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2 in the wee hours of the morning?

3 A You said "large numbers"? I would say  
4 no.

5 MR. MEISTER: No further questions.

6 THE COURT: You may step down.

7 (Witness excused)

8 MR. MEISTER: Brink's calls Dr. Bruce Levin.

9 B R U C E L E V I N, called as a witness,

10 having first been duly sworn, was examined and  
11 testified as follows:

12 DIRECT EXAMINATION

13 BY MR. MEISTER:

14 Q Sir, by whom are you employed?

15 A By Columbia University.

16 Q And are you a professor there?

17 A That's right.

18 Q What subjects do you teach?

19 A I teach theoretical and applied courses  
20 in statistics.

21 Q Could you tell us your educational background,  
22 sir?

23 A Yes.

24 I received my bachelor's degree from Columbia  
25 University in 1968, in the field of pure mathematics,

*Levin*  
*Brink*

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2 and I received my master's degree from Harvard University  
3 in 1972, also in mathematics, and in 1974 I got my PhD  
4 from Harvard University in applied mathematics and statistics.

5 Q After receiving your PhD, Doctor, did you  
6 teach?

7 A Yes, I did.

8 Q And where have you taught since 1974?

9 A At Columbia University in the Departments  
10 of Mathematical Statistics and Vital Statistics.

11 Q Sir, did you receive any honors?

12 A Yes.

13 Q What were they?

14 A I was graduated summa cum laude from Columbia  
15 University.

16 Q And in English, what does summa cum laude  
17 mean?

18 A With highest honors.

19 I'm a member of Phi Beta Kappa and I'm  
20 a member of the Honorary Scientific Research Society,  
21 known as Sigma Si.

22 Q And have you testified before in legal  
23 proceedings as an expert witness in the field of statistics?

24 A Yes, I have.

25 Q Have you published articles in the field

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2 of statistics?

3 A Yes, I have.

4 Q Sir, can you tell us in lay terms, in terms  
5 that we can all understand, what the science of statistics  
6 is?

7 A Statistics is the use of mathematical techniques  
8 to derive information from data.

9 Q And I wondered, sir, if you would be good  
10 enough to go over with me some of the concepts that  
11 were used in the field of statistics and help explain  
12 them in terms that all of us can understand, even if  
13 we're not statisticians. So let's start, if you would,  
14 with data.

15 What is data?

16 A Data is just a body of numbers that contains  
17 information about a certain quantity that we are interested  
18 in studying.

19 Q Now, would it be helpful, sir, if you could  
20 give us an example? And let's choose something which  
21 has nothing to do with parking meters but something  
22 which we would all have an everyday experience with.

23 A Well, certainly.

24 Suppose we look at life expectancy. How  
25 long does a group of individuals live or how long, on

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2 average, does a population live?

3 Q And, sir, what in that type of study would  
4 be the data?5 A The data would be just how long does everybody  
6 in this group live from birth to death?7 Q And you referred, sir, to a question of  
8 average.

9 A Yes.

10 Q What is the meaning of the word "average"  
11 in this context?12 A Well, average would be the expected lifetime,  
13 the one number that best represents how long people  
14 are going to live. Certainly some people will live  
15 longer than the average, some people will live less  
16 than the average. But on the whole, this one number  
17 best describes the expected lifetime of an individual.18 Q And in your field of statistics, are the  
19 methods of computing the number which best describes  
20 the total body of information available?

21 A Oh, yes.

22 Q Those are mathematical --

23 A Yes.

24 Q Now, sir, you said that not everyone would  
25 live to precisely the average; is that correct?A Yes  
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FOLEY SQUARE, NEW YORK, N.Y. - 791-1020

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2 Q And some people would live more and some  
3 people would live less?

4 A Correct.

5 Q Is there a term in statistics for that phenomenon  
6 on data not being precisely on the average?

7 A Yes. We refer to that as random variation,  
8 or fluctuation might be another word.

9 Q Do you always know, sir, what causes the  
10 variations of fluctuations?

11 A No, we don't always know.

12 Q Sir, is there a concept in your field known  
13 as "trend"?

14 A Yes.

15 Q And can you explain what a trend is?

16 A Yes.

17 A trend is a tendency for some numbers to  
18 vary over time. Trends can be increasing or decreasing.  
19 It's the tendency for the numbers to move with time.

