

Date: August 24, 1987

From: James L. Pirkle, M.D., Ph.D.

Subject: Sampling of the Urban Population and the Downward Trend in NHANES II Blood Lead Levels

Questions have arisen as to whether the downward trend in the NHANES II blood lead levels could be attributed to a trend in the percentage of urban dwellers (i.e., living in areas with greater than one million population) sampled during the survey. DuPont replotted NHANES II lead data overlayed with the percent urban dwellers in the sample (attached Figure 1). Figure 2 shows the same overlay with the percent urban dwellers which were actually used in the weighted analysis at the National Center for Health Statistics. Figure 1 and Figure 2 are qualitatively similar although quantitative values for percent urban dwellers is markedly different.

The somewhat similar downward trend in percent urban dwellers sampled and mean lead levels is due to the plotting intervals of January-June and July-December. When the data are plotted with April-September and October-March intervals, the similarity disappears (Figure 3). A plot of mean lead level vs. percent urban dwellers sampled for January-June and July-December intervals is shown in Figure 4. The Pearson correlation coefficient is 0.76. A similar plot for April-September and October-March intervals is shown in Figure 5. The Pearson correlation coefficient is only 0.36.

By contrast, the strong linear relationship between mean lead levels and lead used in gasoline is independent of the plotting intervals. Figures 6 and 7 show the mean blood lead level overlayed with the amount of lead used in gasoline for both sets of intervals (January-June and July-December; April-September and October-March). Figures 8 and 9 show the corresponding correlation plots. Note that the Pearson correlation coefficient is 0.95 independent of the type of interval chosen.

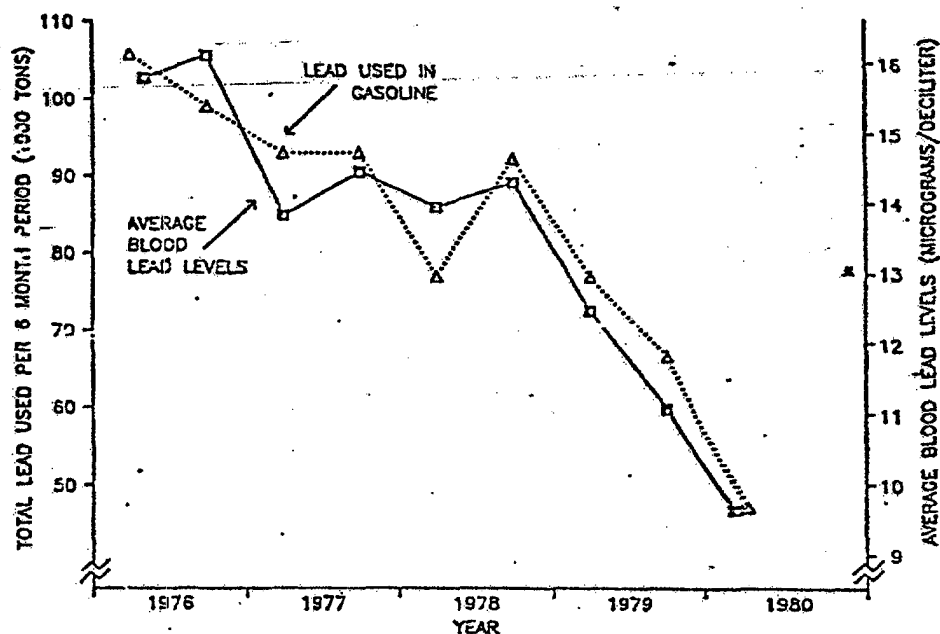
Additional evidence that urban sampling cannot account for the downward trend in lead levels can be seen in plotting subsets of the lead data according to degree of urbanization. Figures 10-15 show three subsets of the lead data plotted vs. time: 1) urban greater than one million population, 2) urban less than one million, and 3) rural. Each subset is plotted using both types of the 6-month intervals (January-June and July-December; April-September and October-March). Distinct downward trends are present in the urban less than one million population and the rural subsets, neither of which includes any of the urban dwellers of subset one. This clearly demonstrates that trends in the percent of urban dwellers (greater than one million population) cannot account for the downward trend in the NHANES II lead data.

TEH 0533237

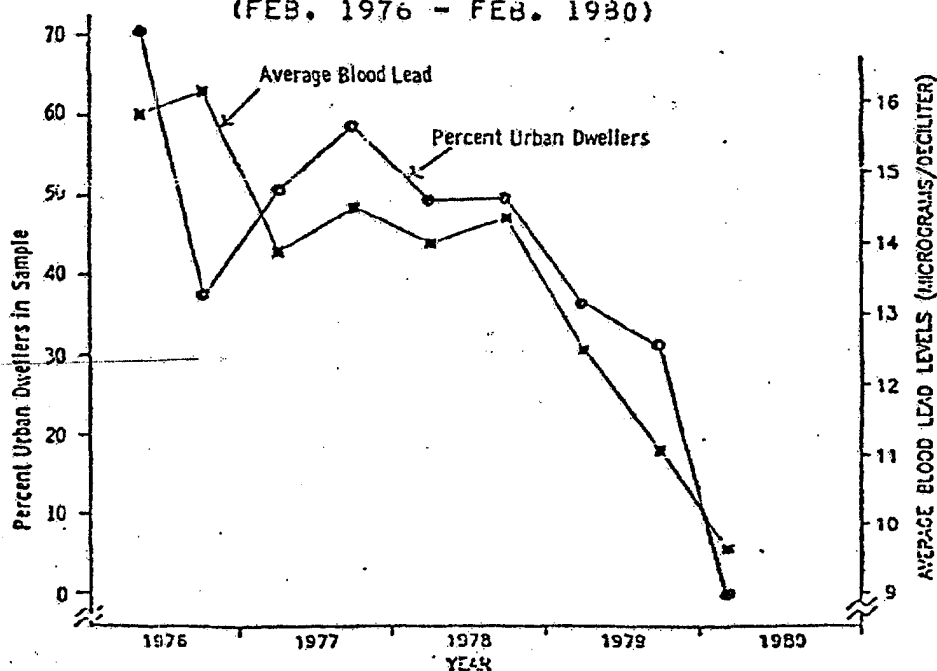
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~~Figure 2~~Original Houk Figure

