-PrtSc to print these specifications.
 Then press  ENTER to continue:
```

Figure 1. User prompting statements of the Multiyear Lead Uptake Program.

the study area during the base year. Paul has developed a program, MATCH-AQ, which creates this file using population data from the Bureau of Census and dispersion modeling estimates of lead air quality.[11] The program yields separate data sets for 1980 and for each of two future years specified by the user. The user of the lead uptake program specifies which data set to use by entering the appropriate file name in response to a request for the "input POPAQ file." The user also specifies the name of an output file which will serve as input to the Biokinetics program.

The user next enters the last year of the seven-year exposure period for which the program will calculate lead uptake values. The user is then given a choice of 1) having BKGD represent urban locations by incorporating the values of VEHIC listed in Table 3 or 2) specifying an alternative set of BKGD values which better represent rural locations. If the user chooses the latter option, the program requests a value for each year of the exposure period. The program also asks whether the critical value (CRVAL) for each year should equal the BKGD value specified for that year. If the answer is no, the user is asked to specify a CRVAL for each year in the exposure period. The remaining promptings request that the user enter a single value for the additive background factor (ADD) and seven year-specific values for MULT.

SECTION 4

ESTIMATION OF BLOOD LEAD LEVELS

Harley and Kneip have developed an integrated metabolic model which estimates day-by-day blood lead levels based on daily uptake of lead into the bloodstream.[2] The model assumes that most (over 95%) of the lead in the body is contained in four compartments (bone, liver, kidney, and blood) and that lead moves among these compartments in a predictable manner. Figure 2 shows the various lead pathways considered in the Harley-Kneip model. Figure 3 presents the mathematical relationships which the model uses in an iterative manner to estimate the total lead content in each compartment as the body receives varying daily lead inputs. Harley and Kneip have incorporated these relationships into a computer program for estimating blood lead concentrations in children 1 to 6 years of age.[12] PEI has adapted the Harley-Kneip program to accept daily lead uptake values (i.e., TDLU) as estimated for a cohort by the Multiyear Lead Uptake Program. The resulting Biokinetics Program tracks a cohort from birth on January 1 of a user-specified calendar year through the last day of a user-specified calendar year. A year is assumed to contain 12 months of 30 days. The cohort receives the same daily lead uptake for each of the 30 days in a month. This value is the TDLU value estimated for that month by the Multiyear Lead Uptake Model. The Biokinetics Program calculates the resulting blood lead concentration on a daily basis but prints out only end-of-the-month values. Thus, 360 sequential blood lead concentrations are calculated for a given year, but only the 12 end-of-the-month values are actually printed out.

Table 5 lists the parameter values used by Harley and Kneip in their model.[1] These have been incorporated into the Biokinetics Program. Note that many of these values change with the age of the child. Section 5 presents typical output from the Biokinetics Program.

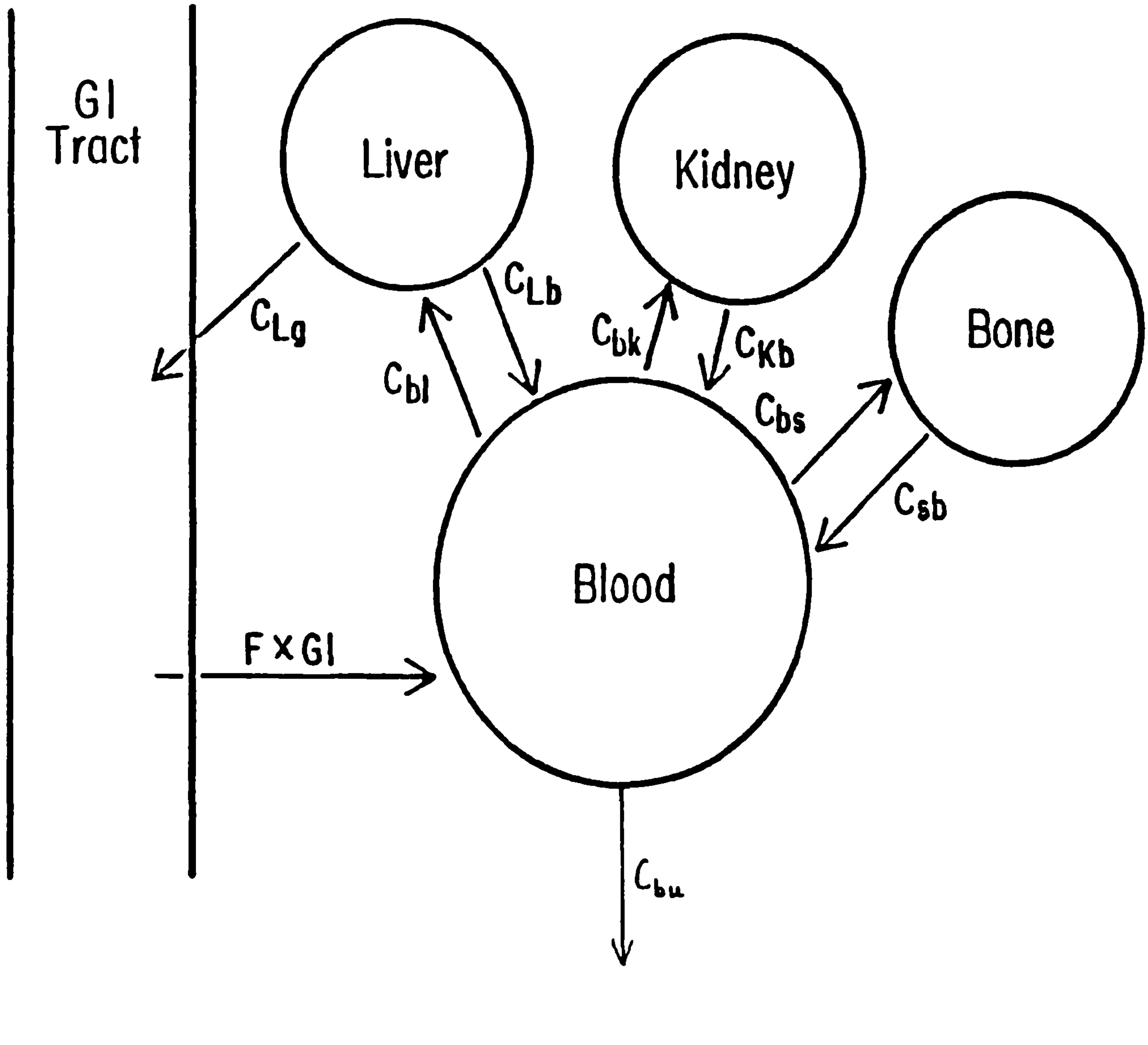

Figure 2. Lead pathways considered in Harley-Kneip integrated metabolic model.[2]

$$dB/dt = P - C_{bs} \times B - C_{bl} \times B - C_{bk} \times B + C_{sb} \times S + C_{lb} \times L + C_{kb} \times K - C_{bu} \times B + F \times C_{lg} \times L$$

$$dS/dt = C_{bs} \times B - C_{sb} \times S$$

$$dL/dt = C_{bl} \times B - C_{lb} \times L - C_{lg} \times L$$

$$dK/dt = C_{bk} \times B - C_{kb} \times K$$

Where P = daily input to blood in ug/day

C_{bs} = blood to skeleton removal rate ($days^{-1}$)

C_{sb} = skeleton to blood removal rate "

C_{bl} = blood to liver removal rate "

C_{lb} = liver to blood removal rate "

C_{bk} = blood to kidney removal rate "

C_{kb} = kidney to blood removal rate "

C_{bu} = blood to urine removal rate "

C_{lg} = liver to gastrointestinal tract removal rate "

F = fractional uptake from gastrointestinal tract to blood

B,S,L,K = total lead content in blood, skeleton, liver, kidney (ug)

The organ burdens are calculated in an iterative manner using the expressions

$$B(t+1)=B(t) + dB/dt$$

$$S(t+1)=S(t) + dS/dt$$

etc.

Figure 3. Harley-Kneip integrated metabolic model for determining lead levels in four body compartments.[2]

TABLE 5. PARAMETER VALUES FOR THE BIOKINETICS PROGRAM

Parameter	Exploration	Age, years						
		0-0.99	1-1.99	2-2.99	3-3.99	4-4.99	5-5.99	6-6.99
C_{bs}	Blood to bone removal rate, days^{-1}	0.300	0.300	0.134	0.134	0.134	0.134	0.134
C_{sb}	Bone to blood removal rate, days^{-1}	2.65×10^{-4}	2.65×10^{-4}	2.65×10^{-4}	2.65×10^{-4}	2.65×10^{-4}	2.65×10^{-4}	2.65×10^{-4}
C_{bl}	Blood to liver removal rate, days^{-1}	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301
C_{lb}	Liver to blood removal rate, days^{-1}	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130
C_{bk}	Blood to kidney removal rate, days^{-1}	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100	0.0100
C_{kb}	Kidney to blood removal rate, days^{-1}	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301	0.0301
C_{bu}	Blood to urine removal rate, days^{-1}	0.0334	0.0334	0.0334	0.0334	0.0334	0.0301	0.0301
C_{lg}	Liver to gastroin-testional tract removal rate, days^{-1}	3	3	5	5	5	10	10
F	Fractional uptake from gastrointestional tract to blood	0.4	0.4	0.3	0.3	0.3	0.3	0.3

SECTION 5

USER PROMPTING AND OUTPUT FORMAT OF THE BIOKINETICS PROGRAM

Appendix C contains a listing of the Biokinetics Program. Figure 4 lists the series of prompting statements by which the program elicits instructions, parameter values, and labeling information from the user.

The user first enters the name of the study area or principal point source as a means of labeling the area to which the program estimates apply. Next the user enters the name of the control scenario to which the estimates apply. Responses to the two prompts are used solely to label output tables.

The program next requests the calendar year which will be the last year of the 7-year exposure period. The user should enter the same year previously specified for the Multiyear Lead Uptake Program run which created the input data file for the Biokinetics Program. The user then enters the name of this file and indicates which estimates (lower or upper bound) the file contains. The last prompting statement asks if the user wants the geometric mean of the 12 end-of-month blood lead values calculated for each cohort's sixth year of exposure.

Appendix C contains printouts for "lower bound" and "upper bound" runs of the program for the study area previously discussed in Section 3. Each printout consists of a separate table for each census tract in the study area and four tables which present results averaged across all census tracts. Values tabulated in the census tract tables are end-of-the-month blood lead concentrations from birth through the last year of the exposure period. The format is similar to that of the Multiyear Lead Uptake Program in that estimates are arranged according to the cohort's age in the last year.

The last two pages of each printout contain the four summary tables. These tables pertain only to those cohorts whose seventh year of life is the last year the 7-year exposure period. (If the last year of the exposure period year is 1980, for example, these would be those children born at the beginning of 1974.) Summary Table 1 presents month-by-month geometric means of the end-of-the-month blood lead concentrations of all cohorts born on January 1 of the

```
+------------------------------------------------------------+
:                                                            :
:                       BIOKINETICS                          :
:                       Version 2.0                          :
:          Calculates end-of-month blood lead                :
:       Concentrations for chidren age 0-6 years             :
:                                                            :
:                                                            :
:                       01-06-1986                           :
:           Strategies and Air Standards Division            :
:                                                            :
+------------------------------------------------------------+

SPECIFICATIONS FOR THIS ANALYSIS:
Enter name of study area or principal point source (in CAPS):
?
Enter name of control scenario to be analyzed (in CAPS):
?
Enter last year of child exposure (4 digits):
PROGRAM ONLY FOR 1980-1997
What type of uptake estimates -- upper(1) or lower(0) bounds?
Do you want the geometric mean blood concentration for each census
tract during the next to last year of exposure(Y/N)?

Inputs complete. Press (Shift-PrtSc) to print specifications.
Then press  ENTER' to continue:


Pause to initialize arrays of data in program...