20 Q Could you give us an example, assuming again  
21 your suggested life mortality?

22 A Sure.

23 Talking about the average lifetime, if we  
24 were talking about 1959, let us say -- I'm sorry, 1929,  
25 the average lifetime of an individual at birth was 59

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2 years approximately in 1929. If we move to 1949, the  
3 average lifetime of an individual was about 65 years  
4 of age. And then again as we moved to 1959, the average  
5 lifetime is closer to 65, 67 years of age, bringing  
6 us right up to the present time where the average lifetime,  
7 at best estimate, is about 67, 67-1/2 years of age.

8 So we see that as time progresses, lifetime  
9 has been increasing -- due to many factors.

10 Q And, sir, is that concept of the average  
11 changing over time this concept of trend?

12 A That's correct.

13 Q How does one determine whether or not there  
14 is a trend when one is studying that?

15 A Well, you need the data and you have to look  
16 at graphical displays of the data and you have to get  
17 as much data as you possibly can to see the overall  
18 tendency of the numbers.

19 Q And once you collect this data, what do you  
20 do with it to determine whether or not there is a trend?

21 A Well, there are mathematical techniques to  
22 apply to the data. The technical name is linear regression,  
23 but this is just a mathematical technique which shows  
24 you what the data are doing, where the numbers are going.

25 Q Sir, I think it might be helpful if you would

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2 step down from the witness stand and walk over to the  
3 easel there and just give us an example of data which  
4 shows a trend.

5 A Well, we can begin by plotting a graph. On  
6 the bottom here you might have time. Time here could  
7 represent years if we were talking about life expectancy;  
8 it could represent months if we were talking about other  
9 things. This is the axis where we are going to measure  
10 some quantity. So let's talk about lifetime.

11 Every X that I draw on this picture might  
12 represent the lifetime of an individual. Of course,  
13 I have many individuals at any particular time. And  
14 so completing this chart will give me a set of data.  
15 These X's represent the data and it says, for example,  
16 how long did somebody live in 1929? How long did somebody  
17 live in 1939? And so on.

18 There is a clear trend, as I have drawn the  
19 picture, lifetime is increasing as time progresses.  
20 Perhaps I've exaggerated the scale slightly, but the  
21 idea is that mean lifetime is increasing.

22 Q When you say "mean," is that something similar  
23 to average?

24 A That's correct. It means the same thing,  
25 average.

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2 Now I've drawn a line through these data  
3 points, and this is what we refer to as the trendline.  
4 It is simply where the average lifetime is in each of  
5 these years.

6 To be an average, I should put the line through  
7 the body of the points so that I get as good a description  
8 of lifetime as I possibly can.

9 Q Thank you, Doctor.

10 MR. MEISTER: For the record, we will mark  
11 that chart which Dr. Levin has just drawn as Plaintiff  
12 Exhibit 206 for identification.

13 BY MR. MEISTER:

14 Q Sir, in determining whether or not there is  
15 a trend and, if so, what it is, is that done by  
16 mathematical analysis?

17 A Yes, it is.

18 Q Is there a term that statisticians use for  
19 determining, in this case, whether that straight line  
20 accurately describes the trend?

21 A Well, the line is fitted by a method known  
22 as linear regression.

23 Q And that's a mathematical concept, it is  
24 not something that you just do freehand?

25 A No. That's very well defined and precisely



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2 conducted.

3 Q Now, sir, in the field of statistics, does  
4 it make a difference what group of data you collect?

5 A Oh, yes, it makes a very big difference.

6 Q Could you give us an example of why that  
7 is?

8 A Sure.

9 The idea is that if you are trying to measure  
10 something about a population, you have to be very careful  
11 that what group of data you are studying is representative  
12 of the population.

13 For example, suppose we were talking about  
14 general health and we were interested in looking at  
15 the, well, lifetime of people in New York City. It  
16 would be silly of me to take a sample of people from  
17 Iowa and measure their lifetimes and say that this  
18 represents the lifetime of people in New York.

19 Why?

20 Well, the two groups may be very noncomparable,  
21 very different. There could be biases that come up  
22 that would thwart my goal of measuring lifetime in New  
23 York City.

24 Q Cold you give us an example of the type of  
phenomenon which might be a bias in that particular

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2 study?