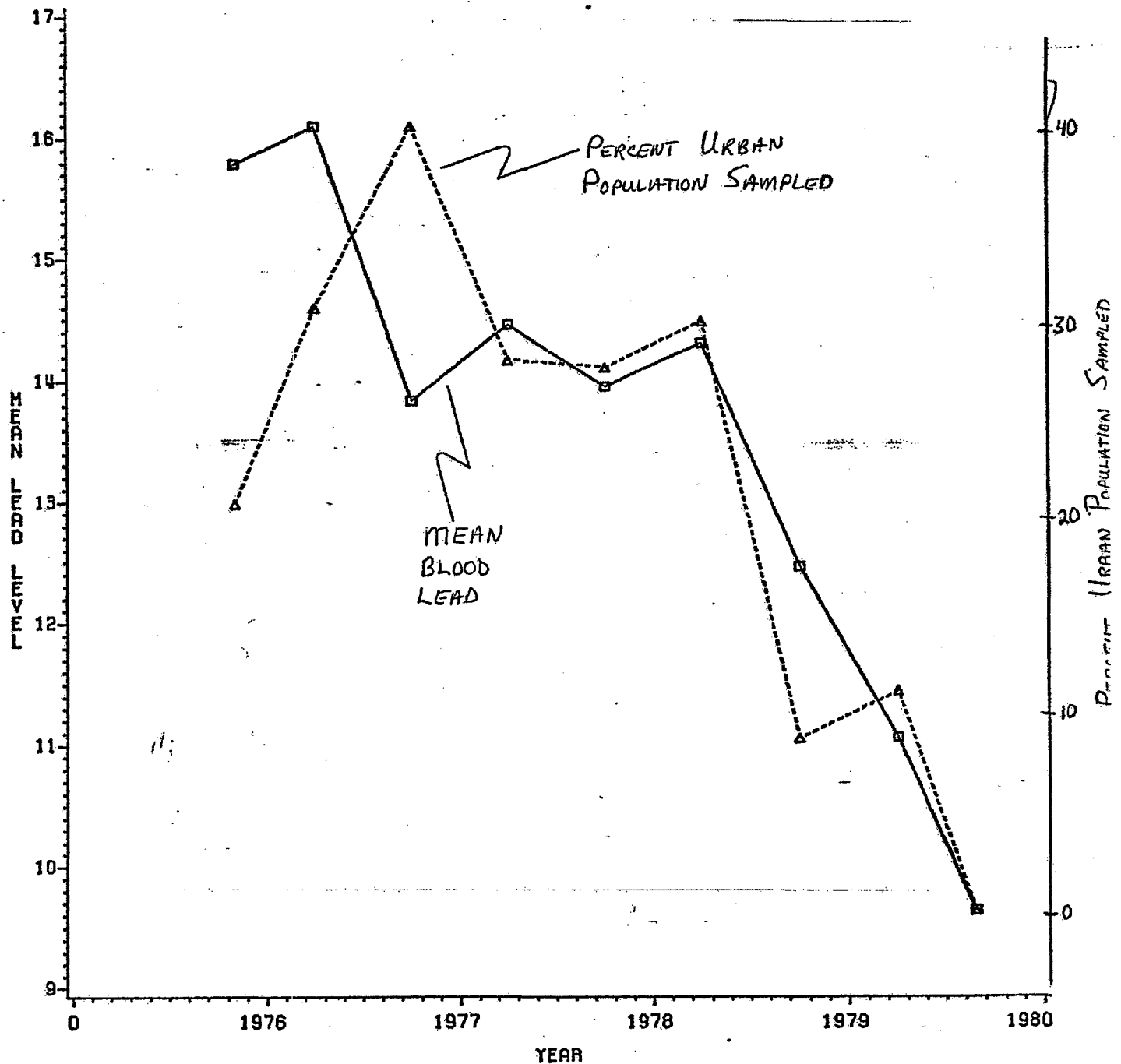
LEAD USED IN GASOLINE PRODUCTION AND
AVERAGE NHANES II BLOOD LEAD LEVELS
(FEB. 1976 - FEB. 1980)

Another Plot of NHANES Data

PERCENT URBAN DWELLERS IN SAMPLE AND
AVERAGE NHANES II BLOOD LEAD LEVELS
(FEB. 1976 - FEB. 1980)



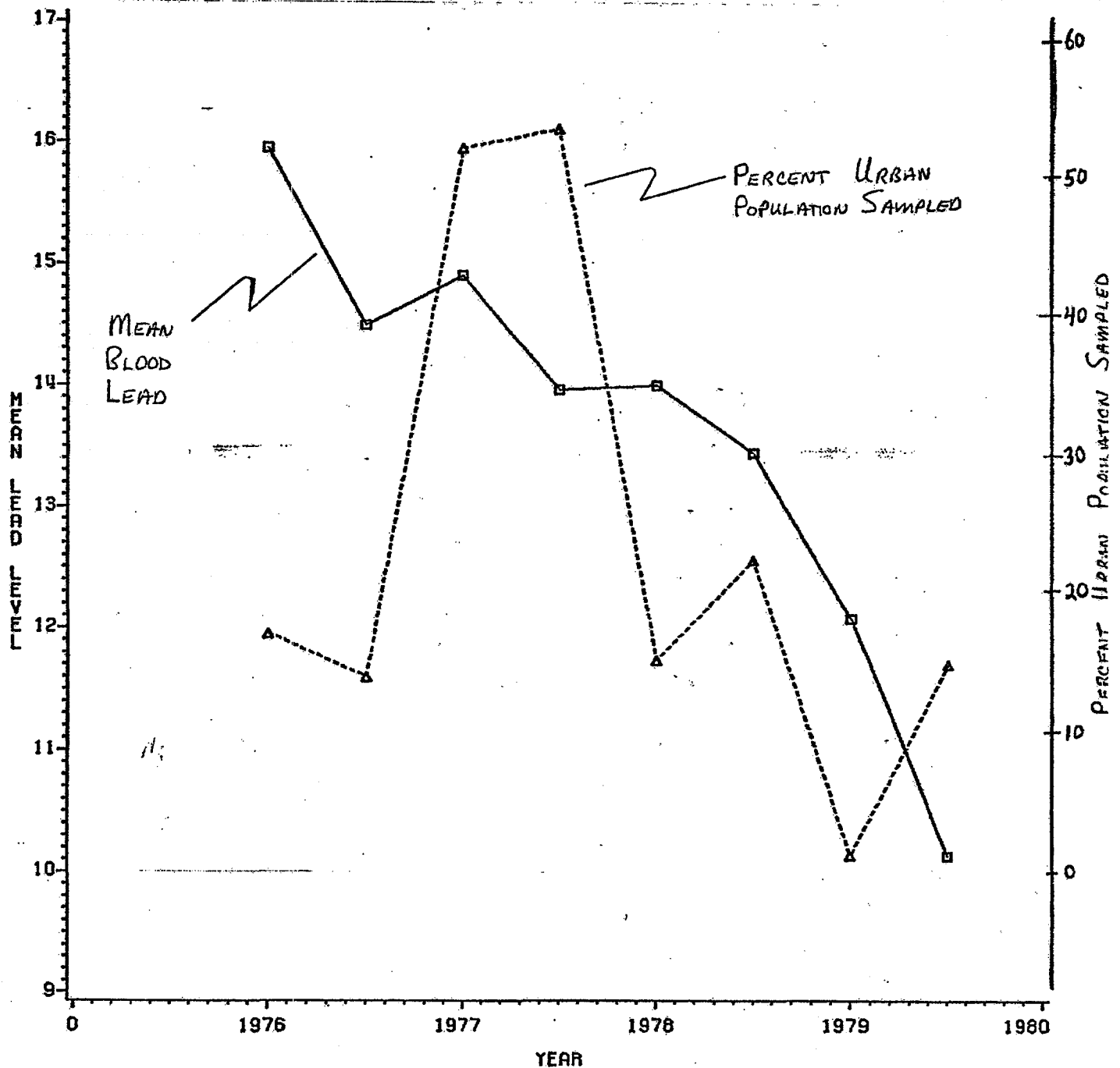
NHANES II LEAD MEANS AND PCT URBAN POPULATION SAMPLED JANUARY - JUNE AND JULY - DECEMBER INTERVALS



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NHANES II LEAD MEANS AND PCT URBAN POPULATION SAMPLED
APRIL - SEPT AND OCT - MARCH INTERVALS