Begin calculations for each cohort within census tracts:
```

Figure 4. User-prompting statements of the Biokinetics Program.

first year listed in the left-hand column. These values are calculated as follows. Let x_{ijk} be the end-of-the-month blood lead concentration for cohort i in the year j and month k. Then y_{jk}, the blood lead concentration listed in Summary Table 1 for month k of calendar year j, is calculated by the expression

$$y_{jk} = \exp[\Sigma(p_i)(\ln x_{ijk})/\Sigma p_i] \quad (12)$$

where p_i is the number of children in cohort i and the summations include all cohorts in the study area which meet the stipulation stated above. Note that y_{jk} is a population-weighted geometric mean.

Summary Table 2 presents population-weighted geometric means of annual average blood lead levels for the same cohorts considered in Summary Table 1. The geometric mean for year j, y_j, is calculated as

$$y_j = \exp[\Sigma(p_i)(\ln m_{ij})/\Sigma p_i] \quad (13)$$

where m_{ij} is the arithmetic mean of the 12 end-of-the-month blood lead concentration values for cohort i in year j, p_i is the number of children in cohort i, and the summations include all cohorts meeting the previously stated stipulation.

The seven values listed in the right-hand column of Summary Table 3 are calculated as follows. Let h_{ij} be the <u>highest</u> end-of-the-month blood lead concentration for cohort i in year j. Then y_j, the blood lead concentration listed in the right-hand column of Summary Table 3 for calendar year j is calculated by the expression

$$y_j = \exp[\Sigma(p_i)(\ln h_{ij})/\Sigma p_i] \quad (14)$$

where p_i is the number of children in cohort i and the summations include all cohorts in the study area which meet the stipulation stated above. Thus y_j is a population-weighted geometric mean of the highest end-of-month blood lead concentration.

In developing Summary Table 4, the program first calculates a_i, the arithmetic mean of the x_{ij} values for the first four years of a cohort's life, and b_i, the arithmetic mean of the x_{ij} values for the next three years of a cohort's life. The first value listed in the right-hand column of Summary Table 4 is calculated as

$$w_a = \exp[\Sigma(p_i)(\ln a_i)/\Sigma p_i] \; ; \tag{15}$$

the second is calculated as

$$w_b = \exp[\Sigma(p_i)(\ln b_i)/\Sigma p_i] \tag{16}$$

The summations include all cohorts in the study area which meet the stated stipulation. The quantities w_a and w_b are both population-weighted geometric means.

SECTION 6

SENSITIVITY ANALYSES

Multiple runs of the Multiyear Lead Uptake and Biokinetics program were made to assess the effects on blood lead estimates of varying the values assigned to selected input parameters. All runs used the same study area, a set of census tracts surrounding a secondary smelter located in a relatively densely populated area of a U.S. city. The parameters listed in Table 6 were selected for the sensitivity analyses because of their apparently large influence on blood lead estimates relative to that of other parameters. Listed in Table 6 is the initial value used for each parameter, an alternate value substituted for the initial value, and the scenario being analyzed.

TABLE 6. INITIAL AND ALTERNATE PARAMETER VALUES USED IN SENSITIVITY ANALYSES

Parameter(s)	Initial value	Alternate value	Scenario analyzed
DIRTCONS	0.1 g/day	0.2 g/day	Baseline exposure Lower and upper bound runs
INMISC	Year-specific estimates (see Table 3)	See text	Precontrol exposure and post-control exposure (1.0 $\mu g/m^3$ standard) Lower and upper bound runs
DUSTIN	Lower bound estimates[a]	Upper bound estimates[a]	Baseline exposure Lower bound run
DIRTST	Lower bound estimates[a]	Upper bound estimates[a]	Baseline exposure Lower bound run
DUSTIN + DIRTST	Lower bound estimates[a]	Upper bound estimates[a]	Baseline exposure Lower bound run
DUSTIN + DIRTST	Upper bound estimates[a]	Lower bound estimates[a]	Baseline exposure Upper bound run

[a]Lower and upper bound estimates used are values presented in Table 4 for "near point source."

The selection of alternative values for the sensitivity analyses was based on the following considerations:

1. While the estimate of 0.1 g/day for the average daily consumption of dirt in young children is generally accepted (lead staff paper[1] and lead criteria document[3]), it is based on a limited amount of data, and most likely is a conservative value. A doubled value of 0.2 g/day of dirt ingestion was arbitrarily chosen to assess how sensitive the model was to this parameter.

2. INMISC represents the dietary lead intake due to lead from solder in canned foods and water distribution systems, natural sources of lead, indirect sources (i.e., historical accumulations of deposited atmospheric lead), as well as sources of lead that have not yet been determined according to the criteria document. Estimates of INMISC are derived in the lead staff paper[1] from calculations presented in the criteria document, which in turn are based on the most recent available data on mean dietary lead intake (1982-1984), and on projections of future trends in the lead content of canned food and of drinking water by the criteria document and EPA's Office of Drinking Water, respectively. Because these projections involve various assumptions on the economic and technologic feasibility of future controls on lead exposure, it was of interest to test how sensitive the model outputs were to these assumptions. Rather than assume that the use of lead-soldered cans in the canning industry would continue to decline after 1983 (the most recent data of lead solder can usage), it was simply assumed that no further controls would be implemented in the canning industry. As a result, rather than a steady decline in INMISC from 12.7 in 1983 to 5.7 µg/day in 1997, there would be a decrease from 12.7 to 12.0 µg/day in 1997 (due solely to expected improvements in lead drinking water quality).

3. Estimates of the lead concentrations in indoor dust, and in street dust and soil associated with different air lead concentrations were obtained from the lead staff paper[1] and were derived from various studies which measured air lead levels and dust and/or surface soil lead concentrations concurrently. Although the studies sampled a broad spectrum of homes, none of the studies included data from homes with reported lead paint hazards. Given the complex variables involved in the air lead/dust soil lead relationship (e.g., deposition rates, chemical and physical characteristics of the lead particles and soils, topographic and meteorologic conditions, frequency of street washings and precipitation, transport of dust and soil into homes, etc.), it is not surprising that a range of soil and dust lead concentrations are estimated for any given air lead concentration. To test the impact the ranges have on the model outputs, three runs were made. The first used the upper bound value of DUSTIN and lower bound value for DIRTST; the second used the lower bound value of DUSTIN and the upper bound value for DIRST; and the third used upper bound values for both parameters.

In general, the air quality (SOURCEAQ) throughout each census tract is assumed to equal the air quality at the geographic center of the census tract. In some cases, the geographic center may be a significant distance from the population center of a census tract. Air quality at the two points could be significantly different, with the air quality at the population center being considered the more accurate indicator of exposure for the children residing in the census tract. To determine the magnitude of the discrepancy, alternative SOURCEAQ input files were developed using the ISC dispersion model and two radial grids.

A series of runs were made to assess the effect of receptor point location on blood lead estimates. In one run, the SOURCEAQ for each census tract was determined using the geographic centroid of the census tract as the receptor point for the ISC model. In another run, geographic centroids were used for all but the two census tracts closest to the smelter. A radial grid receptor point 1000 m from the smelter was used for the census tract nearest the smelter; a receptor point 2000 m from the smelter was used for the other census tract. These receptor points approximated the locations of the population centroids of the two census tracts. In a third run, radial grid receptor points 500 m from the smelter were used for both census tracts. These locations were assumed to represent residential areas experiencing air lead levels near the maximum levels expected in the two census tracts.

Results of the different sensitivity analyses are given in Table 7. To illustrate the effects of the various adjustments, blood lead levels predicted by the model using parameter values given in Tables 2, 3, and 4 are also shown for different scenarios. As noted previously, all of the sensitivity analyses used the same U.S. secondary lead smelter. The results presented in Table 7 for runs without any adjustments apply to the same smelter.

Based on the results of the sensitivity analyses, the following conclusions can be drawn.

1. Doubling the estimate for the average daily dirt ingestion rate from 0.1 to 0.2 g/day significantly increased the blood lead estimates. The marked sensitivity of the model to this parameter, which is based on a limited amount of data in relation to the other parameters, should be highlighted. Furthermore, none of the analyses completed to date were intended to model children with pica. Although no precise estimates are available, the amount of dirt ingested by children with a high degree of pica is significantly

TABLE 7. RESULTS OF SENSITIVITY ANALYSES

Air lead scenario	Parameter(s) tested (value)	Blood lead levels[a]		
		0-3 years	4-6 years	36th month
Baseline-lower bound	No adjustments	19.4	14.3	19.2
Baseline-upper bound	No adjustments	27.0	21.2	27.1
Baseline-lower bound	DUSTCONS (0.2 g/day)	31.6	23.6	31.9
Baseline-upper bound	DUSTCONS (0.2 g/day)	44.4	35.5	45.4
Baseline-lower bound	DUSTIN (upper bound estimates)	23.3	17.4	23.1
Baseline-lower bound	DIRTST (upper bound estimates)	20.4	15.5	20.6
Baseline-lower bound	DUSTIN + DIRTST (upper bounds)	24.3	18.6	24.5
Baseline-upper bound	DUSTIN + DIRTST (lower bounds)	21.4	15.9	21.3
Baseline-lower bound	Radial grid air quality values[b] substituted for	19.3	14.3	19.1
Baseline-upper bound	geographic centroid values at 1000 or 2000 meters only	26.9	21.1	27.0
Baseline-lower bound	Radial grid air quality values[b] substituted for	19.5	14.4	19.2
Baseline-upper bound	geographic centroid values at 500 meters only	27.1	21.3	27.2
Precontrol-lower bound	No adjustments	5.2	2.4	4.4
Precontrol-upper bound	No adjustments	9.9	5.9	9.7
Precontrol-lower bound	INMISC (canned food lead constant post-1983)	5.3	2.6	4.5
Precontrol-upper bound	INMISC (canned food lead constant post-1983)	10.0	6.3	9.8
Post-control (1.0 μg/m³) - lower bound	No adjustments	1.4	1.1	1.3
Post-control (1.0 μg/m³) - upper bound	No adjustments	3.5	3.4	3.6
Post-control (1.0 μg/m³) - lower bound	INMISC (canned food lead constant post-1983)	2.0	1.6	1
Post-control (1.0 μg/m³) - upper bound	INMISC (canned food lead constant post-1983)	4.4	4.2	4.6

[a]Blood lead levels presented represent average levels of the 7-year cohorts born to the beginning of the time period analyzed (1974-1980, 1983-1989, or 1990-1996), at different periods in their life. These levels are used in the risk assessment as indicators of exposure for estimating the risks associated with alternative lead NAAQS of various health effects.

[b]Blood lead results shown are averages across all census tracts surrounding point source. In contrast to area averages, blood lead levels in individual census tracts that were reanalyzed indicate significant differences from baseline run (see text).

larger than for children who ingest dirt in the course of normal hand-to-mouth behavior, which is what the estimate of 0.1 g/day is intended to represent. It is clear from this analysis that the exposure and blood lead estimates for children with a high degree of pica would be significantly greater compared to those of other children.

2. The use in the model of the upper bounds of the ranges of indoor dust lead concentrations and outdoor soil/dust lead concentrations rather than the lower bounds significantly affects the blood lead estimates of the model. The results further indicate that indoor dust lead exerts a significantly greater impact on exposure than does outdoor soil/dust lead. As Equation 11 indicates, the contribution of DIRTIN to WDIRT is greater than the contribution of DIRTST to WDIRT. It should be emphasized that none of the runs completed to date were intended to model children exposed to significant concentrations of lead in paint. For those children living in homes with lead paint hazards, it is clear that significantly higher lead exposures and blood lead levels would be estimated due to the higher levels of lead in indoor, and possibly, outdoor dust.

3. Using radial grid air quality values for receptors points at 1000 and 2000 meters that approximate the locations of the population centroids of the two closest census tracts, rather than using geographic centroid air quality values for those tracts, did not affect the results significantly. For one of the census tracts (Census Tract A), the geographic centroid of the census tract was actually closer to the source than the population centroid. Assigning radial grid air lead concentrations at 500 meters for the two closest census tracts did not significantly increase the blood lead estimates when averaged across all census tracts surrounding the point source (Table 7). The effects of altered air quality on blood lead estimates for individual census tracts was more evident. For example, an approximate 35 percent increase in blood lead estimates for Census Tract A resulted when the radial grid estimates were used for the upper bound run. For the other census tract, the use of radial grid air quality values rather than geographic centroid values did not significantly increase air lead exposure due to the relatively closer proximity of the geographic centroid to the point source. The resulting blood lead estimates for this census tract are not significantly different. It is possible that for other lead point sources, modeling with radial grid air lead concentrations that approximate the population centroids, rather than geographic centroid values, might better represent actual exposures and result in significant differences in blood lead estimates.

4. The assumption that further reductions in canned food lead levels will not occur in the future noticeably alters the blood lead estimates only for the post-control 1990-1996 scenario. Estimates for the precontrol 1983-1989 time period are not significantly affected. Based on projections in the criteria document, it appears most likely that further controls by can manufacturers will continue.

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APPENDIX A

ESTIMATES FOR SELECTED PARAMETER VALUES

Values for parameters of the lead uptake model given in Tables 2 and 3 of the main text that are not derived directly from the lead staff paper[1] are discussed in this appendix.

1. ABSDIET represents the average fraction of ingested dietary lead that is absorbed through the gastrointestinal tract into the bloodstream. Lead balance studies in infants (Alexander[2] and Ziegler[3]) report GI uptake factors in the range of 42 to 53 percent based on measurements of lead in the diet and excreta. Several studies[4-6] have found that adults absorb a much smaller fraction of ingested dietary lead with measurements ranging between 7 to 20 percent. For the present model, a range of 42 to 53 percent is used for infants up to their third year of life, 18 to 24 percent for children upon reaching their 7th year of life, and proportional, incremental values in intermediate ages.

2. Table 3 describes past and future trends in average daily dietary lead intake (INDIET) for 1974-1997. Year-specific estimates by Battye[7] of the mobile source contribution to ambient lead concentration in urban areas, VEHIC $\mu g/m^3$, are used to estimate INADIET, the average daily lead intake related to atmospheric lead deposition on food surfaces before and during processing. Past trends in lead solder usage in canned foods,[1] anticipated future reductions in lead solder usage, and the anticipated impact of the expected revision of the lead drinking water standard[8] were used to make year-specific estimates of the contribution of these sources to average daily dietary lead intake. The contributions of soil lead and undetermined sources of lead remain constant in estimating average daily dietary lead intake between 1974-1997. The contribution of components of dietary lead intake, with the exception of the INADIET component, are combined to yield year-specific estimates of INMISC.

3. ABSLUNG represents the fraction of inhaled lead that is deposited into and subsequently absorbed through the lungs into the bloodstream. In the staff paper, data on particle size distributions of airborne lead mass, collected from various urban, rural, and industrial areas, are combined with particle respiratory deposition and absorption data to calculate the absorption rate of inhaled lead particles for a 2-year old child living in generalized urban/rural areas (15 to 30%) as well as near stationary lead sources (35 to 60%). Data were obtained from Landrigan et al.,[9] Dorn et al.,[10] Chan and Lippmann,[11] Davidson and Osborn,[12] and Phalen et al.[13]

Age-related differences in deposition efficiencies estimated by Phalen et al. are not large for the relatively small particle diameters that predominate in generalized urban/rural areas. Therefore, the range estimated for a 2-year old is applied to all ages of young children (0 to 7 years) living in those areas. Near point-sources, there is generally a greater fraction of coarse-mode particles (>2.5 μm) in the ambient air. Consequently, the fraction of particle mass that deposit in the lungs of young children and are absorbed is estimated to be larger than that of adults. Particle deposition efficiencies for 5 μm particles were derived from Phalen et al. as a function of age and ventilatory state (e.g., low activity, light exertion) to calculate average daily deposition rates by age:

Age	% deposition at low activity	% deposition at light exertion	Average daily deposition rate
0	80	65	75
1	75	60	70
2	70	55	65
3	65	50	60
4	60	45	55
5	60	45	55
6	55	40	50
18	35	35	35

Average respiratory deposition/absorption rates for different ages living near lead point sources were calculated using the equation

$$[(CRD_5 - ARD_5) \times PbPS_{1.0}] + ARDPS$$

where CRD_5 is the average daily deposition rate of 5 μm particles for a child between 0 and 6 years (50 to 75%, from Phalen et al.[13]); ARD_5 is the average daily deposition rate of 5 μm particles for an 18-year old (35% from Phalen et al.); $PbPS_{1.0}$ is the average percentage of lead particle mass collected near point sources that is comprised of particles that are larger than 1.0 μm in diameter (50 to 70%, from Landrigan et al.[9] and Dorn et al.[10]); and ARDPS is the estimated respiratory deposition rate for adults living near lead point sources (20 to 40%, estimated in the lead staff paper[1]).

The calculated ranges were rounded off to yield the rates listed in Table 2. It should be noted that deposition efficiencies for 5 μm particles were combined with data on the percentage of lead particles larger than 1 μm around point sources to calculate point source area respiratory deposition rates. The available data related to particle size in the published literature do not permit a more direct comparison and calculation.

4. HOUT represents the amount of time spent outdoors. Among young children, this value varies depending on their stage of development (i.e., infant, toddler, preschool), season, geographical location, and family behavior. The values for a 2-year old child in Table 2 were obtained from the lead staff paper.[1] Estimates for other ages were developed by Pope,[14] who analyzed the time spent by children indoors, outdoors, and in motor vehicles, with respect to season and day of week.

5. VRESP, the volume of air respired each day, is dependent on age, body size, lung capacity, altitude, and activity of the child. The lead staff paper[1] estimates a range of 4 to 5 m^3 day for 2- and 3-year old children based on various sources (ICRP,[15] Nutrition Foundation,[16] Phalen et al.[13]). Phalen et al. determined average ventilation rates for males and females, at different activity levels, from birth through age 18 from graphical fits of published tabulated data (Altman and Ditmer[17,18]). The calculations for low activity levels were used to construct the ranges of daily ventilation rates in Table 2 for children 0 to 6 years.

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APPENDIX B

MULTIYEAR LEAD UPTAKE PROGRAM AND SAMPLE OUTPUTS

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LIST
10 REM ***************** COHORT LEAD UPTAKE PROGRAM  ***********************
20 REM
30 REM Arrays accomodate age groups 0-6, years of age 0-6, subgroups 1-6,
40 REM calendar years 1974-97(0-23), upper & lower bounds(0-1), and
50 REM unaffected or affected(0-1) by point source of lead.
60 DIM PFRACT(6), IORATIO(6,1,1), HOUT(6,1)
70 DIM VRESP(6,1), ABSLUNG(6,1,1)
80 DIM ABSDIET(6,1), INDIET(6), INMISC(23)
90 DIM DUST1(11,1,1), DUST2(11,1,1), INADIET(23)
100 DIM AIR(11), OUTAQ(6,12), INAIR(6), BKGD(23), CRALT(6)
110 DIM DIRTCONS(6,1), ABSDIRT(6,1), INDIRT(6)
120 DIM GRP$(6), PREG(6), POP(6), MONTH$(12), MULT(6)
130 TODAY$ = DATE$: LF$ = CHR$(10): CLS: LPRINT CHR$(12)
140 PRINT TAB(12) "+----------------------------------------------------------+"
150 PRINT TAB(12) "|                                                          |"
160 PRINT TAB(12) "|                                                          |"
170 PRINT TAB(12) "|          COHORT MULTI-YEAR LEAD UPTAKE PROGRAM           |"
180 PRINT TAB(12) "|      Calculates daily uptake by month over lifetime      |"
190 PRINT TAB(12) "|            For selected children age 0-6 years           |"
200 PRINT TAB(12) "|                                                          |"
210 PRINT TAB(12) "|                                                          |"
220 PRINT TAB(12) "|" TAB(34) TODAY$ TAB(70) "|"
230 PRINT TAB(12) "|         Strategies and Air Standards Division            |"
240 PRINT TAB(12) "|                                                          |"
250 PRINT TAB(12) "|                                                          |"
260 PRINT TAB(12) "+----------------------------------------------------------+"
270 PRINT LF$:LF$: "SPECIFICATIONS FOR THIS ANALYSIS: "
280 PRINT "Enter name of study area or principal point source (in CAPS): ":
    INPUT SRC$
290 PRINT "Enter name of control scenario to be analyzed (in CAPS): ":
    INPUT CTRL$
300 INPUT "Lower(0) or upper(1) bound estimate? ", BND
310 PRINT "Press (Shift-PrtSc) to print these specifications."
320 INPUT "Then press 'ENTER' to continue: ", C$
330 CLS: PRINT LF$: "SPECIFICATIONS CONTINUED: "
340 PRINT: PRINT "Which of the following population groups should be included in
 this"
350 PRINT "analysis?  If more than one, group populations will be added.
360 PRINT "(Note: LPH = lead-painted house:  SOE = secondary occupational exposu
re)"
370 INPUT "     Children in LPH\unsound, with SOE (Y/N)? ", GRP$(1)
380 INPUT "     Children in LPH\unsound, no SOE (Y/N)? ", GRP$(2)
390 INPUT "     Children in LPH\sound, with SOE (Y/N)? ", GRP$(3)
400 INPUT "     Children in LPH\sound, no SOE (Y/N)? ", GRP$(4)
410 INPUT "     Children in non-LPH, with SOE (Y/N)? ", GRP$(5)
420 INPUT "     Children in non-LPH, no SOE (Y/N)? ", GRP$(6)
430 INPUT "Should child groups be further subdivided for this analysis (Y/N)? ",
    POP$
440 IF POP$ <> "y" AND POP$ <> "Y" THEN GOTO 5?0
450 PRINT " Enter fraction of children in each subgroup, by age:"
460 INPUT "       Age 0 - 0.99: ", PFRACT(0)
470 INPUT "       Age 1 - 1.99: ", PFRACT(1)
480 INPUT "       Age 2 - 2.99: ", PFRACT(2)
490 INPUT "       Age 3 - 3.99: ", PFRACT(3)
500 INPUT "       Age 4 - 4.99: ", PFRACT(4)
510 INPUT "       Age 5 - 5.99: ", PFRACT(5)
520 INPUT "       Age 6 - 6.99: ", PFRACT(6)
530 PRINT LF$:LF$: "Press (Shift-PrtSc) to print these specifications."
540 INPUT "Then press 'ENTER' to continue: ", C$
550 [illegible]
```

```
[illegible] INPUT "Enter name of output file or [illegible]
580 PRINT LF$;LF$;: INPUT "Enter last year of exposure (4 digits): ", YEAR
5[illegible] IF YEAR<1980 OR YEAR>1997 THEN PRINT
    "PROGRAM ONLY FOR YEARS OF EXPOSURE ENDING IN 1980-1997": GOTO 580
600 BYR = 0 : IF YEAR >= 1990 THEN BYR = 1
[illegible] PRINT "This program uses  a set of 1974-1997 background values for motor
1[illegible] es."
620 INPUT "Do you want to substitute a set of rural background values (Y/N) ";
     RURAL$
6[illegible] IF RURAL$ = "N" OR RURAL$= "n" THEN GOTO 680
640 FOR Y = 0 TO 6
6[illegible]      YY = YEAR - 6 + Y: Y2 = YY - 1974
6[illegible]      PRINT "    Year "; YY;: INPUT RURALB: BKGD(Y2) = RURALB
6[illegible] NEXT Y
680 PRINT "Should background values be used to indicate critical values"
[illegible] INPUT "    above which point source impact is assumed (Y/N) "; CV$
[illegible] IF CV$ = "y" OR CV$= "Y" THEN GOTO 720
710 PRINT "Enter alternate AQ critical value (ug/cu.m.) above which ";
    PRINT "    point source impact should be assumed: "
[illegible] FOR Y = 0 TO 6
714      YY = YEAR - 6 + Y
7[illegible]      PRINT "    Year "; YY;: INPUT CRALT(Y)
[illegible] NEXT Y
720 INPUT "Enter additive background factor (other than vehicles) to adjust AQ
[illegible]  ADD
[illegible] PRINT "Enter multiplicative factors to adjust AQ by year: "
740 FOR Y = 0 TO 6
750      YY = YEAR - 6 + Y
7[illegible]      PRINT "    Year "; YY;: INPUT MULT(Y)
[illegible] NEXT Y
780 PRINT "Press (Shift-PrtSc) to print these specifications."
[illegible] INPUT "Then press 'ENTER'to continue: ", C$
[illegible] OPEN FILE3$ FOR INPUT AS #3
[illegible] REM *** Names of months: ***
[illegible] FOR MTH = 1 TO 12
[illegible]   READ MONTH$(MTH)
[illegible] NEXT MTH
[illegible] DATA "JANUARY","FEBRUARY","MARCH","APRIL","MAY","JUNE","JULY","AUGUST","SEPT
[illegible] ER","OCTOBER","NOVEMBER","DECEMBER"
[illegible] REM *** Hours/day spent outdoors ***
[illegible] INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
[illegible] FOR Y = 0 TO 6
[illegible]   FOR BD = 0 TO 1: INPUT #3,HOUT(Y,BD): PRINT HOUT(Y,BD);: NEXT BD
[illegible] NEXT Y
[illegible] REM *** Indoor/outdoor ratios to convert to indoor AQ: ***
[illegible] INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
[illegible] FOR Y = 0 TO 6
[illegible]      FOR PS = 0 TO 1
[illegible]           FOR BD = 0 TO 1
[illegible]                INPUT #3, IORATIO(Y,PS,BD): PRINT IORATIO(Y,PS,BD);
[illegible]           NEXT BD
          NEXT PS
[illegible]      NEXT Y
[illegible] REM *** AQ levels from motor vehicles added to background ***
[illegible] INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
[illegible] FOR CY = 1974 TO 1997
[illegible]      INPUT #3, VEHIC: Y2 = CY-1974
[illegible]      IF RURAL$="N" OR RURAL$="n" THEN BKGD(Y2) = VEHIC + ADD
[illegible]      IF RURAL$="Y" OR RURAL$="y" THEN BKGD(Y2) = BKGD(Y2) + ADD
[illegible]      PRINT BKGD(Y2);
[illegible] NEXT CY
[illegible]
[illegible] INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
[illegible]
```

```
REM *** Absorption in lung ***
INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
FOR Y = 0 TO 6
    FOR PS = 0 TO 1
1270        FOR BD = 0 TO 1
                INPUT #3, ABSLUNG(Y,PS,BD): PRINT ABSLUNG(Y,PS,BD);
            NEXT BD
1260    NEXT PS
NEXT Y
REM *** Pb intake from undetermined sources ***
1310 INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
FOR CY = 0 TO 23
    INPUT #3, INMISC(CY): PRINT INMISC(CY);
1340 NEXT CY
REM *** Pb dietary intake related to air  ***
INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
FOR CY = 0 TO 23
1400    INPUT #3, INADIET(CY): PRINT INADIET(CY);
NEXT CY
REM *** Absorption in gut of lead from diet ***
1450 INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
FOR Y = 0 TO 6
    FOR BD = 0 TO 1
1480        INPUT #3, ABSDIET(Y,BD): PRINT ABSDIET(Y,BD);
1470    NEXT BD
NEXT Y
REM *** Quantity of dirt consumed ***
1540 INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
FOR Y = 0 TO 6
    FOR BD = 0 TO 1
1570        INPUT #3, DIRTCONS(Y,BD): PRINT DIRTCONS(Y,BD);
    NEXT BD
NEXT Y
REM  *** Absorption in gut of Pb from dirt ***
INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
FOR Y = 0 TO 6
    FOR BD = 0 TO 1
        INPUT #3, ABSDIRT(Y,BD): PRINT ABSDIRT(Y,BD);
    NEXT BD
NEXT Y
REM *** Twelve discrete air Pb levels for interpolations ***
INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
FOR PB = 0 TO 11
    INPUT #3, AIR(PB): PRINT AIR(PB);
NEXT PB
REM *** Concentration of Pb in street dust ***
INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
FOR PB = 0 TO 11
  FOR PS = 0 TO 1
    FOR BD = 0 TO 1
      INPUT #3, DUST1(PB,PS,BD): PRINT DUST1(PB,PS,BD);
    NEXT BD
  NEXT PS
NEXT PB
REM *** Concentration of Pb in indoor dust ***
INPUT #3, ARRAY$: PRINT LF$,LF$,ARRAY$,LF$
FOR PB = 0 TO 11
  FOR PS = 0 TO 1
    FOR BD = 0 TO 1
      INPUT #3, DUST2(PB,PS,BD): PRINT DUST2(PB,PS,BD);
    NEXT BD
  NEXT PS
NEXT PB
```

```
2050 FOR CTRACT = 1 TO 9999
[illegible]    IF EOF(1) THEN GOTO 2510 ELSE GOSUB 2810: REM To get tract data
[illegible]    IF BND = 0 THEN BD$ = "LOWER"
2080    IF BND = 1 THEN BD$ = "UPPER"
[illegible]    TITLE$ = SPC$ + " - " + CTRL$
[illegible]    TL% = 35 - LEN(TITLE$) / 2
2110    FOR B% = 1 TO TL%: TITLE$ = " " + TITLE$: NEXT B%
2120    LPRINT CHR$(12): LPRINT" ": LPRINT" ": LPRINT TITLE$
[illegible]    LPRINT TAB(11) BD$ " BOUND ESTIMATES OF DAILY LEAD UPTAKE BY MONTH"
2140    LPRINT TAB(20) "FOR COHORTS IN CENSUS TRACT "; TRACT$
2150    LPRINT " ": LPRINT" ": LPRINT"==========================================
=  ======================"
[illegible]    LPRINT " Age                              Daily Lead Uptake (ug/day) by Month
2170    LPRINT YEAR " Pop    year        1    2    3    4    5    6    7    8    9   10   11
!
[illegible]    LPRINT"---------------------------------------------------------------
---";
[illegible]    FOR AG = 6 TO 0 STEP -1
[illegible]      LPRINT" ": LPRINT" ": LPRINT USING"###  ": AG:: LPRINT USING"#####":
         POP(AG);
[illegible]      LASTY = 6 - AG
[illegible]      FOR Y = 6 TO LASTY STEP -1
[illegible]        CY = YEAR - 6 + Y: LPRINT" ":: LPRINT TAB(13) CY: "  ";
2240        IY = CY - 1974
[illegible]        IF CV$ = "Y" OR CV$ = "y" THEN CRVAL = BKGD(IY)
[illegible]        IF CV$ = "N" OR CV$ = "n" THEN CRVAL = CRALT(Y)
2260        PRINT #2. "":
[illegible]        PRINT #2. USING"\          \": TRACT$:
[illegible]        PRINT #2. USING"###": AG:
[illegible]        PRINT #2. USING"#####": POP(AG):
[illegible]        PRINT #2. USING"#####  ": CY:
[illegible]        FOR MO = 1 TO 12
[illegible]          IF(OUTAQ(Y.MO) > CRVAL) THEN PS = 1 ELSE PS = 0
[illegible]          GOSUB 2560: REM  *** Dust Interpolations ****
[illegible]          GOSUB 2670: REM  **** Uptake Calculations ****
[illegible]          LPRINT USING "####": TDLU:
[illegible]          PRINT#2. USING "####": TDLU;
[illegible]        NEXT MO
[illegible]      NEXT Y
[illegible]      PRINT #2. " ":
[illegible]    NEXT AG
[illegible]    LPRINT" ": LPRINT" ": LPRINT"========================================
=========================":
[illegible] LPRINT"Cohorts in this table include:"
[illegible] IF GRP$(1) = "." OR GRP$(1) = "/" THEN LPRINT "     LPH unsound. with SOE"
[illegible] IF GRP$(2) = "." OR GRP$(2) = "/" THEN LPRINT "     LPH unsound. no SOE"
[illegible] IF GRP$(3) = "/" OR GRP$(3) = "." THEN LPRINT "     LPH sound. with SOE"
[illegible] IF GRP$(4) = "." OR GRP$(4) = "/" THEN LPRINT "     LPH sound. no SOE"
[illegible] IF GRP$(5) = "." OR GRP$(5) = "/" THEN LPRINT "     non- LPH. with SOE"
[illegible] IF GRP$(6) = "." OR GRP$(6) = "." THEN LPRINT "     non-LPH. no SOE"
[illegible] PG = PG +1: LPRINT TAB(51): "Page":PG
[illegible] NEXT CTRACT: REM *** End of calculations for census tract ***
[illegible] LPRINT CHR$(12):: PRINT LF$:LF$: "Calculations completed."
[illegible] TODAY$ = DATE$: NOW$ = TIME$: LPRINT TODAY$: "  ": NOW$
[illegible] CLOSE #1.#2
[illegible] END
[illegible] REM
[illegible] REM *** Dust Interpolation subroutine ***
[illegible] REM
[illegible] [illegible]
[illegible]
[illegible]
[illegible]
```

```
2630   IF(AQ >= AIR(CHK)) AND (AQ < AIR(CHK+1)) THEN 2640
       ELSE NEXT CHK
2640 DUSTST = DUST1(CHK,PS,BND) + (DUST1(CHK+1,PS,BND) - DUST1(CHK,PS,BND))
              * (AQ-AIR(CHK)) / (AIR(CHK+1)-AIR(CHK))
2650 DUSTIN = DUST2(CHK,PS,BND) + (DUST2(CHK+1,PS,BND) - DUST2(CHK,PS,BND))
              * (AQ-AIR(CHK)) / (AIR(CHK+1)-AIR(CHK))
2660 RETURN
2670 REM
2680 REM *** Uptake Calc. for Calendar Year(CY), Year of Age(AG), & Month(MO) **
2690 REM
2700 IY = CY - 1974: REM Convert cal. year to index year
2710 AQ = OUTAQ(Y,MO)
2720 H  = HOUT(Y,BND): IO = IORATIO(Y,PS,BND)
2730 WAQ      = (H * AQ + (24-H) * IO * AQ) / 24
2740 UPLUNG   = VRESP(Y,BND) * WAQ * ABSLUNG(Y,PS,BND)
2750 UPDIET   = (INMISC(IY) + INADIET(IY)) * ABSDIET(Y,BND)
2760 WDIRT    = (H * DUSTST + (12 - H) * DUSTIN) / 12
2770 UPDIRT   = DIRTCONS(Y,BND) * WDIRT * ABSDIRT(Y,BND)
2780 TDLU     = UPLUNG + UPDIET + UPDIRT
2790 RETURN
2800 REM
2810 REM **************** Census Tract Data Subroutine ***********************
2820 REM
2830 INPUT #1, TRACT$
2840 REM Input population data ***
2850 FOR GP = 1 TO 6: INPUT #1, PREG(GP): NEXT GP: REM ** Data not used
2860 PRINT LF$; "Census tract "; CTRACT "="; TRACT$; "  Child pops:";
2870 FOR AG = 0 TO 6
2880     POP(AG) = 0
2890     INPUT #1, SAME$
2900     IF SAME$<>TRACT$ THEN PRINT LF$; "ERROR IN INPUT FILE. STOP PROGRAM":
         GOTO 2520
2910     FOR GP = 1 TO 6
2920         INPUT #1, GRPPOP
2930         IF GRP$(GP) = "Y" OR GRP$(GP) = "y" THEN POP(AG) = POP(AG) + GRPPOP
2940     NEXT GP
2950     IF POP$ = "Y" OR POP$ = "y" THEN POP(AG) = POP(AG) + PFRACT(AG)
2960     PRINT USING "####"; POP(AG);
2970 NEXT AG
2980 REM Input Air Quality Data ***
2990 FOR MO = 1 TO 12
3000     INPUT #1, AQIN: AQIN = AQIN / 1000
3010     REM Convert nanograms/cu.m. to micrograms/cu.m. on input
3020     FOR Y2 = 6 TO 0 STEP -1
3030         YY = (YEAR-1974) *6 + Y2: REM BKGD(0-35) is for 1974-1979
3040         OUTAQ(Y2,MO) = MULT(Y2) * AQIN + BKGD(YY)
3050     NEXT Y2
3060 NEXT MO
3070 RETURN
```