3 A Sure.

4 Suppose we assume that the qualify of air  
5 affects total lifetime. I'm afraid it's true that  
6 the air quality in New York City is not the same as  
7 the air quality on the farm in Iowa. We might suspect  
8 that this would lead to a shortening of life in New  
9 York City for those people who have to breathe the air  
10 daily.

11 On the other hand, there may be other factors  
12 which work in the opposite direction. People in Iowa  
13 tend to be farm workers and in jobs related to farms,  
14 and the manual labor there could be a detrimental factor.  
15 We don't really know for sure.

16 The point here is that there are so many  
17 different possible things which differ between New York  
18 City and Iowa that it would be very foolhearty to think  
19 that you are measuring what you think you are measuring  
20 by taking that noncomparable sample.

21 Q Now, sir, in analyzing a bias do you always  
22 know what effect that bias will have?

23 A No, we don't always know.

24 Q Could you just go back to your example of  
25 the pure air in Iowa versus the impurities in New York.

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2 Would that necessarily mean that people in  
3 New York life less longer?

4 A No, it does not necessarily mean that.

5 One of the big problems with this area is  
6 that things are not always as simple as they may sound.  
7 So that although it's plausible that breathing cleaner  
8 air leads to longer life, as I mentioned, cleaner air  
9 might go hand in hand with something else that tends  
10 to decrease life -- for example, strenuous labor or  
11 perhaps another reason might be just because people  
12 are breathing cleaner air, they are not being exposed  
13 to bugs which people in New York are exposed to and  
14 the immunities built up in New York might actually tend  
15 to improve the length of life. We don't know all the  
16 explanations, and it's very difficult to take them apart.

17 Q Would you agree, sir, with a statement of  
18 Former Mayor Lindsay who testified that he never trusts  
19 and breathes air that he can't see?

20 (Pause)

21 Q Sir, if one has difficulty in measuring data  
22 for different groups, what does your science try to  
23 do?

24 A Well, statistics has devoted itself for many,  
25 many years in an effort to propose methods that really

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2 try to get at the heart of the matter without all these  
3 biasing influences.

4 Two very important issues have come up. One  
5 is control. If you want to compare one group with another  
6 group, say if you want to compare an experimental drug  
7 with a standard treatment, you need a control, something  
8 that compares the new thing with the old thing.

9 The second concept is called randomization.  
10 And what randomization means is if you do want to see  
11 the effect of some treatment, you want to give it at  
12 random to patients -- some will get it, some will get  
13 the standard treatment.

14 The point of doing this is to make sure that  
15 any of the biases that come up in making a comparison  
16 will tend to average out.

17 What I mean, for example, is if you were  
18 to give the new treatment only to men and the standard  
19 treatment only to women, again, you would be introducing  
20 a bias because you don't know if the treatment is being  
21 good or bad or whether what we are just dealing with  
22 is the difference between men and women.

23 So the idea here is to control the situation  
24 and try to avoid bias from noncomparable groups.

25 Q And when you say "control," sir, that means

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2 measuring in two groups, one would be exactly the same  
3 as the other?

4 A As close as possible to that idea, yes.

5 Q And in your field of statistics, sir, is  
6 it usually the case that one can find completely comparable  
7 groups?

8 A Well, the only way to guaranty it is by the  
9 device of randomization. Apart from that -- and that  
10 actually is the exception rather than the rule in social  
11 science -- there is no guarantee.

12 Q Sir, we have heard also of the concept of  
13 seasonality. Can you tell us what seasonality means  
14 in statistics?

15 A Yes.

16 Seasonality refers to the fact that the numbers  
17 you are looking at, the data, will tend to fluctuate  
18 up and down according to months of the year or seasons  
19 of the year. So that we see swings up, swings down  
20 and when the year rolls around again, we have, again,  
21 another swing up, another swing down, and so on.

22 Q Can you give an example of that, sir, perhaps  
23 again in your field of life mortality or health or something?

24 A Sure.

25 Suppose we were looking at the number of

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2 illnesses in a given time period in New York City, just  
3 to pin things down again.

4 Well, in the winter months you can be sure  
5 that illness is going to take a swing up; in the summer  
6 months, illness is going to take a swing down. People  
7 are healthier in the summertime.