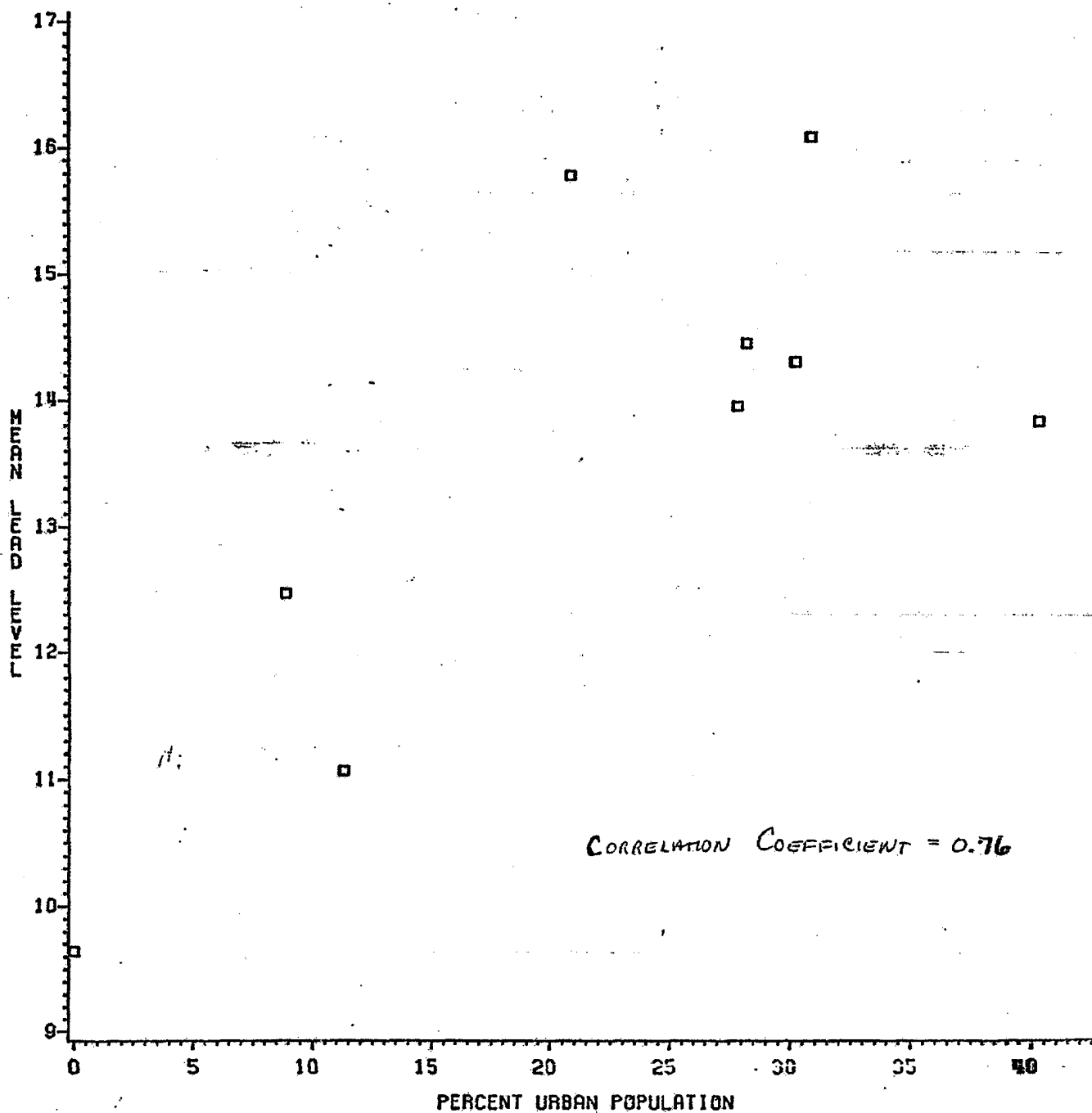


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NHANES II MEAN LEAD VS PCT URBAN POPULATION SAMPLED

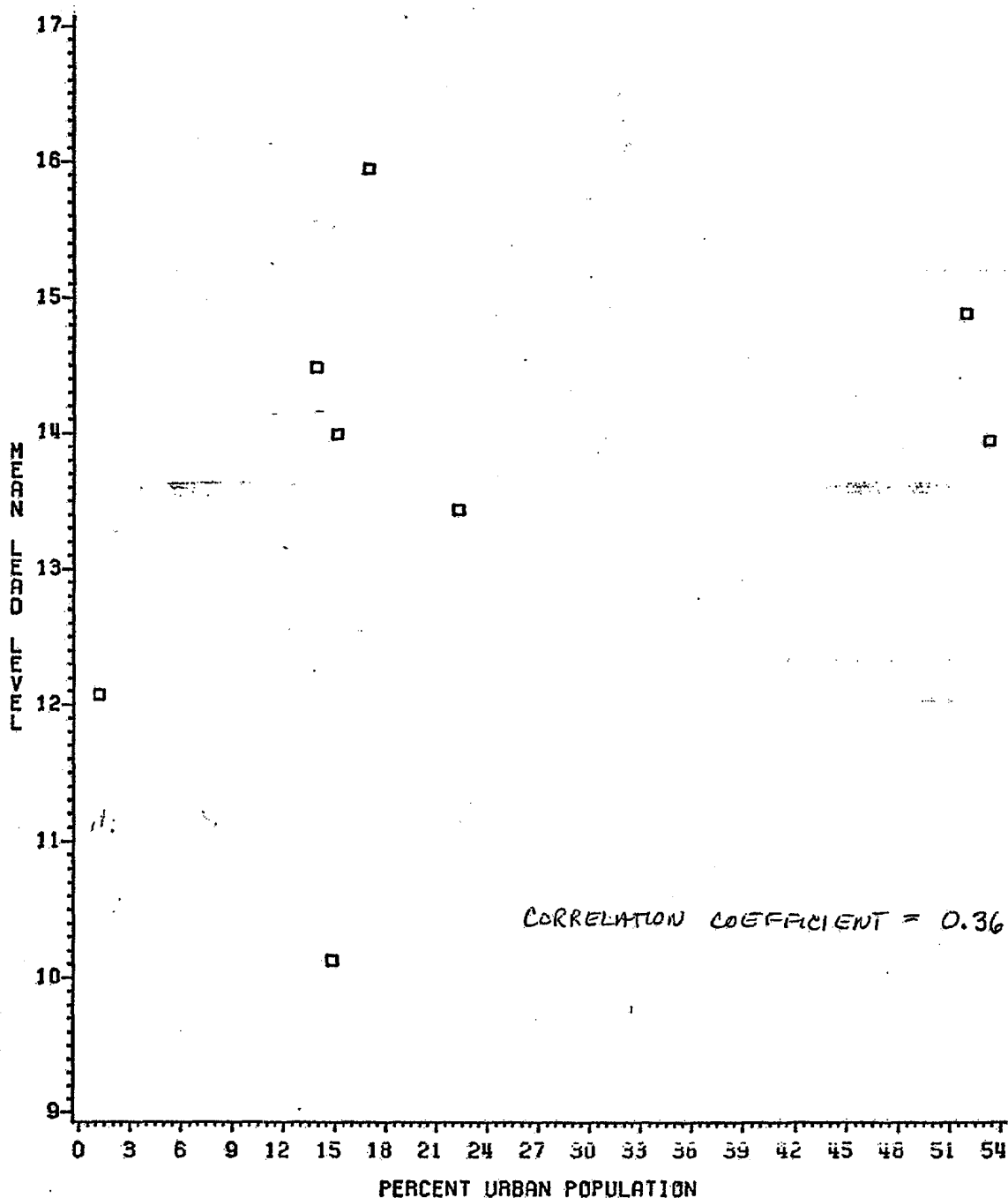
JANUARY - JUNE AND JULY - DECEMBER INTERVALS