JULF2 EU/L DUST 1.2/U LOWER 19.??

DAILY PU UPTAKE BY MONTH

1???	FOR	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
~~5~~	~~56~~	~~1980~~	~~29~~	~~29~~	~~29~~	~~29~~	~~29~~	~~30~~	~~29~~	~~29~~	~~29~~	~~28~~	~~29~~	~~29~~
5	56	1979	45	45	45	45	45	46	45	45	45	44	44	45
~~5~~	~~56~~	~~1978~~	~~52~~	~~52~~	~~52~~	~~52~~	~~52~~	~~53~~	~~52~~	~~52~~	~~52~~	~~51~~	~~52~~	~~52~~
5	56	1977	56	56	56	56	56	56	56	56	56	55	55	56
~~5~~	~~56~~	~~1976~~	~~58~~	~~58~~	~~57~~	~~58~~	~~58~~	~~58~~	~~58~~	~~58~~	~~57~~	~~57~~	~~57~~	~~58~~
5	56	1975	65	65	64	65	64	65	64	64	64	63	64	64
~~5~~	~~56~~	~~1974~~	~~67~~	[illegible]	~~66~~	[illegible]	~~66~~	~~67~~	~~66~~	~~66~~	~~66~~	~~65~~	~~66~~	[illegible]
5	75	1980	29	29	29	29	29	30	29	29	29	28	29	29
~~5~~	~~75~~	~~1979~~	~~45~~	~~45~~	~~45~~	~~45~~	~~45~~	~~46~~	~~45~~	~~45~~	~~45~~	~~44~~	~~44~~	~~45~~
5	75	1978	52	52	52	52	52	53	52	52	52	51	52	52
~~5~~	~~75~~	~~1977~~	~~56~~	~~56~~	~~56~~	~~56~~	~~56~~	~~56~~	~~56~~	~~56~~	~~56~~	~~55~~	~~55~~	~~56~~
5	75	1976	58	58	57	58	58	58	58	58	57	57	57	58
~~5~~	~~75~~	~~1975~~	~~65~~	~~65~~	~~64~~	~~65~~	~~64~~	~~65~~	~~64~~	~~64~~	~~64~~	~~63~~	~~64~~	~~64~~
4	75	1980	29	29	29	29	29	30	29	29	29	28	29	29
~~4~~	~~75~~	~~1979~~	~~45~~	~~45~~	~~45~~	~~45~~	~~45~~	~~46~~	~~45~~	~~45~~	~~45~~	~~44~~	~~44~~	~~45~~
4	75	1978	52	52	52	52	52	53	52	52	52	51	52	52
~~4~~	~~75~~	~~1977~~	~~56~~	~~56~~	~~56~~	~~56~~	~~56~~	~~56~~	~~56~~	~~56~~	~~56~~	~~55~~	~~55~~	~~56~~
4	75	1976	59	58	57	58	58	58	58	58	57	57	57	58
~~3~~	~~75~~	~~1980~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	~~29~~	~~29~~	[illegible]	[illegible]	[illegible]
3	75	1979	45	45	45	45	45	46	45	45	45	44	44	45
~~3~~	~~75~~	~~1978~~	~~52~~	~~52~~	~~52~~	~~52~~	~~52~~	~~53~~	~~52~~	~~52~~	~~52~~	~~51~~	~~52~~	~~52~~
3	75	1977	56	56	56	56	56	56	56	56	56	55	55	56
~~2~~	~~1~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	~~29~~	[illegible]	~~29~~	~~29~~	~~29~~	[illegible]	[illegible]	[illegible]
2	1	1979	45	45	45	45	45	45	45	45	45	44	44	45
~~2~~	~~1~~	~~1978~~	~~52~~	~~52~~	~~52~~	~~52~~	~~52~~	~~53~~	~~52~~	~~52~~	~~52~~	~~51~~	~~52~~	~~52~~
1	1	1980	29	29	29	29	29	30	29	29	29	28	29	29
~~1~~	~~1~~	~~1979~~	~~45~~	~~45~~	~~45~~	~~45~~	~~45~~	~~45~~	~~45~~	~~45~~	~~45~~	~~44~~	~~44~~	~~45~~
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] DUST 1,270 [illegible]

DAILY PB UPTAKE BY MONTH

AGE	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
6	35	1980	29	29	29	29	29	29	29	29	29	29	29	29
[illegible]	35	1979	45	45	44	45	44	45	45	45	44	44	45	45
6	33	1978	52	52	51	52	52	52	52	52	52	51	52	52
[illegible]	[illegible]	1977	56	56	55	[illegible]	55	56	56	56	55	55	56	[illegible]
6	36	1976	56	56	57	56	57	56	56	56	57	57	58	57
[illegible]	[illegible]	1975	64	[illegible]	64	64	64	[illegible]	65	[illegible]	64	64	65	64
6	36	1974	66	67	65	66	66	67	67	66	66	65	66	66
5	31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29	29	29	[illegible]	29	29	[illegible]	29
5	31	1979	45	45	44	45	44	45	45	45	44	44	45	45
5	31	1978	52	52	51	52	52	52	52	52	52	51	52	52
5	31	1977	56	56	55	56	55	56	56	56	55	55	56	56
5	31	1976	56	[illegible]	57	56	57	56	56	56	57	57	56	57
5	31	1975	64	65	64	64	64	65	65	65	64	64	65	64
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29	[illegible]	[illegible]	[illegible]	29	[illegible]	[illegible]	[illegible]
4	3?	1979	45	45	44	45	44	45	45	45	44	44	45	45
4	[illegible]	[illegible]	52	52	51	52	52	52	52	52	52	51	52	52
4	[illegible]	1977	56	56	55	56	55	56	56	56	55	55	56	56
4	[illegible]	[illegible]	56	56	57	[illegible]	57	56	56	56	57	57	56	57
[illegible]	[illegible]	[illegible]	29	29	29	29	29	29	29	29	29	29	29	[illegible]
[illegible]	[illegible]	[illegible]	45	45	44	45	44	45	45	45	44	44	45	[illegible]
[illegible]	[illegible]	1978	52	52	51	52	52	52	52	52	52	51	52	52
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	55	[illegible]	56	56	55	55	56	[illegible]
[illegible]	[illegible]	[illegible]	29	[illegible]	[illegible]	29	29	29	29	29	29	[illegible]	29	[illegible]
[illegible]	[illegible]	[illegible]	45	[illegible]	44	[illegible]	44	45	45	45	44	[illegible]	45	[illegible]
[illegible]	[illegible]	1978	52	52	51	52	52	52	52	52	52	51	52	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29	[illegible]	29	29	29	[illegible]	29	[illegible]
[illegible]	[illegible]	1979	45	45	44	45	44	45	45	45	44	44	45	[illegible]
[illegible]	[illegible]	[illegible]	29	[illegible]	29	[illegible]	29	29	[illegible]	[illegible]	29	[illegible]	29	[illegible]