TEH 0533241

DUP050034508

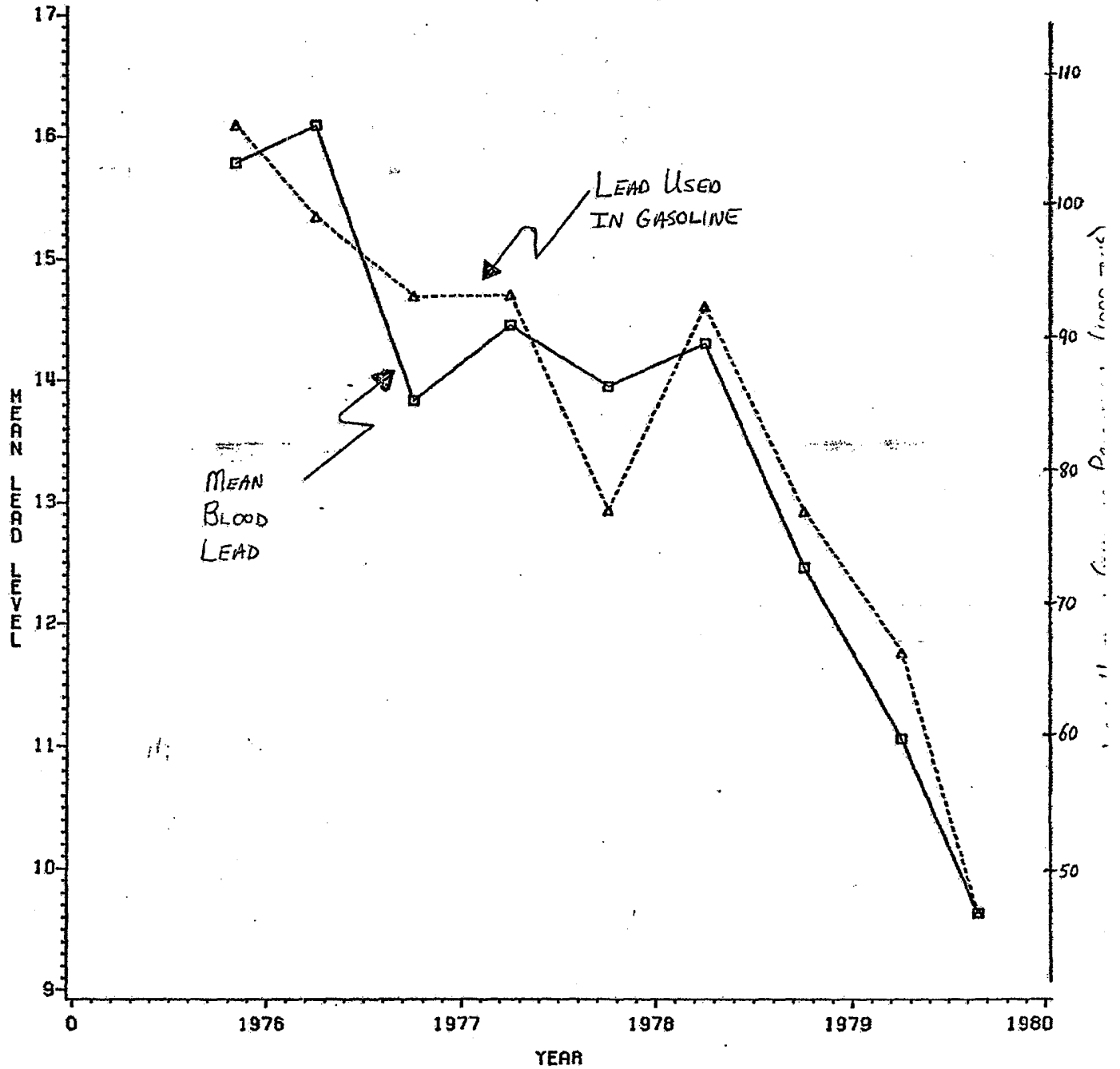
NHANES II LEAD MEANS VS. PCT URBAN POPULATION SAMPLED APRIL - SEPT AND OCT - MARCH INTERVALS



TEH 0533242

DUP050034509

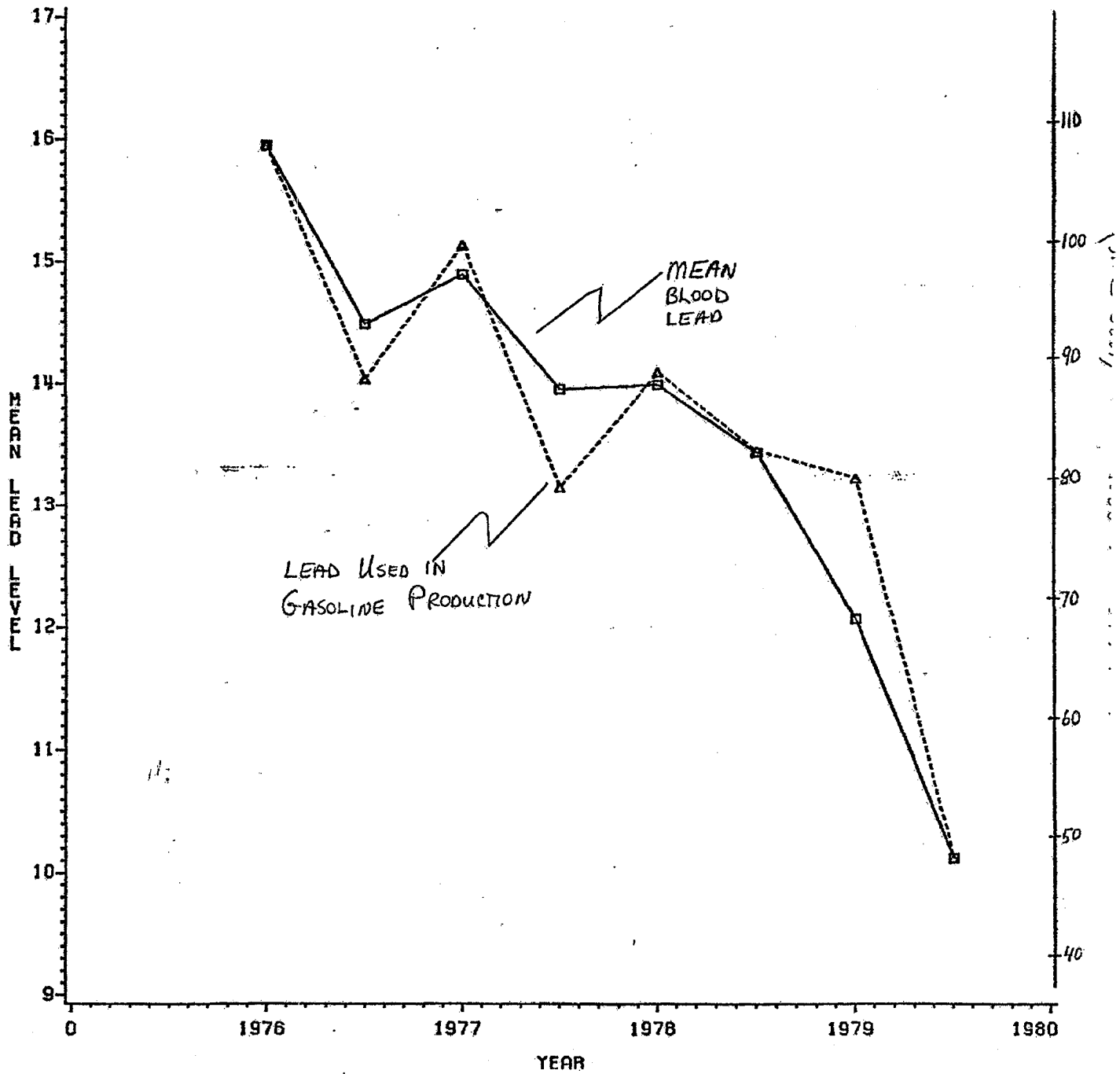
NHANES II LEAD MEANS AND LEAD USED IN GASOLINE JANUARY - JUNE AND JULY - DECEMBER INTERVALS



TEH 0533243

DUP050034510

LEAD USED IN GASOLINE PRODUCTION AND AVERAGE NHANES II BLOOD LEAD
APRIL - SEPT AND OCT - MARCH INTERVALS

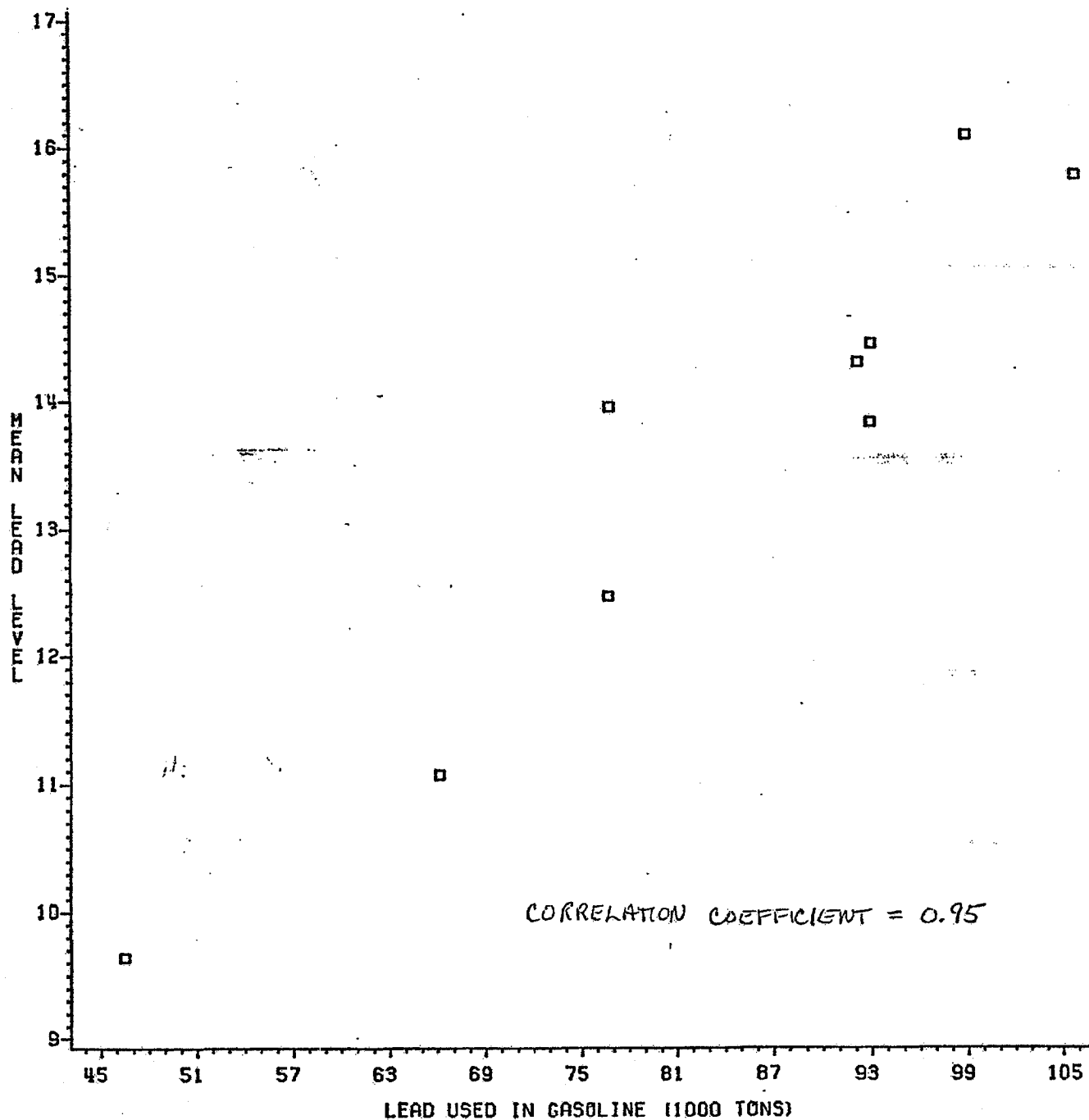


TEH 0533244

DUP050034511

NHANES II MEAN LEAD VS LEAD USED IN GASOLINE

JANUARY - JUNE AND JULY - DECEMBER INTERVALS

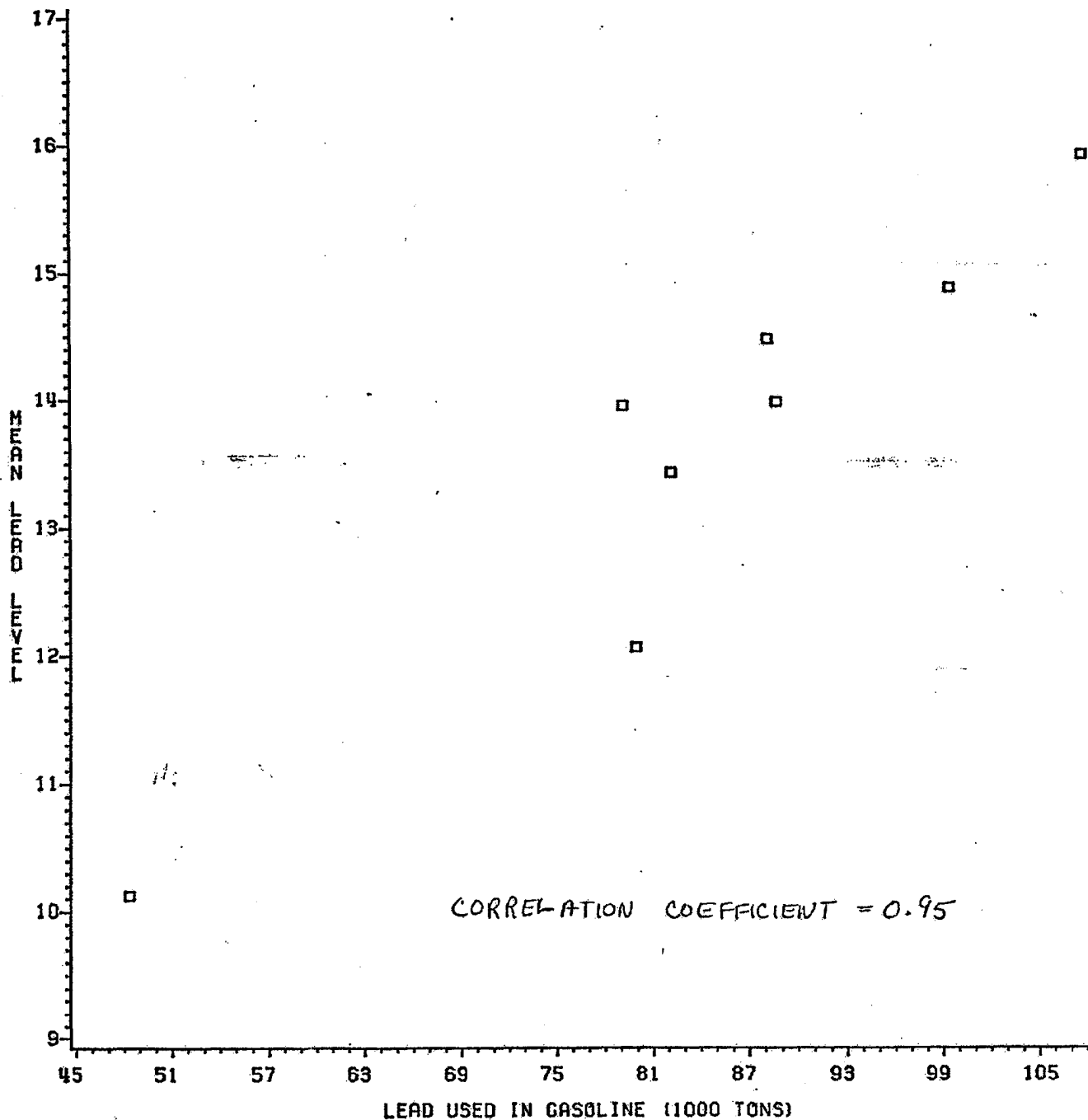


TEH 0533245

DUP050034512

NHANES II LEAD MEANS VS. LEAD USED IN GASOLINE