[illegible]
[illegible] LPH, [illegible] 50

GULF2 [illegible]/L DUST 1.2/U LOWER 34.[illegible]

DAILY P UPTAKE BY MONTH

[illegible]	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
[illegible]	53	[illegible]	29	29	3[illegible]	[illegible]	29	3[illegible]	3[illegible]	3[illegible]	29	29	29	[illegible]
6	53	1979	45	45	46	45	45	45	46	45	45	44	44	45
[illegible]	53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	52	[illegible]	[illegible]	52	52	51	51	52
6	53	1977	56	56	57	56	56	56	57	56	56	55	55	56
[illegible]	53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	57	57	[illegible]
6	53	1975	65	65	66	65	65	65	66	65	65	64	64	64
[illegible]	53	1976	[illegible]	[illegible]	67	[illegible]	[illegible]	67	[illegible]	[illegible]	67	[illegible]	[illegible]	[illegible]
5	54	19[illegible]	29	29	3[illegible]	29	29	3[illegible]	3[illegible]	3[illegible]	29	29	29	29
5	[illegible]	[illegible]	45	[illegible]	[illegible]	[illegible]	45	45	[illegible]	[illegible]	45	[illegible]	[illegible]	45
5	54	1978	52	52	53	52	52	53	53	52	52	51	51	52
[illegible]	[illegible]	1977	[illegible]	[illegible]	57	[illegible]	56	56	57	[illegible]	56	55	55	[illegible]
5	54	1976	58	58	59	58	58	58	59	58	58	57	57	57
5	[illegible]	1975	65	[illegible]	[illegible]	[illegible]	65	65	66	[illegible]	65	64	[illegible]	[illegible]
4	73	1980	29	29	3[illegible]	29	29	3[illegible]	3[illegible]	3[illegible]	29	29	29	29
[illegible]	73	197[illegible]	45	45	46	45	45	45	46	45	45	44	44	45
4	73	1978	52	52	53	52	52	53	53	52	52	51	51	52
[illegible]	73	1977	[illegible]	[illegible]	57	[illegible]	[illegible]	[illegible]	57	[illegible]	56	55	55	[illegible]
4	73	1976	58	58	59	58	58	58	59	58	58	57	57	57
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	73	1979	45	45	46	45	45	45	46	45	45	44	44	45
[illegible]	7[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	73	1977	56	56	57	56	56	56	57	56	56	55	55	56
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29	[illegible]	[illegible]	[illegible]	29	[illegible]	29	[illegible]
2	57	1979	45	45	46	45	45	45	46	45	45	44	44	45
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	57	19[illegible]	29	29	3	[illegible]	29	3[illegible]	3	3[illegible]	29	29	29	[illegible]
[illegible]	[illegible]	[illegible]	45	45	46	[illegible]	45	45	46	45	45	44	44	45
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29	[illegible]	[illegible]	[illegible]	29	29	29	[illegible]

[illegible]

GOLF2 [illegible] DOST 1,270 LOWER [illegible]

DAILY PB UPTAKE BY MONTH

AGE	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
6	36	1980	29	29	29	29	30	29	30	3[illegible]	30	29	29	[illegible]
[illegible]	[illegible]	1979	45	4[illegible]	45	45	45	45	46	47	45	44	45	[illegible]
6	36	1978	52	52	52	52	52	52	53	54	53	52	52	53
[illegible]	[illegible]	1977	56	[illegible]	56	[illegible]	56	56	57	57	[illegible]	[illegible]	56	57
6	36	1976	55	55	58	5[illegible]	58	56	58	59	58	57	56	59
[illegible]	[illegible]	1975	[illegible]	[illegible]	65	[illegible]	65	[illegible]	65	[illegible]	65	64	65	[illegible]
6	36	1974	66	66	67	67	67	67	67	66	67	66	66	67
[illegible]	37	1980	[illegible]	[illegible]	29	[illegible]	30	[illegible]	[illegible]	[illegible]	30	29	29	[illegible]
5	37	1979	45	45	45	45	45	45	46	47	45	44	45	46
[illegible]	37	1978	52	52	52	52	52	52	53	54	53	52	52	53
5	37	1977	56	56	56	56	56	56	57	57	56	55	56	57
[illegible]	37	1976	[illegible]	5[illegible]	56	5[illegible]	5[illegible]	[illegible]	5[illegible]	[illegible]	5[illegible]	57	5[illegible]	5[illegible]
5	37	1975	65	65	65	65	65	65	65	66	65	64	65	66
[illegible]	[illegible]	1980	[illegible]	[illegible]	29	[illegible]	30	[illegible]	[illegible]	[illegible]	30	29	29	[illegible]
4	40	1979	45	45	45	45	45	45	46	47	45	44	45	46
[illegible]	[illegible]	1978	52	[illegible]	52	5[illegible]	5[illegible]	5[illegible]	53	54	53	52	5[illegible]	[illegible]
4	4[illegible]	1977	56	56	56	56	56	56	57	57	56	55	56	57
[illegible]	[illegible]	1976	[illegible]	[illegible]	56	[illegible]	5[illegible]	5[illegible]	5[illegible]	[illegible]	5[illegible]	57	5[illegible]	5[illegible]
3	40	19[illegible]	29	29	29	29	30	29	3[illegible]	30	31	29	29	[illegible]
[illegible]	[illegible]	1979	4[illegible]	4[illegible]	45	4[illegible]	45	45	46	47	45	44	45	4[illegible]
3	40	1978	52	5[illegible]	52	52	52	52	53	54	53	52	52	53
[illegible]	[illegible]	1977	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	57	57	[illegible]	[illegible]	[illegible]	57
2	41	[illegible]	29	29	29	29	30	29	3[illegible]	30	3[illegible]	29	29	[illegible]
[illegible]	41	1979	4[illegible]	4[illegible]	45	[illegible]	45	45	46	47	45	44	4[illegible]	[illegible]
2	41	197[illegible]	52	52	52	5[illegible]	52	52	53	54	53	52	5[illegible]	[illegible]
[illegible]	41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	41	[illegible]	4[illegible]	4[illegible]	4[illegible]	4[illegible]	45	4[illegible]	4[illegible]	47	45	44	4[illegible]	[illegible]
[illegible]	[illegible]	1[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	30	29	[illegible]	[illegible]	[illegible]	29	29	[illegible]

[illegible]
[illegible]-LPH, [illegible] SOP

GULF2 [illegible]/L DUST 1.2/U LOWER 36.[illegible]

[illegible]	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
6	64	1979	47	45	46	47	46	47	46	47	47	44	47	47
6	64	1977	59	57	56	55	56	58	59	57	57	55	58	57
6	64	1975	67	65	65	67	65	67	63	66	67	64	67	[illegible]
5	62	1980	31	30	30	31	30	31	31	32	30	29	31	30
5	62	1978	54	53	53	54	53	54	55	55	54	52	54	54
5	62	1976	60	59	58	60	58	60	61	61	60	57	60	60
4	64	1980	31	30	30	31	30	31	31	32	30	29	31	30
4	64	1978	54	53	53	54	53	54	55	55	54	52	54	54
4	64	1976	60	59	58	60	58	60	61	61	60	57	60	60
[illegible]	64	1979	47	46	46	47	46	47	46	47	47	44	47	47
[illegible]	64	1977	58	57	56	56	56	58	57	57	57	55	56	57
[illegible]	62	1979	47	46	46	47	46	47	46	47	47	44	47	47
[illegible]	62	1979	47	46	46	47	46	47	46	47	47	44	47	47

[illegible]

[illegible] DUST [illegible].270 LOWER [illegible]

AGE	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
3	11	1980	33	31	32	32	32	33	31	35	39	45	39	34
[illegible]	11	1979	[illegible]	47	[illegible]	[illegible]	49	[illegible]	[illegible]	[illegible]	55	[illegible]	55	[illegible]
4	11	1978	56	54	56	55	56	57	55	57	62	65	62	57
[illegible]	11	1977	61	53	[illegible]	[illegible]	[illegible]	61	59	[illegible]	66	71	67	[illegible]
4	11	1976	63	60	62	61	62	63	61	65	68	73	68	64
[illegible]	11	1975	[illegible]	67	[illegible]	[illegible]	[illegible]	[illegible]	66	72	75	79	75	71
4	11	1974	71	69	71	70	71	72	69	74	76	81	76	73
[illegible]	22	[illegible]	33	31	32	32	32	33	31	[illegible]	39	45	[illegible]	34
5	22	1979	50	47	50	49	49	50	48	52	55	61	55	51
[illegible]	22	1978	56	54	56	[illegible]	56	57	55	[illegible]	62	[illegible]	62	57
5	22	1977	61	56	60	59	60	61	59	65	66	71	67	62
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	62	[illegible]	[illegible]	[illegible]	[illegible]	73	[illegible]	[illegible]
5	22	1975	70	67	70	68	69	70	68	72	75	79	75	71
[illegible]	33	[illegible]	33	31	32	32	32	33	31	[illegible]	39	45	[illegible]	[illegible]
4	33	1979	50	47	50	49	49	50	48	52	55	61	55	51
[illegible]	33	[illegible]	[illegible]	[illegible]	56	55	56	57	55	[illegible]	62	[illegible]	62	57
4	33	1977	61	56	60	59	60	61	59	65	65	71	67	62
[illegible]	33	[illegible]	63	[illegible]	62	61	62	63	61	65	[illegible]	73	[illegible]	[illegible]
[illegible]	33	[illegible]	33	31	32	32	32	33	31	35	39	45	39	34
[illegible]	[illegible]	[illegible]	[illegible]	47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	55	61	[illegible]	[illegible]
[illegible]	33	1978	56	54	56	55	56	57	55	57	62	[illegible]	[illegible]	57
[illegible]	33	1977	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	61	[illegible]	[illegible]	[illegible]	71	67	[illegible]
[illegible]	[illegible]	[illegible]	33	31	32	[illegible]	32	33	31	35	39	45	[illegible]	34
[illegible]	[illegible]	[illegible]	[illegible]	47	[illegible]	[illegible]	49	[illegible]	[illegible]	[illegible]	55	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	56	54	56	55	56	57	55	57	62	[illegible]	[illegible]	57
[illegible]	[illegible]	[illegible]	[illegible]	31	[illegible]	[illegible]	72	[illegible]	31	[illegible]	[illegible]	45	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	47	[illegible]	[illegible]	49	[illegible]	[illegible]	[illegible]	[illegible]	61	[illegible]	[illegible]
	[illegible]	[illegible]	33	[illegible]	32	[illegible]	72	[illegible]	[illegible]	35	[illegible]	45	[illegible]	[illegible]

[illegible]

[illegible]

GULFZ [illegible]/L DUST 1,2/U LOWER 58.[illegible]

AGE (YR)	POP	YEAR	DAILY Pb UPTAKE BY MONTH 1	2	3	4	5	6	7	8	9	10	11	12
~~[illegible]~~	~~19~~	~~19[illegible]~~	~~3[illegible]~~	~~2[illegible]~~	~~3[illegible]~~	~~[illegible]~~	~~30~~	~~3[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~30~~	~~2[illegible]~~	~~29~~	~~[illegible]~~
6	19	1979	46	45	46	46	46	46	46	46	46	45	45	47
~~[illegible]~~	~~19~~	~~1978~~	~~53~~	~~52~~	~~53~~	~~5[illegible]~~	~~53~~	~~53~~	~~53~~	~~53~~	~~53~~	~~52~~	~~52~~	~~54~~
6	19	1977	57	56	57	56	56	57	57	57	57	56	56	5[illegible]
~~6~~	~~19~~	~~1976~~	~~59~~	~~5[illegible]~~	~~59~~	~~5[illegible]~~	~~58~~	~~5[illegible]~~	~~59~~	~~5[illegible]~~	~~59~~	~~5[illegible]~~	~~5[illegible]~~	~~6[illegible]~~
6	19	1975	66	65	65	65	65	66	66	66	66	64	65	67
~~[illegible]~~	~~19~~	~~1974~~	~~[illegible]~~	~~67~~	~~67~~	~~67~~	~~67~~	~~67~~	~~67~~	~~6[illegible]~~	~~6[illegible]~~	~~[illegible]~~	~~67~~	~~[illegible]~~
5	23	1980	33	29	3[illegible]	3[illegible]	30	3[illegible]	33	3[illegible]	30	29	29	3[illegible]
~~5~~	~~23~~	~~1979~~	~~46~~	~~45~~	~~46~~	~~4[illegible]~~	~~46~~	~~4[illegible]~~	~~46~~	~~4[illegible]~~	~~46~~	~~45~~	~~45~~	~~47~~
5	23	1978	53	52	53	53	53	53	53	53	53	52	52	54
~~5~~	~~23~~	~~1977~~	~~57~~	~~5[illegible]~~	~~57~~	~~5[illegible]~~	~~5[illegible]~~	~~57~~	~~57~~	~~5[illegible]~~	~~57~~	~~56~~	~~56~~	~~5[illegible]~~
5	23	1976	59	5[illegible]	59	5[illegible]	58	59	59	59	59	56	56	6[illegible]
~~5~~	~~23~~	~~1975~~	~~66~~	~~65~~	~~65~~	~~65~~	~~65~~	~~66~~	~~66~~	~~66~~	~~66~~	~~64~~	~~65~~	~~67~~
4	16	1980	30	29	3[illegible]	3[illegible]	30	3[illegible]	33	3[illegible]	3[illegible]	29	29	3[illegible]
~~4~~	~~16~~	~~1979~~	~~4[illegible]~~	~~4[illegible]~~	~~4[illegible]~~	~~4[illegible]~~	~~46~~	~~4[illegible]~~	~~46~~	~~4[illegible]~~	~~46~~	~~45~~	~~45~~	~~47~~
4	16	1978	53	53	53	53	53	53	53	53	53	52	52	54
~~4~~	~~16~~	~~1977~~	~~57~~	~~5[illegible]~~	~~57~~	~~5[illegible]~~	~~5[illegible]~~	~~57~~	~~57~~	~~5[illegible]~~	~~57~~	~~56~~	~~56~~	~~5[illegible]~~
4	16	1976	59	56	59	5[illegible]	58	59	59	59	59	56	56	6[illegible]
~~[illegible]~~	~~1[illegible]~~	~~1[illegible]~~	~~3[illegible]~~	~~[illegible]~~	~~3[illegible]~~	~~[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~2[illegible]~~	~~2[illegible]~~	~~[illegible]~~
3	16	1979	46	45	46	46	46	4[illegible]	46	4[illegible]	46	45	45	47
~~3~~	~~16~~	~~1978~~	~~5[illegible]~~	~~5[illegible]~~	~~5[illegible]~~	~~5[illegible]~~	~~53~~	~~5[illegible]~~	~~53~~	~~5[illegible]~~	~~53~~	~~5[illegible]~~	~~5[illegible]~~	~~5[illegible]~~
[illegible]	16	1977	57	56	57	56	56	57	57	57	57	56	56	5[illegible]
~~2~~	~~[illegible]~~	~~1[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~2[illegible]~~	~~2[illegible]~~	~~[illegible]~~
2	7	1979	4[illegible]	4[illegible]	46	4[illegible]	46	46	46	46	45	45	45	47
~~2~~	~~[illegible]~~	~~1978~~	~~5[illegible]~~	~~5[illegible]~~	~~5[illegible]~~	~~5[illegible]~~	~~53~~	~~5[illegible]~~	~~53~~	~~5[illegible]~~	~~53~~	~~52~~	~~5[illegible]~~	~~5[illegible]~~
~~[illegible]~~	~~7~~	~~1[illegible]~~	~~3[illegible]~~	~~2[illegible]~~	~~3[illegible]~~	~~[illegible]~~	~~3[illegible]~~	~~[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~29~~	~~2[illegible]~~	~~[illegible]~~
[illegible]	[illegible]	1979	46	45	46	4[illegible]	46	4[illegible]	46	4[illegible]	46	45	45	47
~~[illegible]~~	~~[illegible]~~	~~1~~	~~[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~3[illegible]~~	~~30~~	~~29~~	~~2[illegible]~~	~~[illegible]~~

[illegible]

GULF2 [illegible] DUST 1,270 LOWER 12[illegible]

DAILY PB UPTAKE BY MONTH

AGE (YRS)	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
6	52	1980	30	29	30	30	29	31	29	29	29	28	28	29
~~6~~	~~52~~	~~1979~~	~~46~~	~~45~~	~~45~~	~~46~~	~~45~~	~~46~~	~~45~~	~~44~~	~~45~~	~~44~~	~~44~~	~~45~~
6	52	1978	53	52	52	53	52	54	52	51	52	51	51	52
~~6~~	~~52~~	~~1977~~	~~57~~	~~56~~	~~56~~	~~57~~	~~56~~	~~58~~	~~56~~	~~55~~	~~56~~	~~55~~	~~55~~	~~56~~
6	52	1976	59	58	58	58	58	60	58	57	57	57	57	[illegible]
~~6~~	~~52~~	~~1975~~	~~66~~	~~65~~	~~65~~	~~65~~	~~64~~	~~67~~	~~64~~	~~64~~	~~64~~	~~63~~	~~63~~	~~65~~
6	52	1974	67	66	67	67	66	69	66	65	66	65	65	67
~~5~~	~~53~~	~~1980~~	~~30~~	~~29~~	~~30~~	~~30~~	~~29~~	~~31~~	~~29~~	~~29~~	~~29~~	~~28~~	~~28~~	~~29~~
5	53	1979	46	45	45	46	45	46	45	44	45	44	44	45
~~5~~	~~53~~	~~1978~~	~~53~~	~~52~~	~~52~~	~~53~~	~~52~~	~~54~~	~~52~~	~~51~~	~~52~~	~~51~~	~~51~~	~~52~~
5	53	1977	57	56	56	57	56	58	56	55	56	55	55	56
~~5~~	~~53~~	~~1976~~	~~59~~	~~58~~	~~58~~	~~58~~	~~58~~	~~60~~	~~58~~	~~57~~	~~57~~	~~57~~	~~57~~	[illegible]
5	53	1975	66	65	65	65	64	67	64	64	64	63	63	65
~~4~~	[illegible]	~~1980~~	~~30~~	~~29~~	~~30~~	~~30~~	~~29~~	~~31~~	~~29~~	~~29~~	~~29~~	~~28~~	~~28~~	~~29~~
4	[illegible]	1979	46	45	45	46	45	46	45	44	45	44	44	45
~~4~~	[illegible]	~~1978~~	~~53~~	~~52~~	~~52~~	~~53~~	~~52~~	~~54~~	~~52~~	~~51~~	~~52~~	~~51~~	~~51~~	~~52~~
4	[illegible]	1977	57	56	56	57	56	58	56	55	56	55	55	56
~~4~~	[illegible]	~~1976~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	~~57~~	~~57~~	~~57~~	~~57~~	[illegible]
3	[illegible]	1980	[illegible]	29	30	30	29	31	29	29	29	28	28	[illegible]
~~3~~	[illegible]	~~1979~~	~~46~~	~~45~~	~~45~~	~~46~~	~~45~~	~~46~~	~~45~~	~~44~~	~~45~~	~~44~~	~~44~~	~~45~~
3	[illegible]	1978	53	52	52	53	52	54	52	51	52	51	51	52
~~3~~	[illegible]	~~1977~~	~~57~~	~~56~~	~~56~~	~~57~~	~~56~~	~~58~~	~~56~~	~~55~~	[illegible]	~~55~~	~~55~~	[illegible]
2	[illegible]	1980	[illegible]	29	30	30	29	31	29	29	29	28	28	[illegible]
~~2~~	[illegible]	~~1979~~	~~46~~	~~45~~	~~45~~	~~46~~	~~45~~	~~46~~	~~45~~	~~44~~	~~45~~	~~44~~	~~44~~	~~45~~
~~2~~	[illegible]	[illegible]	~~53~~	~~52~~	~~52~~	~~53~~	~~52~~	~~54~~	~~52~~	~~51~~	~~52~~	~~51~~	~~51~~	~~52~~
1	[illegible]	[illegible]	[illegible]	29	30	30	29	31	29	29	29	28	28	[illegible]
~~1~~	[illegible]	[illegible]	~~46~~	~~45~~	~~45~~	~~46~~	~~45~~	~~46~~	~~45~~	~~44~~	~~45~~	~~44~~	~~44~~	~~45~~
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29	31	29	29	29	[illegible]	[illegible]	[illegible]

[illegible]

JLF2 8J/L DUST 1,2/U LOWER 127.02

?E ?RU	POP	YEAR	DAILY ?? UPTAKE BY MONTH 1	2	3	4	5	6	7	8	9	10	11	12
~~5~~	~~28~~	~~1980~~	~~41~~	~~3?~~	~~34~~	~~36~~	~~31~~	~~35~~	~~31~~	~~30~~	~~32~~	~~29~~	~~29~~	~~36~~
5	28	1979	57	55	51	53	47	52	47	47	50	44	45	52
~~5~~	~~28~~	~~1978~~	~~54~~	~~60~~	~~58~~	~~60~~	~~54~~	~~55~~	~~54~~	~~54~~	~~56~~	~~51~~	~~52~~	~~59~~
5	28	1977	68	67	62	64	58	63	58	57	60	55	56	64
~~5~~	~~28~~	~~1976~~	[illegible]	[illegible]	~~64~~	[illegible]	[illegible]	~~65~~	[illegible]	[illegible]	~~62~~	~~57~~	~~58~~	[illegible]
5	28	1975	76	75	72	73	67	72	67	66	70	64	64	73
~~5~~	~~28~~	~~1974~~	~~77~~	~~76~~	~~73~~	~~74~~	~~69~~	~~73~~	~~69~~	[illegible]	~~71~~	[illegible]	[illegible]	~~74~~
5	57	1980	41	39	34	36	31	35	31	30	32	29	29	36
~~5~~	~~57~~	~~1979~~	~~57~~	~~55~~	~~51~~	~~53~~	~~47~~	~~52~~	~~47~~	~~47~~	~~50~~	~~44~~	~~45~~	~~52~~
5	57	1978	54	60	58	60	54	55	54	54	56	51	52	59
~~5~~	~~57~~	~~1977~~	~~68~~	~~67~~	~~62~~	~~64~~	~~58~~	~~63~~	~~58~~	~~57~~	~~60~~	~~55~~	~~56~~	~~64~~
5	57	1976	59	68	64	66	60	65	60	60	62	57	58	66
~~5~~	~~57~~	~~1975~~	~~76~~	~~75~~	~~72~~	~~73~~	~~67~~	~~72~~	~~67~~	~~66~~	~~70~~	~~64~~	~~64~~	~~73~~
4	21	1980	41	39	34	36	31	35	31	30	32	29	29	36
~~4~~	~~21~~	~~1979~~	~~57~~	~~55~~	~~51~~	~~53~~	~~47~~	~~52~~	~~47~~	~~47~~	~~50~~	~~44~~	~~45~~	~~52~~
4	21	1978	54	60	58	60	54	55	54	54	56	51	52	59
~~4~~	~~21~~	~~1977~~	[illegible]	~~67~~	~~62~~	[illegible]	~~58~~	[illegible]	~~58~~	~~57~~	[illegible]	~~55~~	~~56~~	~~64~~
4	21	1976	59	6?	64	66	60	65	60	60	62	57	56	66
~~3~~	~~21~~	~~1980~~	~~41~~	[illegible]	~~34~~	~~36~~	~~31~~	~~35~~	~~31~~	~~30~~	~~32~~	[illegible]	[illegible]	[illegible]
3	21	1979	57	55	51	53	47	52	47	47	50	44	45	52
~~3~~	~~21~~	~~1978~~	~~54~~	[illegible]	[illegible]	[illegible]	~~54~~	~~55~~	~~54~~	~~54~~	~~56~~	~~51~~	~~52~~	[illegible]
3	21	1977	68	67	62	64	58	63	58	57	60	55	56	64
[illegible]	[illegible]	[illegible]	~~41~~	[illegible]	~~34~~	[illegible]	~~31~~	~~35~~	[illegible]	[illegible]	~~32~~	~~29~~	[illegible]	
[illegible]	[illegible]	[illegible]	~~57~~	~~55~~	~~51~~	~~53~~	~~47~~	~~52~~	~~47~~	~~47~~	~~50~~	~~44~~	~~45~~	~~52~~
2	37	1978	54	60	58	60	54	55	54	54	56	51	52	59
[illegible]	~~37~~	[illegible]	~~41~~	~~39~~	~~34~~	~~36~~	~~31~~	~~35~~	~~31~~	~~30~~	~~32~~	~~29~~	~~29~~	~~36~~
1	37	1979	57	55	51	53	47	52	47	47	50	44	45	52
	~~27~~	[illegible]	~~41~~	[illegible]	~~34~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	

[illegible]

GCLP2 [illegible] DUST [illegible],270 LOWER [illegible]

DAILY PB UPTAKE BY MONTH

AGE	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
6	69	1980	31	31	31	30	30	33	30	29	31	30	30	31
6	69	1979	48	47	48	47	46	50	45	45	47	46	46	45
6	69	1978	54	54	55	53	53	57	52	52	54	53	53	55
6	69	1977	[illegible]	[illegible]	59	57	57	61	56	56	56	56	57	59
6	69	1976	61	60	61	59	59	63	58	56	60	58	59	61
6	69	1975	67	67	68	[illegible]	66	72	65	65	67	65	66	[illegible]
6	69	1974	69	68	69	68	67	72	67	68	69	67	67	69
5	39	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	39	1979	48	47	48	47	46	50	45	45	47	46	46	45
5	39	1978	54	54	55	53	53	57	52	52	54	53	53	55
5	39	1977	55	56	59	57	57	61	56	56	56	56	57	59
5	39	[illegible]	[illegible]	[illegible]	61	[illegible]	59	63	58	[illegible]	[illegible]	[illegible]	[illegible]	61
5	39	1975	67	67	68	66	66	72	65	65	67	65	66	68
4	47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	29	31	[illegible]	[illegible]	[illegible]
4	47	1979	48	47	48	47	46	50	45	45	47	46	46	45
4	47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	57	[illegible]	[illegible]	54	[illegible]	[illegible]	[illegible]
4	47	1977	55	55	59	57	57	61	56	56	58	56	57	59
4	47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	59	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	47	1980	31	31	31	[illegible]	30	33	[illegible]	29	31	[illegible]	[illegible]	31
[illegible]	47	1979	[illegible]	47	[illegible]	47	[illegible]	[illegible]	45	45	47	[illegible]	46	[illegible]
3	47	1978	54	54	55	53	53	57	52	52	54	53	53	55
[illegible]	47	1977	[illegible]	[illegible]	[illegible]	57	57	61	[illegible]	[illegible]	[illegible]	[illegible]	57	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	39	1979	48	47	48	47	46	50	45	45	47	46	46	[illegible]
2	39	[illegible]	54	54	55	[illegible]	53	57	[illegible]	52	54	[illegible]	[illegible]	[illegible]
1	39	[illegible]	31	[illegible]	31	[illegible]	30	[illegible]	[illegible]	29	31	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	47	[illegible]	47	[illegible]	[illegible]	[illegible]	[illegible]	47	[illegible]	[illegible]	[illegible]
	39	[illegible]	31	31	31	[illegible]	[illegible]	33	[illegible]	29	31	[illegible]	[illegible]	[illegible]

[illegible]
[illegible] S0

? LF2 8.0/L DUST 1.2/U LOWER 159.02

DAILY PU UPTAKE BY MONTH

AGE (YR)	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
~~6~~	~~233~~	~~1980~~	~~29~~	[illegible]	[illegible]	~~29~~	~~30~~	~~29~~	~~29~~	~~29~~	~~30~~	~~30~~	~~31~~	~~30~~
6	233	1979	45	45	46	44	46	45	45	44	46	46	47	46
~~6~~	~~233~~	~~1978~~	~~52~~	~~53~~	~~53~~	~~52~~	~~53~~	~~52~~	~~52~~	~~51~~	~~53~~	~~53~~	~~54~~	~~53~~
6	233	1977	56	56	57	56	57	56	56	55	57	57	58	57
~~6~~	~~233~~	~~1976~~	~~58~~	~~58~~	~~59~~	~~57~~	~~59~~	~~58~~	~~57~~	~~57~~	~~58~~	~~59~~	~~60~~	~~59~~
6	233	1975	65	65	66	64	66	65	64	64	65	66	67	66
~~6~~	~~233~~	~~1974~~	~~67~~	~~67~~	~~67~~	~~65~~	~~67~~	~~66~~	~~66~~	~~65~~	~~67~~	~~67~~	[illegible]	~~67~~
5	176	1980	29	30	30	29	30	29	29	29	30	30	31	30
~~5~~	~~176~~	~~1979~~	~~45~~	~~45~~	~~46~~	~~44~~	~~46~~	~~45~~	~~45~~	~~44~~	~~46~~	~~46~~	~~47~~	~~46~~
5	176	1978	52	53	53	52	53	52	52	51	53	53	54	53
~~5~~	~~176~~	~~1977~~	~~56~~	~~56~~	~~57~~	~~56~~	~~57~~	~~56~~	~~56~~	~~55~~	~~57~~	~~57~~	[illegible]	[illegible]
5	176	1976	58	58	59	57	59	58	57	57	58	59	60	59
~~5~~	~~176~~	~~1975~~	~~65~~	~~65~~	~~66~~	~~64~~	~~66~~	~~65~~	~~64~~	~~64~~	~~65~~	~~66~~	~~67~~	~~66~~
4	175	1980	29	30	30	29	30	29	29	29	30	30	31	30
~~4~~	~~175~~	~~1979~~	~~45~~	~~45~~	~~46~~	~~44~~	~~46~~	~~45~~	~~45~~	~~44~~	~~46~~	~~46~~	~~47~~	~~46~~
4	175	1978	52	53	53	52	53	52	52	51	53	53	54	53
~~4~~	~~175~~	~~1977~~	~~56~~	~~56~~	~~57~~	~~56~~	~~57~~	~~56~~	~~56~~	~~55~~	~~57~~	~~57~~	~~58~~	~~57~~
4	175	1976	58	58	59	57	59	58	57	57	58	59	60	59
~~3~~	~~175~~	~~1980~~	~~29~~	~~30~~	~~30~~	~~29~~	~~30~~	~~29~~	~~29~~	~~29~~	~~30~~	~~30~~	~~31~~	~~30~~
3	175	1979	45	45	46	44	46	45	45	44	46	46	47	46
~~3~~	~~175~~	~~1978~~	~~52~~	~~53~~	~~53~~	~~52~~	~~53~~	~~52~~	~~52~~	~~51~~	~~53~~	~~53~~	~~54~~	~~53~~
3	175	1977	56	56	57	56	57	56	56	55	57	57	58	57
2	175	1980	29	30	30	29	30	29	29	29	30	30	31	[illegible]
~~2~~	~~175~~	~~1979~~	~~45~~	~~45~~	~~45~~	~~44~~	~~46~~	~~45~~	~~45~~	~~44~~	~~46~~	~~46~~	~~47~~	~~46~~
2	175	1978	52	53	53	52	53	52	52	51	53	53	54	53
~~1~~	~~175~~	~~1980~~	~~29~~	[illegible]	[illegible]	~~29~~	~~30~~	~~29~~	~~29~~	~~29~~	~~30~~	[illegible]	~~31~~	[illegible]
1	175	1979	45	45	46	44	46	45	45	44	46	46	47	46
~~0~~	~~175~~	~~1980~~	~~29~~	[illegible]	[illegible]	~~29~~	~~30~~	~~29~~	~~29~~	~~29~~	~~30~~	[illegible]	~~31~~	[illegible]

L-PVS.0 ...