APRIL - SEPT AND OCT - MARCH INTERVALS



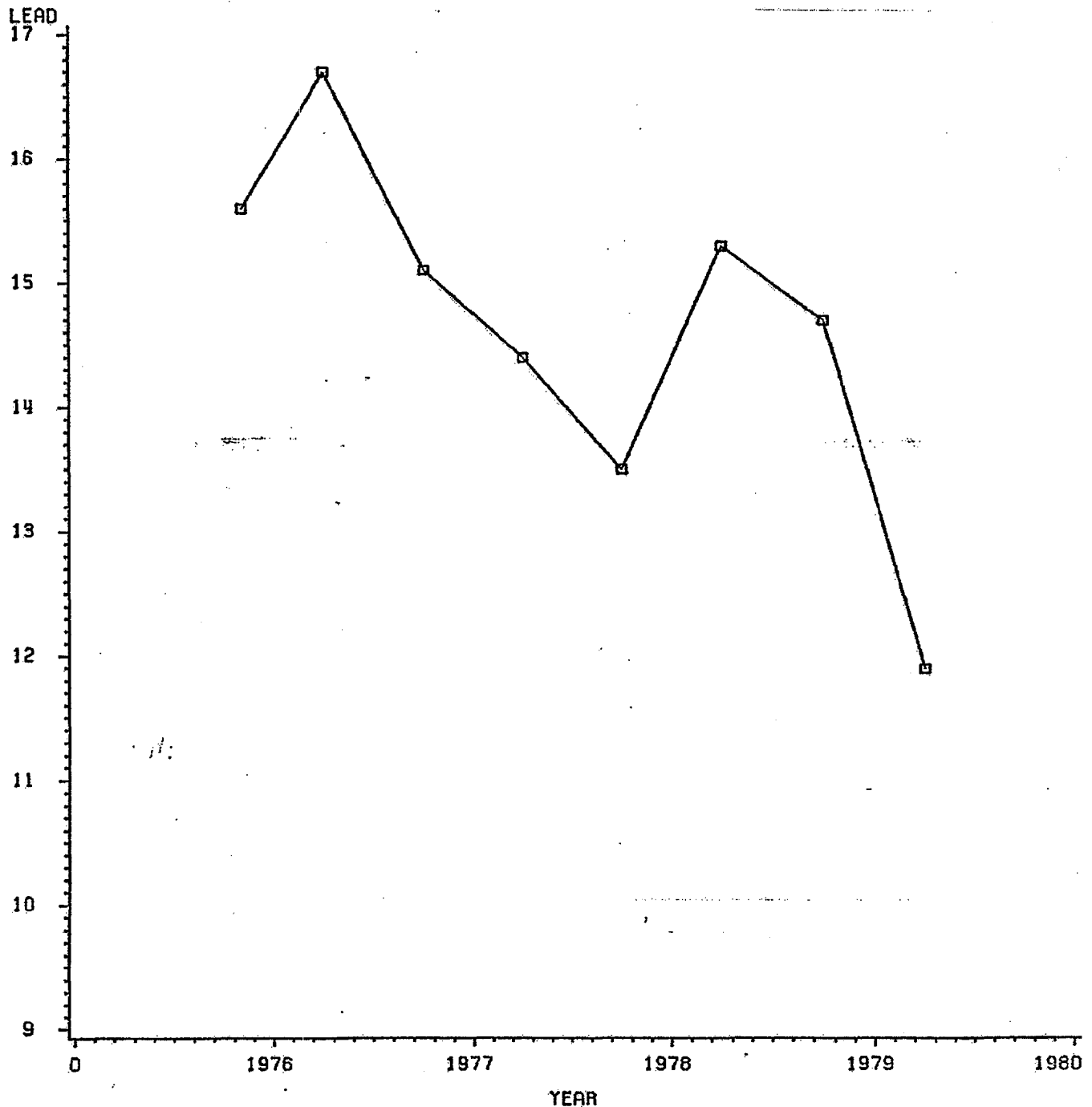
TEH 0533246

DUP050034513

NHANES II MEAN LEAD VS YEAR

JANUARY - JUNE AND JULY - DECEMBER INTERVALS

GROUP=URBAN GREATER THAN 1 MILLION POP.

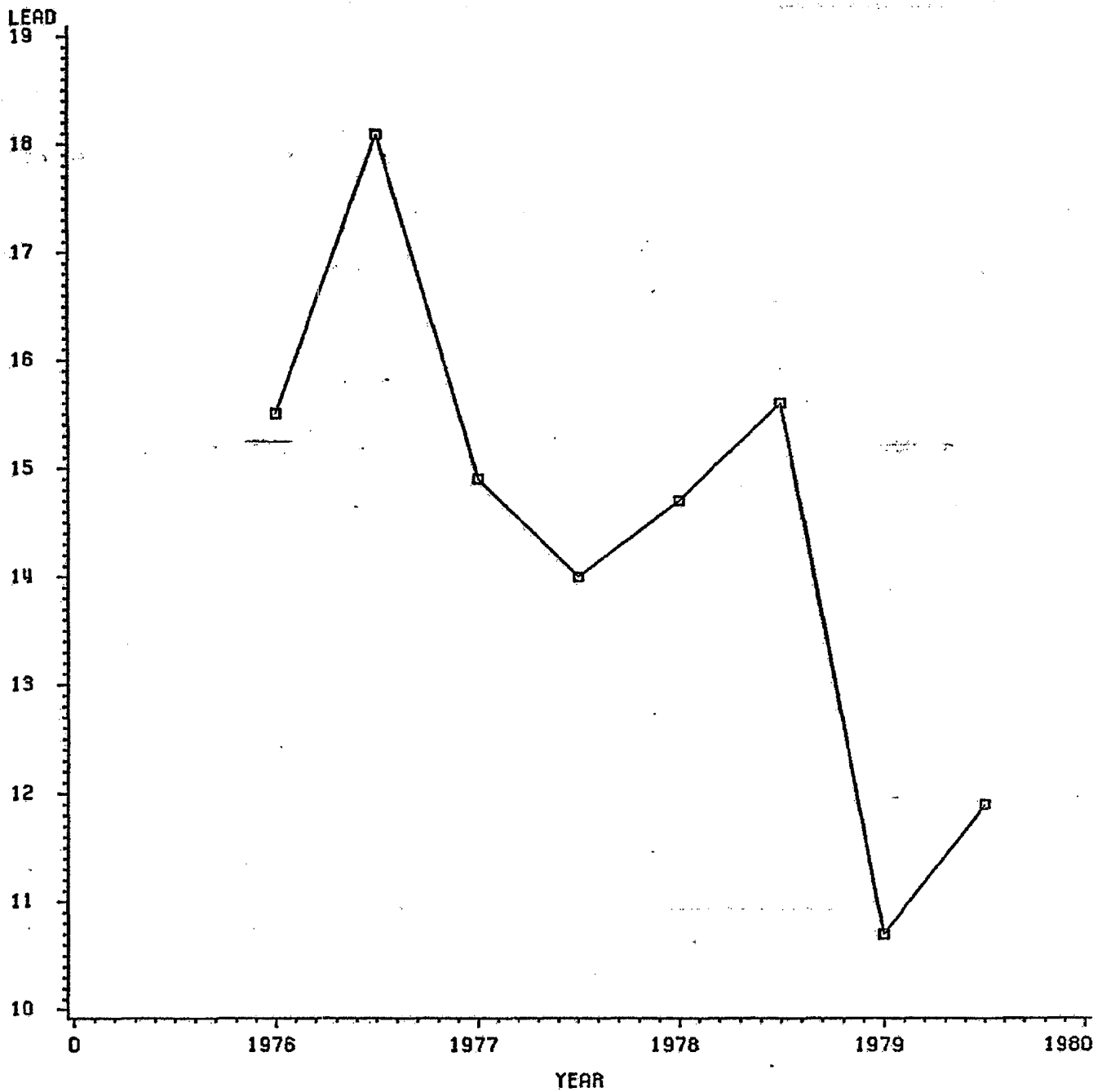


TEH 0533247

DUP050034514

NHANES II LEAD MEANS VS. YEAR

APRIL - SEPT AND OCT - MARCH INTERVALS
GROUP=URBAN GREATER THAN 1 MILLION POP.