APPENDIX C

BIOKINETICS PROGRAM
AND SAMPLE OUTPUTS

```
10 REM ***************** BIOKINETICS Version 2 ***************************
20 REM Calculate lead  organ burdens for continuous exposure of cohorts.
30 REM Program adapted from Dr. N. Harley, NYU School of Medicine, 12/85.
40 DIM CBLBO(84),CBOBL(84),SCALE(84),FACTOR(84)
50 DIM GU(6),CLIGUT(6)
60 DIM TB(6,84),TC(84),TBO(84),TL(84),TK(84),WT(84)
70 DIM CBLUR(84),WTB(84),WTBO(84),GI(84),CLIGU(84),WTFAC(84)
80 DIM UPTAKE(6,12), HIGH6(260,6), SUM12M(6), SUMYR(6), SUMMO(6,12)
90 DIM CGROUP(6), CPOP(6), SUMHI(6), HIGHPB(260,6), GEOM(6)
100 DIM TRAVGQ(6), TRAVG6(6), TRLVL36(6)
110 TODAY$ = DATE$: LF$ = CHR$(10): LPRINT CHR$(12): CLS
120 PRINT TAB(12) "+--------------------------------------------------------+"
130 PRINT TAB(12) "|                                                        |"
140 PRINT TAB(12) "|                      BIOKINETICS                       |"
150 PRINT TAB(12) "|                      Version 2.0                       |"
160 PRINT TAB(12) "|         Calculates end-of-month blood lead             |"
170 PRINT TAB(12) "|      Concentrations for chidren age 0-6 years          |"
180 PRINT TAB(12) "|                                                        |"
190 PRINT TAB(12) "|                                                        |"
200 PRINT TAB(12) "|" TAB(33) TODAY$ TAB(70) "|"
210 PRINT TAB(12) "|         Strategies and Air Standards Division          |"
220 PRINT TAB(12) "|                                                        |"
230 PRINT TAB(12) "+--------------------------------------------------------+"
240 PRINT LF$;LF$; "SPECIFICATIONS FOR THIS ANALYSIS:"
250 PRINT  "Enter name of study area or principal point source (in CAPS): ":
    INPUT SRC$
260 PRINT "Enter name of control scenario to be analyzed (in CAPS): ":
    INPUT CTRL$
270 INPUT "Enter last year of child exposure (4 digits): ", YEAR
280 IF YEAR<1980 OR YEAR>1997 THEN PRINT "PROGRAM ONLY FOR 1980-1997": GOTO 270
290 INPUT "Enter name of input file in DOS format: ", FILE$
300 INPUT "What type of uptake estimates -- upper(1) or lower(0) bounds"; BND
310 PRINT "Do you want the geometric mean blood concentration for each census
320 INPUT "tract during the next to last year of exposure(Y/N)"; GMU$
330 PRINT LF$: "Inputs complete. Press <Shift-PrtSc> to print specifications."
340 INPUT "Then press <ENTER> to continue: ", C$
350 PRINT LF$;LF$; "Pause to initialize arrays of data in program..."; LF$
360 REM *** urinary excretion half-times
370 DATA 9,9,9,9,9,10,10
380 FOR I%= 0 TO 6: READ SCALE(I%): NEXT I%
390 FOR I%= 1 TO 84
400      K%= (I%-1)\12
410      CBLUR(I%)= LOG(2)/ SCALE(K%)
420 NEXT I%
430 REM *** bone turnover scale
440 DATA 85,85,38,38,38,38,38
450 FOR I%= 0 TO 6: READ FACTOR(I%): NEXT I%
460 FOR I%= 1 TO 84
470      K%= (I%-1)\12
480      CBLBO(I%)= .3*FACTOR(K%)/85
490 NEXT I%
500 REM *** bone removal half-times
510 DATA 1135,1135,1135,1135,1135,1135,1135
520 FOR I%= 0 TO 6: READ FACTOR(I%): NEXT I%
530 FOR I%= 1 TO 84
540      K%= (I%-1)\12
550      CBOBL(I%)= LOG(2)/FACTOR(K%)
560 NEXT I%
570 REM *** GI uptake factors
580 DATA [illegible]
```

```
610 FOR I%= 0 TO 6: READ CLIGUT(I%): NEXT I%
620     FOR I%= 1 TO 84
630         K%= (I%-1)\12
640         CLIGU(I%)= CLIGUT(K%)
650         GI(I%)= GU(K%)
660     NEXT I%
670 REM *** Body weight with age
680 DATA 4.5,6,6.7,7.4,8,8.5,9,9.2,9.6,10,10.4
690 DATA 12,12,12,12,13,13,13,13,14,14,14,14
700 DATA 15,15,15,15,16,16,16,16,17,17,17,17
710 DATA 18,18,18,18,18,18,18,18,18,18,18,18
720 DATA 19,19,19,19,19,19,19,19,19,19,19,19
730 DATA 21,21,21,21,21,21,21,21,21,21,21,21
740 DATA 23,23,23,23,23,23,24,24,24,24,25,25: REM Added line
750 FOR  I%= 1 TO 84
760         READ WT(I%)
770         WTB(I%)= 80*WT(I%)
780 NEXT I%
790 REM *** Use mitchell Ca data and divide by .37 for ash weight
800 DATA 30,40,45,50,55,60,65,75,80,85,92,100
810 DATA 105,105,110,115,120,122,125,130,135,137,140,145
820 DATA 150,151,155,157,160,162,165,167,170,173,175,180
830 DATA 180,182,185,185,188,190,190,192,195,196,198,200
840 DATA 200,203,205,206,207,210,210,213,214,215,217,220
850 DATA 220,221,223,225,226,230,230,231,232,235,236,240
860 DATA 241,243,245,247,250,251,254,255,257,260,262,265: REM Added line
870 FOR I%= 1 TO 84
880         READ WTBO(I%)
890         WTBO(I%)= WTBO(I%)/.37
900 NEXT I%
910 REM ******************************************************************
920 PRINT LF$; "Begin calculations for each cohort within census tracts:"
930 OPEN FILE$ FOR INPUT AS #1
940 FOR CTRACT = 1 TO 9999
950    CT = CTRACT
960    IF EOF(1) THEN GOTO 1140
970    FOR AG = 6 TO 0 STEP -1
980      INPUT #1, BLANK$: REM Blank line precedes age group data.
990      FOR Y = AG TO 0 STEP -1
1000        INPUT #1, TRACT, CGROUP(AG), CPOP(AG), CYEAR
1010        TRACT$ = STR$(TRACT): PRINT LF$;LF$
1020        FOR L= 1 TO 5: IF LEN(TRACT$)<7 THEN TRACT$ = TRACT$+" ": NEXT L
1030        PRINT LF$; TRACT$; CGROUP(AG); CPOP(AG); CYEAR;
1040        FOR MO = 1 TO 12
1050             INPUT #1, UPTAKE(Y,MO)
1060             PRINT UPTAKE(Y,MO);
1070        NEXT MO
1080      NEXT Y
1090      PRINT LF$;LF$;: GOSUB 1190: REM Cohort calc. for age group AG
1100    NEXT AG
1110    PRINT LF$:LF$
1120    GOSUB 1[illegible]00: REM *** Output Table for 1 census tract
1130 NEXT CTRACT
1140 GOSUB 2590: REM *** Output tables required 10/11/85.  ***
1150 NOW$ = TIME$: LPRINT CHR$(12); LF$; LF$; TODAY$; "  "; NOW$
1160 STOP
1170 END
1180 REM
1190 REM ********************** Process One Cohort ******************************
1200 REM
1210 REM  ** Initial values for each cohort:
1220 TMONE = 2.0: DBONE = .
1230 TLIVER = 0:  CLIVER = 0
```

```
1280 CBLKI = LOG(2)/(30*T): CKIBL = LOG(2)/(10*T)
1290 WBL = 5200: WBO = 5000: WLI = 1700: WKI = 300
1300 REM
1310 REM *** Calculations for each month of life ***
1320 AG% = AG
1330 ENDMO = (AG+1)*12
1340 FOR I%= 1 TO ENDMO
1350   YR% = (I%-1)\12: MO% = I% - YR%*12
1360   PRINT "TRACT=";TRACT$; "  AGE GRP=";AG; " YR=";YR%; " MO=";MO%;
1370   INJECT = UPTAKE(YR%.MO%)
1380   PRINT " INJECT="; INJECT; " BLOOD=";
1390   FOR J%= 1 TO 30
1400     REM *** blood ***
1410     DBLOOD = INJECT + (LOG(2)/CLIGU(I%))*TLIVER*GI(I%)
1420     DBLOOD = DBLOOD - CBLBO(I%)*TBLOOD - CBLLI*TBLOOD - CBLKI*TBLOOD
1430     DBLOOD = DBLOOD + CBOBL(I%)*TBONE + CLIBL*TLIVER + CKIBL*TKIDNEY
1440     DBLOOD = DBLOOD - CBLUR(I%)*TBLOOD
1450     TBLOOD = TBLOOD + DBLOOD
1460     REM *** liver ***
1470     DLIVER = CBLLI*TBLOOD - CLIBL*TLIVER - 1/CLIGU(I%)*LOG(2)*TLIVER
1480     TLIVER = TLIVER + DLIVER
1490     REM *** kidney ***
1500     DKIDNEY = CBLKI*TBLOOD - CKIBL*TKIDNEY
1510     TKIDNEY = TKIDNEY + DKIDNEY
1520     REM *** bone ***
1530     DBONE = CBLBO(I%)*TBLOOD - CBOBL(I%)*TBONE
1540     TBONE = TBONE + DBONE
1550   NEXT J%
1560   TB(AG%.I%)= (TBLOOD/ WTB(I%)) * 100: REM Convert ug/ml to ug/dl
1570   PRINT USING "###.##"; TB(AG%.I%)
1580   IF I%=36 THEN TRLVL36(AG) = TB(AG%.I%)
1590   REM ***
1600   IF (GMO$="N" OR GMO$="n") THEN GOTO 1640
1610   GMOYR% = AG% - 1
1620   IF (YR%=GMOYR%) THEN TRSUMO = TRSUMO + TB(AG%.I%)
1630   REM ***
1640   IF (AG  6) THEN GOTO 1700
1650   POPWT = CPOP(AG)*LOG(TB(AG%.I%))
1660   SUMMO(YR%.MO%)  = SUMMO(YR%.MO%) + POPWT
1670   IF (I%=36) THEN SUMM36 = SUMM36 + POPWT
1680   IF (TB(AG%.I%)  HIGH6(CT.YR%)) THEN HIGH6(CT.YR%) = TB(AG%.I%)
1690   SUM12M(YR%) = SUM12M(YR%) + TB(AG%.I%)
1700 NEXT I%
1710 TRAVGO(AG) = TRSUMO/12: TRSUMO = 0: REM reset for next census tract
1720 PRINT AG; " TRAVGO(AG)="; TRAVGO(AG)
1730 REM *** Geom. means for 7-year cohorts (AG=6)
1740 IF (AG  6) THEN GOTO 1880
1750 FOR Y2=0 TO 6
1760     SUMHI(Y2) = SUMHI(Y2) + CPOP(AG)*LOG(HIGH6(CT.Y2))
1770     YEARAVG   = SUM12M(Y2)/12: SUM12M(Y2) = 0: REM Reset ***
1780     SUMYR(Y2) = SUMYR(Y2) + CPOP(AG)*LOG(YEARAVG)
1790     TRAVG6(Y2) = YEARAVG
1800 NEXT Y2
1810 TOT6 = TOT6 + CPOP(AG)
1820 SUM = 0
1830 FOR Y2=0 TO 3: SUM = SUM  + HIGH6(CT.Y2): NEXT Y2
1840 SUMMA = SUMMA + CPOP(AG)*LOG(SUM/4): REM sum/4 = avg
1850 SUM = 0
1860 FOR Y2=4 TO 6: SUM = SUM  + HIGH6(CT.Y2): NEXT Y2
1870 SUMMB = SUMMB + CPOP(AG)*LOG(SUM/3): REM sum/3 = avg
1880 RETURN
```

```
1950 TITLE$ = SRC$ + " " + ...
1940 TL% = 35 - LEN(TITLE$) / 2
   0 FOR B% = 1 TO TL%: TITLE$ = " " + TITLE$: NEXT B%
1960 LPRINT CHR$(12); LF$; LF$; TITLE$
1970 LPRINT TAB(13) BD$; " BOUND ESTIMATES OF END-OF-MONTH BLOOD LEAD "
   0 LPRINT TAB(13) "CONCENTRATIONS FOR COHORTS IN CENSUS TRACT"; TRACT$
   0 LPRINT LF$; "==========================================================
=======" 
   0 LPRINT " Age                     End-of-Month Blood Lead Concentration (ug/dl

2010 LPRINT YEAR; " Pop    Year        1    2    3    4    5    6    7    8    9   10   11   1
-
   0 LPRINT"------------------------------------------------------------------
- ;
2070 FOR AG = 6 TO 0 STEP -1
   0   LPRINT LF$;: LPRINT USING"###  #####"; CGROUP(AG), CPOP(AG);
 050   FOR Y = 0 TO AG
2060     YY = YEAR -AG + Y: LPRINT TAB(13) YY; "   ";
   0     FOR MO = 1 TO 12
  30          I = Y*12 + MO
2090          LPRINT USING "### "; TB(AG,I);
   0          IF YY <> YEAR THEN GOTO 2120
   0          IF TB(AG,I) > HIGHPB(CT,AG) THEN HIGHPB(CT,AG) = TB(AG,I)
2120     NEXT MO
2130   NEXT Y
   0 NEXT AG
2150 LPRINT LF$; "==========================================================
=======" 
   0 TRPOP = 0
  70 FOR AG = 0 TO 6: TRPOP = TRPOP + CPOP(AG): NEXT AG
2180 REM *** Donna Sledge option:
   0 IF (GMO$="N" OR GMO$="n") THEN GOTO 2280
   0 TRPOPQ = TRPOP - CPOP(0): REM age 0 not born in next-to-last year.
2210 FOR AG = 1 TO 6
2220   LOGAVG = LOG(TRAVGQ(AG))
  30   WTSUMQ = WTSUMQ + CPOP(AG) * LOGAVG
2240 NEXT AG
2250 GEOMQ = EXP(WTSUMQ/TRPOPQ): WTSUMQ = 0: REM Reset for next census tract
   0 LPRINT "Population-Weighted Geometric Mean Conc. during"; (YEAR-1); " = ";
  70 LPRINT USING "###.#"; GEOMQ;: LPRINT " ug/dl."
2280 REM *** Jeff Cohen footnote:
   0 TRSUM36=0: TRPOP36=0
  00 FOR AG=2 TO 5
2310   TRPOP36 = TRPOP36 + CPOP(AG)
   0   TRSUM36 = TRSUM36 + CPOP(AG) * LOG(TRLVL36(AG))
   0 NEXT AG
2340 TRGM36 = EXP(TRSUM36/TRPOP36)
2350 LPRINT "Population-Weighted Geometric Mean Conc. in 36th mo.=";
   0 LPRINT USING "###.#"; TRGM36;
   0 LPRINT " ug/dl."
2380 REM ***
   0 FOR Y2=0 TO 3: TRSUMA = TRSUMA + LOG(TRAVG6(Y2)): NEXT Y2
   0 TRGMA = EXP(TRSUMA/4): TRSUMA = 0: REM reset for next census tract
2410 LPRINT "Geometric Mean of Annual Avg. Concs. for the 84-month Cohort"
   0 LPRINT "  During Years"; (YEAR-6); "-"; (YEAR-3); "=";
  30 LPRINT USING "###.#"; TRGMA;: LPRINT " ug/dl"
2440 FOR Y2=4 TO 6: TRSUMB = TRSUMB + LOG(TRAVG6(Y2)): NEXT Y2
2450 TRGMB = EXP(TRSUMB/3): TRSUMB = 0: REM reset for next census tract
  50 LPRINT "  During Years"; (YEAR-2); "-"; (YEAR); "=";
2470 LPRINT USING "###.#"; TRGMB;: LPRINT " ug/dl."
2480 TSUMA = 0: TSUMB = 0: REM: Reset for next census tract
  90 REM ***
   0 LPRINT "Highest end-of-month blood lead occurring in";YEAR;" by age group:"
```

```
2540      IF (G=2) THEN LPRINT LF$;
2550 NEXT G
2560 PG = PG+1: LPRINT LF$;LF$: LPRINT TAB(32) "Page"; PG
2570 RETURN
2580 REM
2590 REM ******** Output Tables for All 84-Month Cohorts in Study Area *******
2600 REM
2610 LPRINT CHR$(12); LF$;LF$
2620 LPRINT TAB(17) "SUMMARY DATA FOR 84-MONTH COHORTS "
2630 LPRINT TITLE$; LF$;LF$;LF$;LF$; TAB(33); "Table 1."
2640 LPRINT TAB(13) "GEOMETRIC MEANS OF ";BD$; " BOUND ESTIMATES OF END-OF-MONTH
"
2650 LPRINT TAB(16) "BLOOD LEAD CONCENTRATIONS FOR ALL 84-MONTH COHORTS "
2660 LPRINT LF$; "              ===========================================
== ===="
2670 LPRINT "                                Mean Blood Lead Concentration (ug/dl)"
2680 LPRINT "            Year     1   2   3   4   5   6   7   8   9  10  11  ..
"
2690 LPRINT "            -------------------------------------------------------
-": LF$:
2700 FOR Y = 0 TO 6
2710      YY = YEAR - 6 + Y: LPRINT TAB(13) YY: "   ":
2720      FOR MO = 1 TO 12
2730           GEOMMO = EXP(SUMMO(Y,MO)/TOT6)
2740           LPRINT USING "### "; GEOMMO;
2750      NEXT MO
2760 NEXT Y
2770 LPRINT LF$; "              ===========================================
=  ===="
2780 LPRINT LF$;LF$;LF$;LF$: LPRINT TAB(33) "Table 2."
2790 LPRINT TAB(12)"GEOMETRIC MEANS OF ";BD$;" BOUND ESTIMATES OF ANNUAL AVERAGE
"
2800 LPRINT TAB(15) "BLOOD LEAD CONCENTRATIONS FOR ALL 84-MONTH COHORTS "
2810 LPRINT TAB(20) "===================================="
2820 LPRINT TAB(20) "                    Mean Blood Lead "
2830 LPRINT TAB(20) " Year          Concentration (ug/dl)"
2840 LPRINT TAB(20) "------------------------------------", LF$
2850 FOR Y = 0 TO 6
2860      YY = YEAR - 6 + Y: LPRINT TAB(20) YY: "              ";
2870      GEOMYR = EXP(SUMYR(Y)/TOT6): LPRINT USING "###.#"; GEOMYR
2880      IF Y <= 3 THEN SUM1 = SUM1 + GEOMYR
2890      IF Y > 3 THEN SUM2 = SUM2 + GEOMYR
2900 NEXT Y
2910 MEAN1 = SUM1 / 4:  MEAN2 = SUM2 / 3
2920 LPRINT LF$;LF$; TAB(20); (YY-6) "-" (YY-3); TAB(38);: LPRINT USING "###.#
     MEAN1
2930 LPRINT LF$: TAB(20); (YY-2) "-" YY); TAB(38);: LPRINT USING "###.#":
   MEAN2
2940 LPRINT LF$: TAB(20) "===================================="
2950 LPRINT CHR$(12); LF$;LF$
2960 LPRINT TAB(17) "SUMMARY DATA FOR 84-MONTH COHORTS"
2970 LPRINT TITLE$: LF$:LF$
2980 FOR Y2=0 TO 6: GEOM(Y2) = EXP(SUMHI(Y2),TOT6): NEXT Y2
2990 LPRINT TAB(10) "         Table 3. Study Area Means(b) of Highest
3000 LPRINT TAB(10) " End-of-Month Blood Lead Concentration by Cohort Age "
3010 LPRINT TAB(10) "+------------------------------------------------------+"
3020 LPRINT TAB(10) "|   Cohort    |  Calendar  |         Blood Lead          |"
3030 LPRINT TAB(10) "| Age(Years)  |    Year    |  Concentration (ug/dl)      |"
3040 LPRINT TAB(10) "+------------------------------------------------------+"
3050 FOR Y2 = 0 TO 6
3060      YY = YEAR -6 + Y2
3070      LPRINT TAB(10) "|      "; Y2: "    |    "; YY: "    |          ";
3080      LPRINT USING "###.#"; GEOM(Y2);: LPRINT "         |"
```

```
3120 GEOMA = EXP(SUMMA/TOT6): GEOMB = EXP(SUMMB/TOT6)
3130 LPRINT TAB(10) "  Table 4. Study Area Means(b) of Blood Lead "
3140 LPRINT TAB(10) "              Indicators(c) by Cohort Age           "
3150 LPRINT TAB(10) "+-----------------------------------------------+"
3160 LPRINT TAB(10) "!   Cohort   !   Calendar   !  Blood Lead Indicator  !"
3170 LPRINT TAB(10) "! Age(Years)!     Years     !  Concentration (ug/dl) !"
3180 LPRINT TAB(10) "!-----------------------------------------------!"
3190 LPRINT TAB(10) "!    0-3     !"; (YEAR-6); "-"; (YEAR-3); "!          ";
3200 LPRINT USING "###.#"; GEOMA;: LPRINT "           !"
3210 LPRINT TAB(10) "!    4-6     !"; (YEAR-2); "-";  YEAR;    "!          ";
3220 LPRINT USING "###.#"; GEOMB;: LPRINT "           !"
3230 LPRINT TAB(10) "+-----------------------------------------------+"
3240 LPRINT LF$;LF$
3250 GEOM36 = EXP(SUMM36/TOT6)
3260 LPRINT TAB(10) "Population-weighted Geometric Mean Concentration "
3270 LPRINT TAB(10) "in 36th month of life =";
3280 LPRINT USING "###.#"; GEOM36;: LPRINT " ug/dl."
3290 LPRINT LF$;LF$;LF$; "    FOOTNOTES:
3300 LPRINT "     (a) Seven year (84-month) cohorts are born January 1 of the "
3310 LPRINT "         first year and experience 7 full years (84 months)"
3320 LPRINT "         of exposure prior to their 7th birthday."
3330 LPRINT "     (b) Table 1-4 means are population-weighted geometric means "
3340 LPRINT "         of a blood lead indicator for the seven-year cohort in each
"
3350 LPRINT "         census tract."
3360 LPRINT "     (c) Table 4 blood lead indicator for the seven-year cohort in
3370 LPRINT "         one census tract is the arithmetic mean of highest end-of-
3380 LPRINT "         month blood concentration during each year in a series of
3390 LPRINT "         years."
3400 RETURN
```