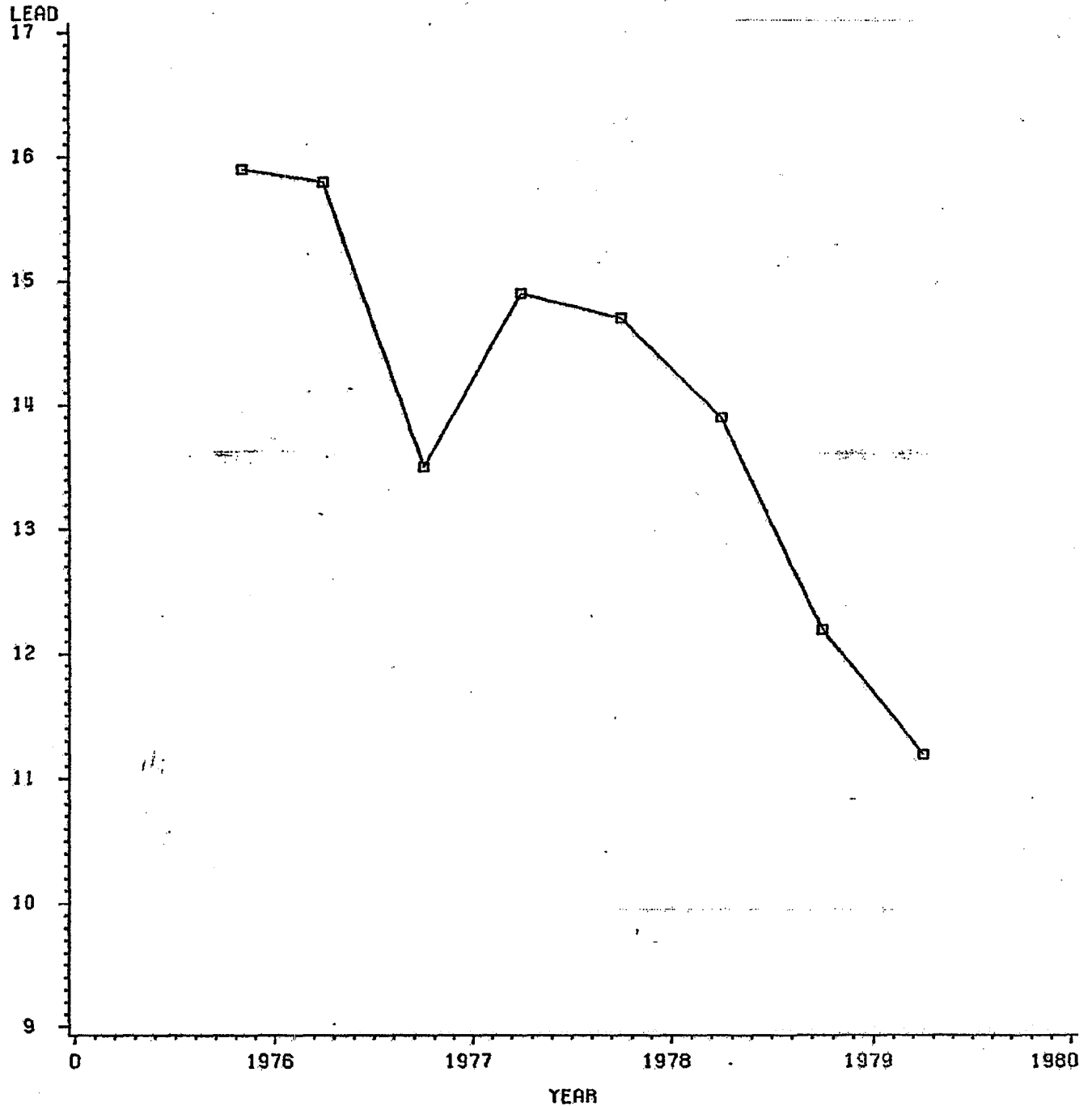


TEH 0533248

DUP050034515

NHANES II MEAN LEAD VS YEAR

JANUARY - JUNE AND JULY - DECEMBER INTERVALS
GROUP=URBAN LESS THAN 1 MILLION POP.

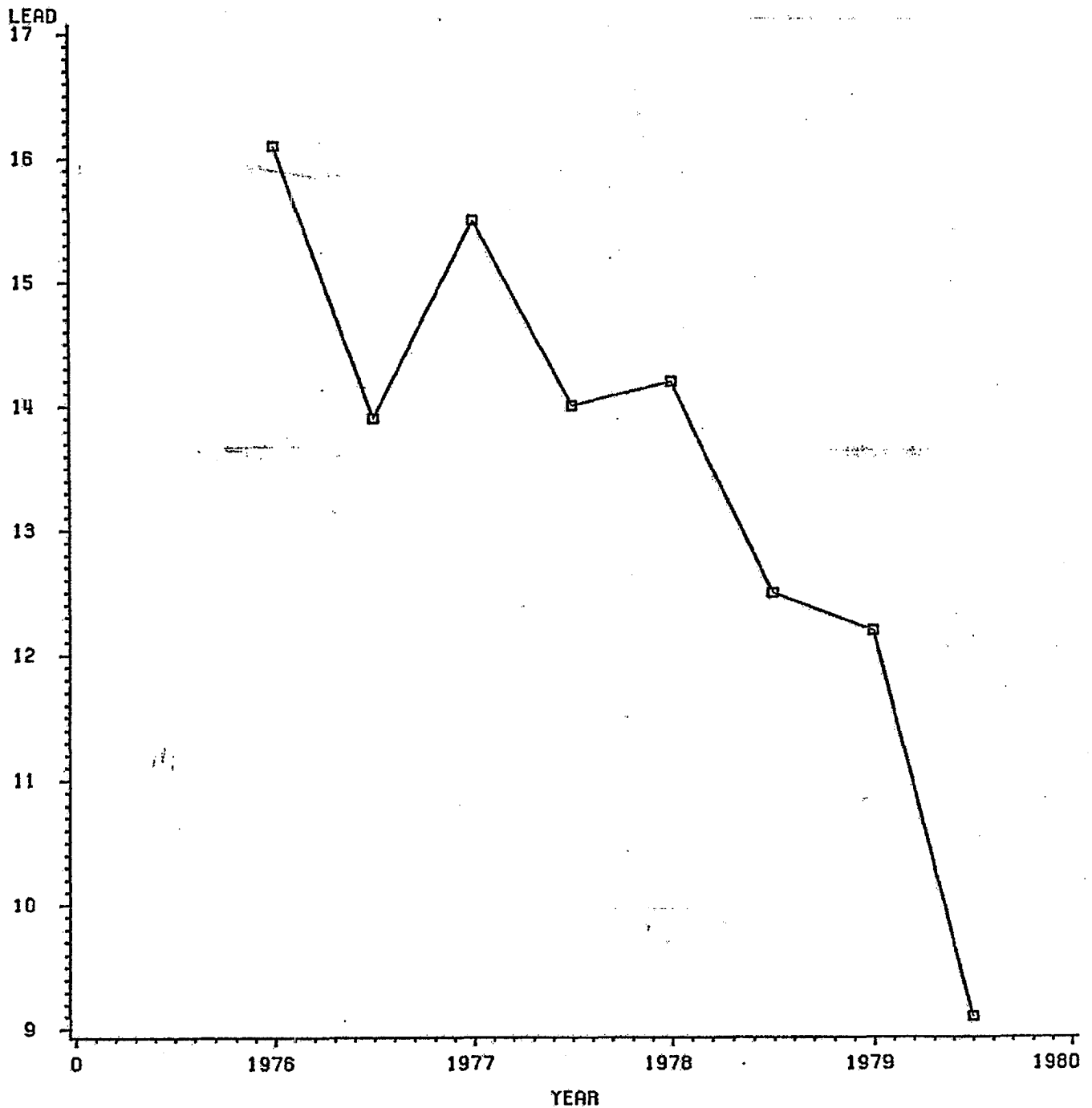


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NHANES II LEAD MEANS VS. YEAR