[illegible]

AGE (YR)	POP	YEAR	BLOOD PB CONC 1	2	3	4	5	6	7	8	9	10	11	12
6	68.	1974	51	41	35	31	29	27	26	24	24	23	23	22
6	[illegible]	1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17	[illegible]	[illegible]
6	68.	1976	26	26	26	26	25	25	25	25	23	24	24	24
5	[illegible]	1977	22	[illegible]	22	[illegible]	23	23	23	23	23	23	23	[illegible]
5	68.	1978	21	21	21	21	21	22	21	21	22	21	22	22
5	[illegible]	1979	[illegible]	[illegible]	[illegible]	[illegible]	19	[illegible]	19	[illegible]	20	19	19	[illegible]
5	68.	1980	14	14	14	14	14	15	14	14	14	14	13	13
5	75.	1975	[illegible]	[illegible]	33	[illegible]	30	26	25	24	23	22	22	21
5	75.	1976	17	17	17	15	17	17	17	17	16	16	16	16
5	75.	1977	25	25	25	25	24	24	24	24	23	23	23	23
5	75.	1978	21	21	21	21	21	21	21	21	21	21	22	22
5	75.	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	75.	1980	15	15	15	15	15	15	15	15	15	14	15	15
4	73.	1976	44	[illegible]	[illegible]	[illegible]	25	24	22	21	21	[illegible]	[illegible]	[illegible]
4	73.	1977	17	17	17	17	15	16	16	16	15	15	15	16
4	73.	1978	23	23	23	23	22	22	22	22	21	21	21	21
4	73.	1979	1?	1?	19	1?	19	19	19	1?	19	19	19	?0
4	73.	1980	14	14	14	[illegible]	[illegible]	14	14	14	14	[illegible]	[illegible]	[illegible]
3	73.	1977	42	35	29	27	24	25	22	21	21	[illegible]	[illegible]	19
3	73.	1978	15	[illegible]	[illegible]	[illegible]	15	[illegible]	15	[illegible]	14	14	15	15
3	73.	1979	2?	2?	21	21	19	2?	2?	2?	19	1?	19	[illegible]
3	73.	1980	14	[illegible]	14	14	14	14	14	[illegible]	14	13	14	14
2	?1.	1978	33	32	27	25	23	22	2?	1?	1?	15	15	17
2	?1.	1979	14	[illegible]	14	14	13	13	13	[illegible]	13	13	13	13
2	?1.	1980	14	15	15	15	14	14	14	14	13	13	13	13
1	?1.	197?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17	[illegible]	17	16	15	15
1	?1.	198?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0	?.	198?	[illegible]	[illegible]	[illegible]	[illegible]	13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

POPULATION-WEIGHTED GEOMETRIC MEAN CONC. DURING 1974 = 1?.? UG/DL.
[illegible]
GEOMETRIC MEAN OF ANNUAL AVG. CONCS. FOR THE 84-MONTH COHORT
[illegible]

[illegible] DURING YEARS [illegible] = [illegible] UG/DL
HIGHEST END-OF-MONTH BLOOD LEAD OCCURRING IN 1981 BY AGE GROUP:
([illegible])= [illegible] ([illegible])= [illegible] ([illegible])= [illegible]
(3)= 13.9 (4)= 14.3 (5)= 14.5
([illegible])= [illegible]

[illegible]

AGE	POP	YEAR	BLOOD PB CONC 1	2	3	4	5	6	7	8	9	10	11	12
6	38.	1974	5?	41	34	31	29	27	26	24	24	23	23	22
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	38.	1976	26	26	26	26	24	25	25	25	23	24	24	24
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	38.	1978	21	21	21	21	21	21	21	21	22	21	22	22
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	38.	1980	14	14	14	14	14	14	14	14	14	14	13	13
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	31.	1976	17	17	17	16	16	17	17	17	16	16	16	16
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	31.	1978	21	21	21	21	21	21	21	21	21	21	22	22
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	31.	1980	15	15	15	15	15	15	15	15	15	15	15	15
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	39.	1977	17	17	17	17	16	16	16	16	15	15	16	16
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	39.	1979	18	1?	18	19	16	19	19	19	19	19	19	1?
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	3?.	1977	42	35	29	27	24	23	22	21	2?	2?	19	19
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	3?.	1979	2?	2?	2?	21	19	2?	2?	2?	18	1?	19	19
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	?.	197?	3?	3?	27	2?	23	21	2?	19	19	1?	1?	17
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	?.	19??	14	15	15	15	14	14	14	14	13	13	13	13
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	?.	19??	[illegible]	[illegible]	[illegible]	[illegible]	9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

POPULATION-WEIGHTED GEOMETRIC MEAN CONC. DURING 197? = 17.9 UG/DL.
[illegible]
GEOMETRIC MEAN OF ANNUAL AVG. CONCS. FOR THE 84-MONTH COHORT
[illegible]

AND DURING YEARS 1975-1980 = 17.9 UG/DL
GHEST END-OF-MONTH BLOOD LEAD OCCURRING IN 1981 BY AGE GROUP:
(0)= 22.0 (1)= 9.4 (2)= 14.8
(3)= 13.5 (4)= 14.1 (5)= 14.7
(6)= 14.5

SULF[illegible] [illegible] [illegible] LOWE[illegible] [illegible]

AGE	POP	YEAR	BLOOD PB CONC 1	2	3	4	5	6	7	8	9	10	11	12
6	53.	1974	5[illegible]	41	35	31	29	27	26	25	25	23	23	22
[illegible]	53.	1975	19	17	[illegible]	[illegible]	[illegible]	17	19	19	18	18	16	[illegible]
6	53.	1976	26	26	24	26	25	25	25	25	24	24	24	24
[illegible]	53.	1977	22	22	23	[illegible]	23	23	23	23	23	23	23	[illegible]
6	53.	1978	21	21	21	21	21	22	22	22	22	21	21	22
[illegible]	53.	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	53.	1980	15	14	15	14	14	15	14	14	14	14	13	13
5	54.	1975	[illegible]	[illegible]	34	31	[illegible]	[illegible]	[illegible]	34	34	33	32	31
5	54.	1976	17	17	18	16	17	17	17	17	16	16	16	16
5	54.	1977	25	25	25	25	24	24	24	24	23	23	23	23
5	54.	1978	21	21	21	21	21	21	22	21	21	21	21	22
5	54.	1979	19	17	19	[illegible]	19	19	19	17	19	19	19	[illegible]
5	54.	1980	15	15	15	15	15	15	15	15	15	15	15	15
4	7[illegible].	1976	44	[illegible]	31	[illegible]	25	24	[illegible]	21	21	[illegible]	[illegible]	[illegible]
4	7[illegible].	1977	17	17	17	17	16	16	16	16	15	15	15	16
4	7[illegible].	1978	23	23	24	23	22	22	23	[illegible]	21	21	21	21
4	7[illegible].	1979	18	1[illegible]	19	19	19	19	19	19	19	19	19	19
4	7[illegible].	1980	14	14	14	14	14	14	14	14	14	14	14	14
3	7[illegible].	1977	42	35	3[illegible]	27	24	23	22	21	21	2[illegible]	19	19
3	7[illegible].	1978	15	16	14	14	15	15	15	[illegible]	14	14	14	15
3	76.	1979	2[illegible]	2[illegible]	21	21	20	2	2[illegible]	2[illegible]	19	1[illegible]	19	19
3	7[illegible].	1980	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	57.	1978	39	32	2[illegible]	23	23	22	21	1[illegible]	19	18	16	17
2	57.	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	57.	1980	14	15	15	15	14	14	14	14	13	13	13	13
1	57.	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17	[illegible]	[illegible]	[illegible]
1	57.	1980	[illegible]	[illegible]	1	[illegible]	9	[illegible]	9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible].	19[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

POPULATION-WEIGHTED GEOMETRIC MEAN CONC. DURING 197[illegible] = [illegible].4 UG/DL.
POPULATION-WEIGHTED GEOMETRIC MEAN CONC. IN [illegible]TH [illegible] = [illegible] UG/DL.
GEOMETRIC MEAN OF ANNUAL AVG. CONCS. FOR THE SAME AGE COHORT
[illegible] YEARS 197[illegible]-1977 = [illegible] UG/DL

[illegible] DURING YEARS 197[illegible]-19[illegible] = 1[illegible].1 [illegible]

GHEST END-OF-MONTH BLOOD LEAD OCCURRING IN 199[illegible] BY AGE GROUP:

([illegible])= [illegible] ([illegible])= [illegible] (2)= 1[illegible]

(3)= 14.[illegible] (4)= 14.4 (5)= 14.9

([illegible])= 14.[illegible]

[illegible]

AGE			BLOOD PB CONC											
[illegible]	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
6	36.	1974	[illegible]	41	35	32	29	27	26	25	25	23	23	22
[illegible]	36.	1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	36.	1976	26	25	26	26	25	25	25	25	24	24	24	24
[illegible]	36.	1977	22	22	22	[illegible]	23	23	23	23	23	23	[illegible]	[illegible]
6	36.	1978	21	21	21	21	21	21	22	22	22	22	22	22
[illegible]	36.	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	36.	1980	15	14	14	14	15	14	14	14	14	14	13	14
5	59.	1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	59.	1976	17	17	18	18	17	17	17	17	16	16	16	17
[illegible]	59.	1977	[illegible]	[illegible]	[illegible]	[illegible]	24	24	24	24	[illegible]	[illegible]	[illegible]	[illegible]
5	59.	1978	21	21	21	21	21	21	22	24	22	22	22	22
5	59.	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	59.	1980	15	15	15	15	15	15	15	15	15	15	15	15
4	46.	1976	[illegible]	[illegible]	[illegible]	[illegible]	25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	46.	1977	17	17	17	17	16	16	16	17	15	15	16	15
4	[illegible]	1978	23	23	23	[illegible]	22	22	23	[illegible]	21	21	21	[illegible]
4	46.	1979	18	16	19	19	19	19	19	19	19	19	19	19
[illegible]	[illegible]	[illegible]	14	14	14	14	14	14	14	14	14	14	14	14
[illegible]	[illegible]	1977	42	35	29	27	24	23	22	21	21	[illegible]	19	19
[illegible]	[illegible]	1978	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	14	[illegible]	[illegible]
[illegible]	[illegible]	1979	[illegible]	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19	19	19	19
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	41.	[illegible]	[illegible]	[illegible]	27	[illegible]	23	21	21	[illegible]	19	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	41.	[illegible]	14	15	15	[illegible]	14	14	14	14	13	13	13	14
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

POPULATION-WEIGHT [illegible] GEOMETRIC [illegible] CONC. DURING [illegible] = [illegible] UG/DL.
[illegible]
GEOMETRIC MEAN OF ANNUAL AV. CONCS. FOR THE [illegible] COHORT
[illegible]

```
[illegible] DURING YEARS 197[illegible]-198[illegible] = 1[illegible].1 UG/DL
HIGHEST END-OF-MONTH BLOOD LEAD OCCURRING IN 198[illegible] BY AGE GROUP:
   ( [illegible] )= 22.[illegible]   ( 1 )=  9.4   ( 2 )= [illegible].7
   ( 3 )= 14.1   ( 4 )= 14.5   ( 5 )= 15.[illegible]
   ( 6 )= 14.7
```

[illegible]

AGE	POP	YEAR	BLOOD PB CONC 1	2	3	4	5	6	7	8	9	10	11	12
6	54.	1974	52	42	35	33	29	28	27	26	25	24	24	23
6	54.	1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	54.	1976	27	27	26	27	25	26	26	25	25	24	25	25
6	54.	1977	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	24	[illegible]	[illegible]	[illegible]	[illegible]	24
6	54.	1978	22	22	22	22	22	22	22	23	22	22	22	23
6	54.	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21	[illegible]	[illegible]	[illegible]	[illegible]
6	54.	1980	15	15	15	15	15	15	14	15	14	14	14	14
5	52.	1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	52.	1976	18	16	18	16	17	17	16	16	17	16	17	17
5	52.	1977	[illegible]	[illegible]	[illegible]	[illegible]	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	24	[illegible]
5	52.	1978	22	21	21	22	22	22	22	22	22	22	22	22
5	52.	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	52.	1980	15	15	15	15	15	15	15	16	15	15	15	15
4	49.	1976	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	24	24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	49.	1977	17	17	17	15	16	17	17	17	16	15	16	16
4	49.	1978	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	49.	1979	19	19	19	19	19	19	20	20	20	19	20	[illegible]
4	49.	1980	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	49.	1977	44	35	29	27	24	24	22	26	21	22	[illegible]	19
3	49.	1978	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	15	15	15	[illegible]
3	49.	1979	21	21	21	22	20	20	21	21	19	19	20	[illegible]
3	49.	1980	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	52.	1978	41	30	29	23	23	22	21	20	20	19	19	[illegible]
2	52.	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	13	[illegible]	[illegible]	[illegible]
2	52.	1980	15	15	15	16	14	15	15	15	14	13	14	14
1	52.	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	52.	1980	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

POPULATION-WEIGHT[illegible] GEOMETRIC [illegible] CONC. DURING 1974 = [illegible] UG/DL.
[illegible]
GEOMETRIC [illegible] OF ANNUAL AVG. CONCS. FOR THE [illegible] COHORT
[illegible]