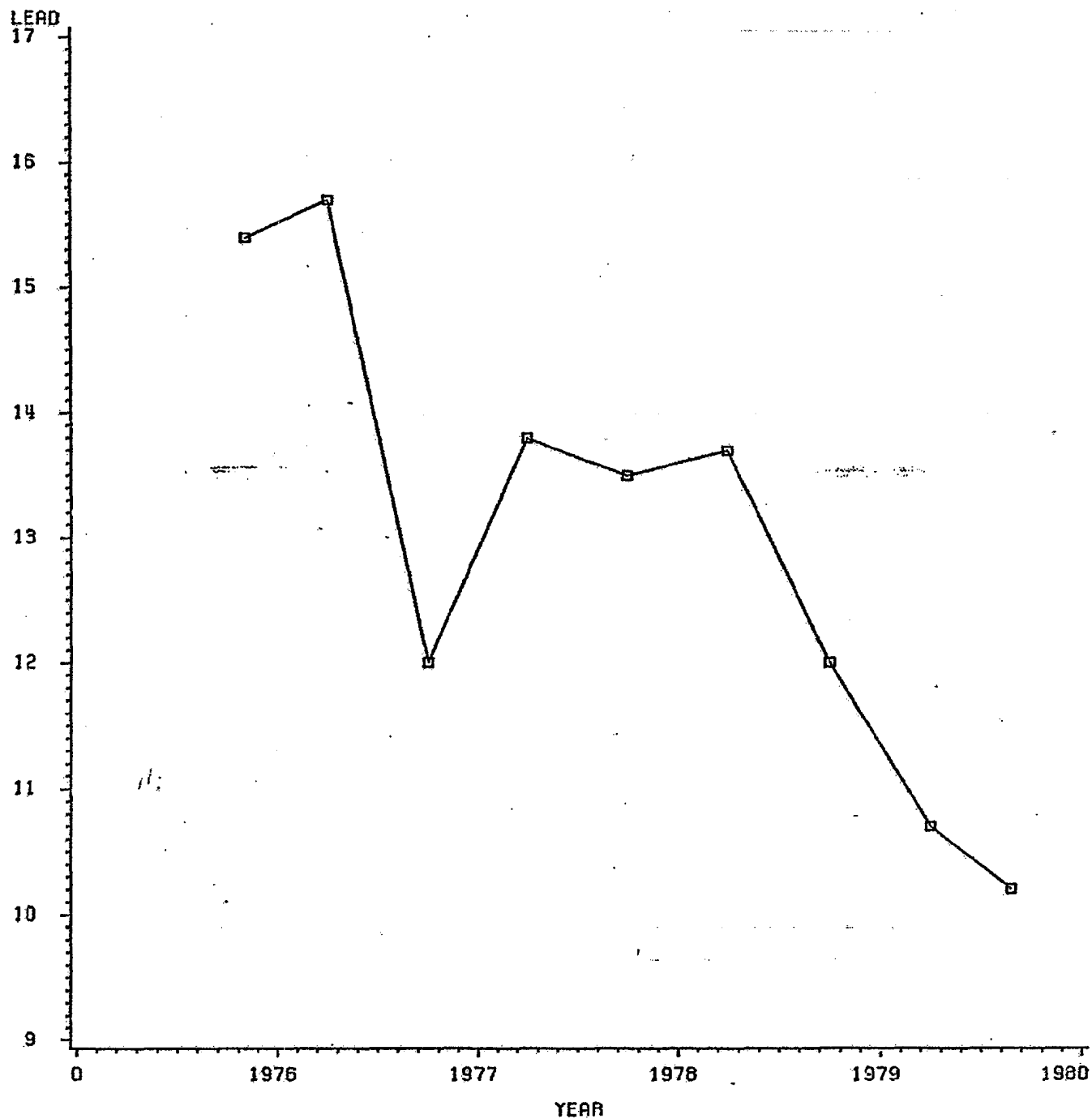
APRIL - SEPT AND OCT - MARCH INTERVALS
GROUP=URBAN LESS THAN 1 MILLION POP.



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DUP050034517

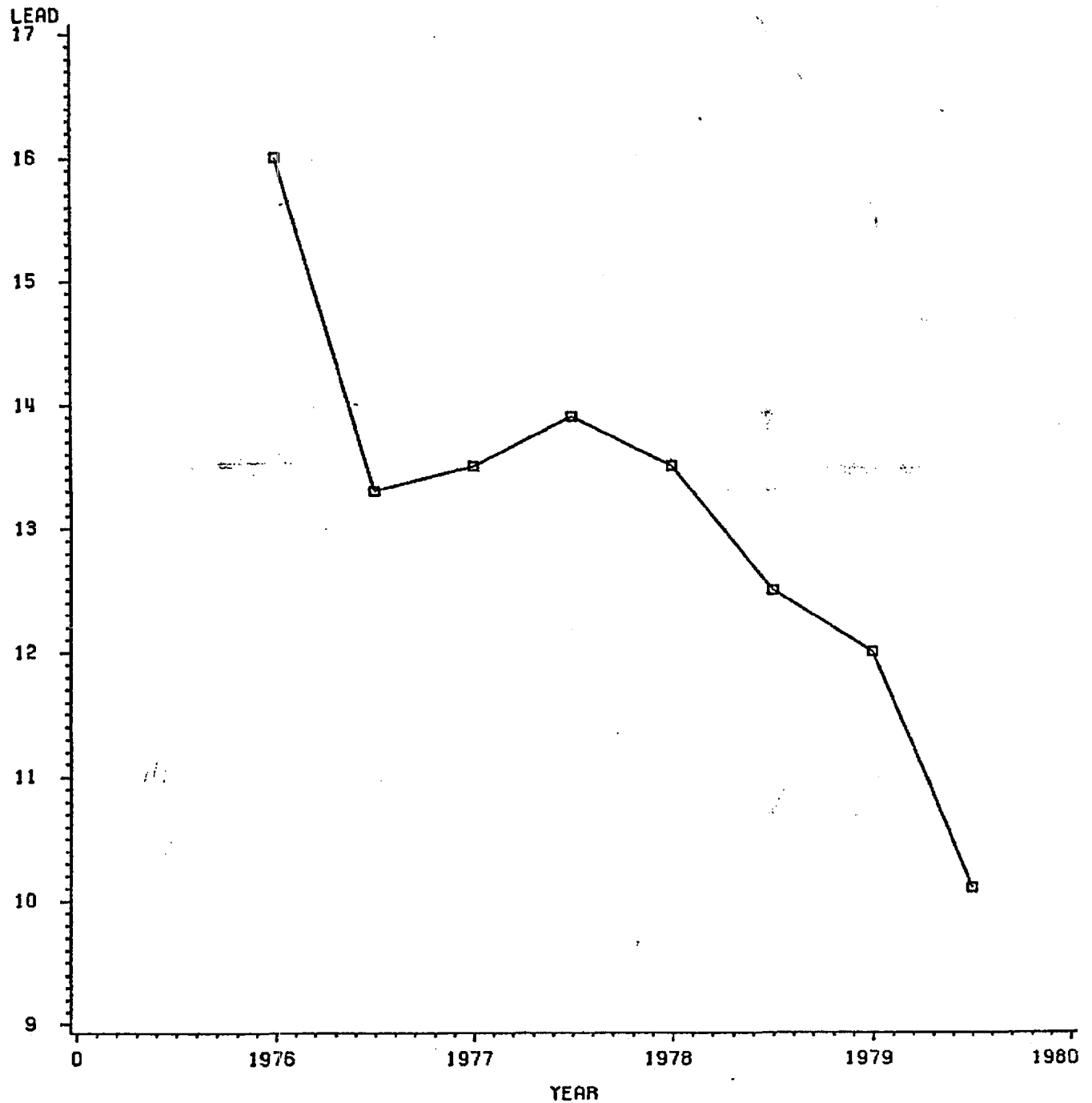
NHANES II MEAN LEAD VS YEAR
JANUARY - JUNE AND JULY - DECEMBER INTERVALS
GROUP=RURAL



TEH 0533251

DUP050034518

NHANES II LEAD MEANS VS. YEAR

APRIL - SEPT AND OCT - MARCH INTERVALS
GROUP=3

TEH 0533252

DUP050034519