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[illegible] DURI[illegible] YEARS [illegible] = [illegible] UG/DL
HIGHEST END-OF-MONTH BLOOD LEAD OCCURRING IN 198[illegible] BY AGE GROUP:
  ( [illegible] )= 23.[illegible]  ( [illegible] )= [illegible]  ( 2 )= [illegible]
  ( 3 )= 14.7  ( 4 )= 15.1  ( 5 )= 15.[illegible]
  ( [illegible] )= 15.[illegible]
```

~~[illegible] [illegible] DUST [illegible] [illegible] 37.33~~

AGE			BLOOD PB CONC											
~~[illegible]~~	~~PER~~	~~YEAR~~	~~1~~	~~2~~	~~3~~	~~4~~	~~5~~	~~6~~	~~7~~	~~8~~	~~9~~	~~10~~	~~11~~	~~12~~
[illegible]	11.	1974	54	43	37	33	31	29	27	27	28	25	26	24
~~[illegible]~~	~~11.~~	~~1975~~	~~21~~	~~[illegible]~~	~~21~~	~~21~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~21~~	~~23~~	~~21~~	~~21~~	~~[illegible]~~
[illegible]	11.	1976	28	27	28	[illegible]	27	27	27	26	27	29	28	27
~~[illegible]~~	~~11.~~	~~1977~~	~~24~~	~~[illegible]~~	~~24~~	~~24~~	~~24~~	~~[illegible]~~	~~24~~	~~26~~	~~[illegible]~~	~~[illegible]~~	~~27~~	~~[illegible]~~
[illegible]	11.	1978	23	22	23	[illegible]	23	23	23	24	25	27	25	24
~~[illegible]~~	~~11.~~	~~1979~~	~~21~~	~~21~~	~~21~~	~~21~~	~~21~~	~~[illegible]~~	~~21~~	~~[illegible]~~	~~23~~	~~[illegible]~~	~~23~~	~~[illegible]~~
[illegible]	11.	1980	16	15	16	16	16	15	15	[illegible]	17	18	16	15
~~[illegible]~~	~~22.~~	~~1975~~	~~[illegible]~~	~~[illegible]~~	~~37~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~27~~	~~27~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
[illegible]	22.	1976	19	18	19	19	16	16	18	19	19	20	19	18
~~[illegible]~~	~~22.~~	~~1977~~	~~27~~	~~[illegible]~~	~~27~~	~~27~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~27~~	~~[illegible]~~	~~[illegible]~~	~~27~~	~~[illegible]~~
5	22.	1978	23	22	23	[illegible]	23	23	23	24	25	27	25	24
~~[illegible]~~	~~22.~~	~~1979~~	~~21~~	~~[illegible]~~	~~21~~	~~21~~	~~21~~	~~21~~	~~21~~	~~[illegible]~~	~~23~~	~~24~~	~~[illegible]~~	~~[illegible]~~
5	22.	1980	16	15	16	16	15	16	16	17	18	[illegible]	15	17
~~4~~	~~33.~~	~~1976~~	~~[illegible]~~	~~37~~	~~[illegible]~~	~~[illegible]~~	~~27~~	~~[illegible]~~	~~24~~	~~24~~	~~25~~	~~26~~	~~[illegible]~~	~~21~~
4	33.	1977	18	17	18	18	17	17	17	16	18	19	16	17
~~4~~	~~33.~~	~~1978~~	~~25~~	~~24~~	~~25~~	~~25~~	~~24~~	~~24~~	~~24~~	~~[illegible]~~	~~25~~	~~27~~	~~25~~	~~24~~
4	33.	1979	[illegible]	[illegible]	21	[illegible]	20	21	[illegible]	21	22	24	23	22
~~4~~	~~33.~~	~~1980~~	~~[illegible]~~	~~[illegible]~~	~~16~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~16~~	~~17~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
[illegible]	33.	1977	46	36	31	[illegible]	26	25	23	25	24	25	23	21
~~[illegible]~~	~~33.~~	~~1978~~	~~17~~	~~[illegible]~~	~~17~~	~~17~~	~~16~~	~~16~~	~~16~~	~~17~~	~~17~~	~~[illegible]~~	~~17~~	~~16~~
[illegible]	33.	1979	22	22	23	23	21	22	21	[illegible]	22	24	22	[illegible]
~~[illegible]~~	~~33.~~	~~[illegible]~~	~~[illegible]~~	~~15~~	~~15~~	~~[illegible]~~	~~15~~	~~[illegible]~~	~~15~~	~~[illegible]~~	~~17~~	~~[illegible]~~	~~17~~	~~[illegible]~~
[illegible]	1.	[illegible]	42	33	29	26	24	23	21	22	23	24	21	[illegible]
~~[illegible]~~	~~1.~~	~~[illegible]~~	~~15~~	~~[illegible]~~	~~15~~	~~15~~	~~14~~	~~[illegible]~~	~~14~~	~~[illegible]~~	~~15~~	~~14~~	~~[illegible]~~	~~[illegible]~~
[illegible]	1[illegible].	[illegible]	16	16	16	[illegible]	15	15	15	16	17	17	17	15
~~[illegible]~~	~~1.~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~21~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
[illegible]	1[illegible].	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11	11	12	11	[illegible]
	~~[illegible].~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~17~~	~~[illegible]~~	~~16~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~16~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~

POPULATION-WEIGHTED GEOMETRIC MEAN CONC. DURING 1974 = [illegible] UG/M3.

~~POPULATION-WEIGHTED [illegible] = 22.1 UG/M3.~~

GEOMETRIC MEAN OF ANNUAL AVG. CONCS. FOR THE [illegible]-MONTH COHORT

~~[illegible] = [illegible] UG/M3~~

AND DURING YEARS 197[illegible]-19[illegible] = 2[illegible].3 UG/DL

HIGHEST END-OF-MONTH BLOOD LEAD OCCURRING IN 19[illegible] BY AGE GROUP:

([illegible])= 2[illegible] ([illegible])= 12.[illegible] ([illegible])= [illegible]

(3)= 1[illegible].9 (4)= 19.1 (5)= 1[illegible].5

(6)= 1[illegible].[illegible]

AGE	POP	YEAR	BLOOD PB CONC 1	2	3	4	5	6	7	8	9	10	11	12
6	19.	1974	52	41	35	32	29	27	26	25	25	23	23	23
6	19.	1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	19.	1976	26	25	27	26	25	25	25	25	24	24	24	25
6	19.	1977	23	22	23	[illegible]	23	23	23	23	23	23	23	24
6	19.	1978	21	21	22	22	22	22	22	22	22	22	22	22
6	19.	1979	19	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	19.	1980	15	15	15	15	15	15	14	14	14	14	13	14
5	23.	1975	[illegible]	[illegible]	34	31	[illegible]	27	[illegible]	24	24	[illegible]	[illegible]	[illegible]
5	23.	1976	15	15	15	15	17	17	17	17	16	16	16	17
5	23.	1977	25	25	25	[illegible]	24	24	24	24	23	23	23	24
5	23.	1978	21	21	21	21	21	22	22	22	22	22	22	22
5	23.	1979	19	19	19	19	19	19	19	20	20	19	19	20
5	23.	1980	15	15	15	15	15	15	15	15	15	15	15	15
4	16.	1976	45	[illegible]	31	[illegible]	35	34	33	32	32	31	[illegible]	[illegible]
4	16.	1977	17	17	17	17	16	16	16	17	16	16	16	16
4	16.	1978	23	23	24	[illegible]	22	23	23	[illegible]	22	21	21	22
4	16.	1979	19	19	19	19	19	19	19	19	19	19	19	[illegible]
4	16.	1980	14	14	14	14	14	14	14	14	14	14	14	15
3	16.	1977	43	35	[illegible]	27	24	23	22	21	21	[illegible]	19	19
3	16.	1978	[illegible]	[illegible]	16	[illegible]	15	15	15	[illegible]	15	14	15	15
3	16.	1979	21	21	21	21	20	[illegible]	[illegible]	[illegible]	19	19	19	[illegible]
3	16.	1980	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	1978	[illegible]	32	[illegible]	23	23	22	21	[illegible]	19	19	16	[illegible]
2	[illegible]	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	13	13	[illegible]	13	13	13	13
2	[illegible]	1980	15	15	15	15	14	14	14	14	14	13	13	14
1	[illegible]	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17	[illegible]	[illegible]	[illegible]
1	[illegible]	1980	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

POPULATION-WEIGHTED GEOMETRIC ... CONC. DURING 1979 = 16.9 UG/DL.
POPULATION-WEIGHTED GEOMETRIC ... CONC. ... = 14.2 UG/DL.
GEOMETRIC MEAN OF ANNUAL AVG. CONCS. FOR THE ... COHORT
... = ... UG/DL

[illegible] 5 YEARS [illegible] = [illegible] UG/DL

HIGHEST END-OF-MONTH BLOOD LEAD OCCURRING IN 19[illegible] BY AGE GROUP:

(1)= 2[illegible] (2)= [illegible] (2)= [illegible]

(3)= 14.2 (4)= 14.5 (5)= 15.1

(6)= 1[illegible]

AND DURI G YEAR [illegible] = [illegible] UG/DL

HIGHEST END-OF-MONTH BLOOD LEAD OCCURRING IN 19[illegible] BY AGE GROUP:

([illegible])= 2[illegible].[illegible] ([illegible])= [illegible].7 ([illegible])= [illegible].[illegible]

(3)= 14.2 (4)= 14.[illegible] (5)= [illegible]5.1

([illegible])= 14.[illegible]

~~[illegible] 1,270 [illegible] 173.72~~

AGE	POP	YEAR	BLOOD PB CONC 1	2	3	4	5	6	7	8	9	10	11	12
6	28.	1974	58	47	36	35	30	30	27	25	26	24	23	25
~~6~~	~~28.~~	~~1975~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	28.	1976	33	30	29	[illegible]	26	28	26	26	25	24	24	27
~~6~~	~~28.~~	~~1977~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	28.	1978	25	24	23	24	23	24	23	23	23	22	22	24
~~6~~	~~28.~~	~~1979~~	[illegible]	[illegible]	[illegible]	[illegible]	~~21~~	[illegible]	~~21~~	~~21~~	~~22~~	[illegible]	[illegible]	[illegible]
6	28.	1980	18	17	16	17	16	16	15	15	15	15	14	15
~~5~~	~~57.~~	~~1975~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	57.	1976	20	20	19	20	17	19	18	16	17	16	17	19
~~5~~	~~57.~~	~~1977~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	~~27~~	[illegible]	[illegible]	~~24~~	[illegible]	~~24~~	[illegible]
5	57.	1978	25	24	23	24	22	23	22	23	23	22	22	24
~~5~~	~~57.~~	~~1979~~	[illegible]	[illegible]	~~21~~	[illegible]	[illegible]	~~22~~	[illegible]	[illegible]	~~21~~	[illegible]	[illegible]	[illegible]
5	57.	1980	18	16	17	17	16	17	16	15	16	15	15	17
~~4~~	~~21.~~	~~1976~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	21.	1977	20	20	19	19	17	13	17	17	16	16	16	18
~~4~~	~~21.~~	~~1978~~	~~27~~	~~27~~	[illegible]	~~27~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	21.	1979	22	22	21	21	20	21	20	20	21	19	20	22
~~4~~	~~21.~~	~~1980~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	21.	1977	52	41	33	30	25	26	23	21	22	20	20	21
~~3~~	~~21.~~	~~1978~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	~~17~~	[illegible]	[illegible]	~~15~~	~~15~~	[illegible]	[illegible]
3	21.	1979	25	24	23	24	21	22	21	21	21	19	19	21
~~3~~	~~21.~~	~~1980~~	[illegible]	[illegible]	[illegible]	[illegible]	~~15~~	[illegible]	[illegible]	[illegible]	~~15~~	[illegible]	[illegible]	[illegible]
2	34.	1978	46	[illegible]	[illegible]	[illegible]	24	24	21	20	20	[illegible]	[illegible]	[illegible]
~~2~~	~~34.~~	~~1979~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	34.	1980	19	15	17	15	15	16	15	15	15	14	14	[illegible]
~~1~~	~~37.~~	~~1979~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	37.	1980	12	10	11	11	10	11	[illegible]	10	9	9	[illegible]	[illegible]
	~~47.~~	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

POPULATION-WEIGHTED GEOMETRIC MEAN CONC. DURING 1974 = 30. UG/DL.

~~POPULATION WEIGHTED GEOMETRIC [illegible] CONC. [illegible] = 22.5 UG/DL.~~

GEOMETRIC MEAN OF ANNUAL AVG. CONCS. FOR THE 84-MONTH COHORT

~~[illegible] UG/DL~~

AND DURING YEARS 1975-1980 = 19.7 [illegible]

HIGHEST END-OF-MONTH FLOOD LEAD OCCURRING IN 1980 BY AGE GROUP:

([illegible])= [illegible] ([illegible])= 12.[illegible] (2)= [illegible].9

(3)= 17.4 (4)= 17.3 (5)= [illegible].2

(6)= 17.[illegible]

SULFR [illegible] DUST [illegible] LOWER [illegible]

AGE			BLOOD PB CONC											
[illegible]	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
6	69.	1974	52	42	36	32	29	29	26	25	25	24	23	23
6	69.	1975	[illegible]	[illegible]	[illegible]	[illegible]	19	[illegible]	19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	69.	1976	27	27	27	27	25	27	25	25	25	24	24	25
[illegible]	[illegible]	1977	23	[illegible]	[illegible]	[illegible]	23	24	23	[illegible]	24	23	24	[illegible]
6	69.	1978	22	22	22	22	22	23	22	22	22	22	22	23
[illegible]	[illegible]	1979	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	21
6	69.	1980	15	15	15	15	15	16	14	14	14	14	14	14
5	[illegible]	[illegible]	[illegible]	41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	24	[illegible]	[illegible]	[illegible]	[illegible]
5	39.	1976	18	18	18	18	17	18	17	17	17	16	17	17
5	39.	1977	25	26	26	26	24	25	24	24	24	23	23	24
5	39.	1978	22	22	22	22	22	23	22	24	22	22	22	23
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19	21	19	19	25	25	25	[illegible]
5	39.	1980	15	15	15	15	15	15	15	15	15	15	15	15
4	47.	[illegible]	45	37	[illegible]	[illegible]	[illegible]	[illegible]	23	[illegible]	22	21	[illegible]	[illegible]
4	47.	1977	17	17	18	17	16	17	16	16	16	16	16	17
4	47.	[illegible]	24	24	24	24	23	[illegible]	22	[illegible]	22	[illegible]	[illegible]	22
4	47.	1979	19	19	20	19	19	20	19	19	20	19	20	20
4	47.	[illegible]	[illegible]	[illegible]	15	[illegible]	15	[illegible]	15	14	15	15	15	[illegible]
3	47.	1977	44	36	31	27	25	25	22	21	21	20	20	[illegible]
3	47.	[illegible]	[illegible]	[illegible]	17	[illegible]	[illegible]	[illegible]	15	[illegible]	15	15	15	[illegible]
3	47.	1979	21	21	22	22	20	21	20	20	19	19	19	20
[illegible]	47.	[illegible]	14	[illegible]	14	[illegible]	[illegible]	15	14	[illegible]	14	[illegible]	[illegible]	15
2	59.	[illegible]	41	33	29	25	23	23	[illegible]	[illegible]	[illegible]	19	18	[illegible]
[illegible]	[illegible]	[illegible]	14	14	15	[illegible]	[illegible]	[illegible]	13	[illegible]	13	13	[illegible]	[illegible]
2	59.	[illegible]	15	15	15	15	14	15	14	14	14	14	14	14
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	17	14	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11	11	11	[illegible]	[illegible]

POPULATION-WEIGHTED GEOMETRIC MEAN CONC. DURING 1974 = 19.1 UG/M3.
[illegible] UG/M3.
GEOMETRIC MEAN OF ANNUAL AVG. CONC. FOR THE 14-MONTH COHORT
[illegible] UG/M3

AND DURING YEARS [illegible] = 1[illegible].7 UG/DL

HIGHEST END-OF-MONTH BLOOD LEAD OCCURRING IN 198[illegible] BY AGE GROUP:

([illegible])= [illegible] ([illegible])= [illegible] ([illegible])= [illegible]

(3)= 14.9 (4)= 15.3 (5)= [illegible]

([illegible])= 1[illegible]

BLOOD PB CONC

	POP	YEAR	1	2	3	4	5	6	7	8	9	10	11	12
	233.	1974	51	41	35	31	29	27	26	24	25	24	24	22
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	233.	1976	26	26	27	26	25	25	25	25	24	24	25	24
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	233.	1978	21	21	22	21	22	21	22	21	22	22	22	22
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	233.	1980	15	15	15	14	15	14	14	14	14	14	14	14
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	176.	1976	17	17	16	[illegible]	17	17	17	17	16	16	17	17
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	176.	1978	21	21	21	21	21	21	21	21	22	22	22	22
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	176.	1980	15	15	15	15	15	15	15	15	15	15	15	15
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	175.	1977	17	17	17	17	16	16	16	16	16	16	16	16
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	175.	1979	19	19	19	19	19	19	19	19	19	19	20	19
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	175.	1977	42	35	[illegible]	27	25	[illegible]	22	[illegible]	21	[illegible]	[illegible]	19
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	175.	1979	[illegible]	21	21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	19	19	19	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	1974	55	[illegible]	[illegible]	[illegible]	23	21	[illegible]	[illegible]	19	[illegible]	19	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	14	15	15	[illegible]	14	14	14	14	13	14	14	14
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

POPULATION-WEIGHTED GEOMETRIC [illegible] CONC. DURING 1975 = [illegible] UG/DL.

[illegible]

GEOMETRIC [illegible] FOR THE [illegible] COHORT

[illegible]

SUMMARY DATA FOR 34-MONTH COHORTS
GULF2 80/L - DUST 1,2/U (1974 - 1980)

TABLE 1.
GEOMETRIC MEANS OF LOWER BOUND ESTIMATES OF END-OF-MONTH
BLOOD LEAD CONCENTRATIONS FOR ALL 34-MONTH COHORTS(A)

	MEAN BLOOD LEAD CONCENTRATIONS (UG/DL)											
YEAR	1	2	3	4	5	6	7	8	9	10	11	12
1974	31	42	35	32	29	28	26	25	25	24	23	23
1975	19	21	20	20	[illegible]	19	19	19	18	18	18	19
1976	26	[illegible]	27	26	[illegible]	25	25	25	24	24	24	25
1977	23	23	23	23	[illegible]	23	23	23	23	23	24	24
1978	21	22	22	22	22	22	22	22	22	22	22	22
1979	19	19	20	20	20	20	20	20	20	20	20	20
1980	15	15	15	15	15	15	14	14	14	14	14	14

TABLE 2.
GEOMETRIC MEANS OF LOWER BOUND ESTIMATES OF ANNUAL AVERAGE
BLOOD LEAD CONCENTRATIONS FOR ALL 34-MONTH COHORTS(A)

YEAR	MEAN BLOOD LEAD CONCENTRATION (UG/DL)
1974	35.1
1975	19.9
1976	25.2
1977	23.4
1978	21.8
1979	19.8
1980	14.7
1974 - 1977	24.3
1978 - 1980	18.6

SUMMARY DATA FOR 84-MONTH COHORTS
GULF2 [illegible] - DUST 1,2/U (1974 - 198[illegible])

TABLE 3. STUDY AREA MEANS(B) OF HIGHEST
END-OF-MONTH BLOOD LEAD CONCENTRATION BY COHORT AGE

COHORT AGE (YEARS)	CALENDAR YEARS	BLOOD LEAD CONCENTRATION (UG/DL)
[illegible]	1974	[illegible]
1	1975	[illegible]
[illegible]	1976	[illegible]
3	1977	23.3
[illegible]	1978	22.4
5	1979	[illegible]
[illegible]	1980	[illegible]

TABLE 4. STUDY AREA MEANS(B) OF BLOOD LEAD
INDICATORS(C) BY COHORT AGE

COHORT AGE (YEARS)	CALENDAR YEARS	BLOOD LEAD INDICATOR CONCENTRATION (UG/DL)
[illegible]	1974 - 1977	[illegible]
4-6	1978 - [illegible]	19.2

POPULATION-WEIGHTED GEOMETRIC MEAN CONCENTRATION
IN 84TH MONTH OF LIFE = 24.5 UG/DL.

FOOTNOTES:
(A) SEVEN YEAR (84-MONTH) COHORTS ARE BORN JANUARY 1 OF THE FIRST YEAR AND EXPERIENCE [illegible] FULL YEARS ([illegible] MONTHS) OF EXPOSURE PRIOR TO THEIR 7TH BIRTHDAY.
(B) [illegible] POPULATION-WEIGHTED GEOMETRIC MEANS OF A BLOOD LEAD INDICATOR FOR THE SEVEN-YEAR COHORT IN EACH CENSUS TRACT.
(C) TABLE 4 BLOOD LEAD INDICATOR FOR THE SEVEN-YEAR COHORT IN [illegible] CENSUS TRACT IS THE [illegible] MEAN OF HIGHEST END-OF-MONTH BLOOD CONCENTRATION DURING EACH YEAR IN A SERIES OF YEARS.

[illegible]

[illegible]