8 If you were looking at another example, say,  
9 at hayfever sufferers in the springtime and then again  
10 in the fall, we have a peak in the number of hayfever  
11 sufferers; in the winter and summer months we have a  
12 valley. So these swings up and down, up and down is  
13 what we refer to as seasonality.

14  
15  
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2 Q Is there a concept in statistics adjusting  
3 for seasonality?

4 A Yes, there is.

5 Q How does that work?

6 A What you want to do is say how much of this  
7 very high number that we are looking at is due to the  
8 fact that in general at this particular time of year  
9 we have a high number, how much of this high number  
10 is due to seasonality and how much is due to other factors.

11 In order to answer the question, we need  
12 as much data as we possibly can get in order to see  
13 the pattern over and over and over again.

14 Q You say as much data as you possibly can  
15 get; could you determine seasonality? -- well, let me  
16 withdrawn that.

17 If one had two adjacent years' data, would  
18 that in your expert opinion be a reasonable basis to  
19 judge seasonality?

20 A Hardly.

21 Q Hardly?

22 A Hardly reasonable.

23 Q Why?

24 A With merely two adjacent years' worth of  
25 data you have a real tough time in separating out how

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2 much of the swings up and down are due to seasonality  
3 and how much is just due to random chance.

4 What you need is many years worth of data  
5 so that you can see over and over and over again that  
6 we have a swing up, a swing down, followed by a swing  
7 up and a swing down.

8 Q Professor Levin, in determining seasonality  
9 is there some general amount of data which you require  
10 as a minimum to make that determination?

11 MR. GLEN: Objection as to what he requires  
12 to make a hypothetical determination.

13 THE COURT: I take it he is giving his opinion  
14 as an expert as to what he requires.

15 I will allow it.

16 A It is difficult to give a precise answer  
17 to your question. It depends very much on the context.  
18 However, in the context such as the one before us, it  
19 would take more than, I believe, two years to adequately  
20 understand the seasonality involved. I would require,  
21 at the very least, five years of data to see the swings  
22 up and down over and over again.

23 Q As an expert statistician, if it was possible  
24 to accumulate five years of data would you attempt to  
25 determine seasonality with only two?



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2 A I would be very naive in saying that my adjust-  
3 ments based on two years was as good as what I might  
4 have done with a more complete set of data.

5 THE COURT: I think this may be a good point  
6 at which to take the mid-morning recess.

7 The jurors may leave the courtroom.

8 (Jury left the courtroom)

9 THE COURT: Would the lawyers come up for  
10 a moment.

11 (Discussion off the record at the  
12 side bar)

13 (Recess)

14 (Jury present)

15 THE COURT: Please continue, Mr. Meister.

16 BY MR. MEISTER:

17 Q Dr. Levin, as a statistician, are you called  
18 upon to make statistical determinations in fields where  
19 you yourself are not an expert?

20 A Yes. That is usually the case.

21 Q In doing that do you have to make judgments  
22 about the comparability of different periods or different  
23 sets of data?

24 A Yes.

25 Q What is the basis upon which you make a

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2 judgment as an expert as to the comparability of different  
3 periods?

4 A The bottom line is always the data. You  
5 have a question about something, you look at the data  
6 and the data will tell you. That is my job.

7 Q In that connection, sir, do you sometimes  
8 rely on data provided by other persons?

9 A Yes.

10 Q Sir, have you been informed that there has  
11 been evidence in this case of a comparison of parking  
12 meter monies delivered to the City in two periods, the  
13 first, June 1979 to March 1980, which for convenience  
14 we will call the Brink's period, and the second, June  
15 1980 to March 1981 which, for convenience, we will call  
16 the CDC period?

17 A Yes.

18 Q Does the fact that those periods were of  
19 the same months in successive years necessarily mean  
20 to you as an expert that the periods are comparable?

21 A Oh, no.

22 Q Why is that?

23 A There are just too many factors that can  
24 intercede and intervene between the two time periods  
25 that would make the periods not comparable. Things

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2 change over time.

3 Q In your judgment, sir, as an expert, would  
4 a comparison of the money received by the City from  
5 collectors of parking meters in one period compared  
6 to the other necessarily be a valid measure of whether  
7 there was theft by one group of collectors or the other  
8 or, if there were, how much?

9 A No, it would not be valid.

10 Q What additional data would you need to see  
11 whether or not that was a valid comparison?

12 A Well, just from a common sense point of view,  
13 the money received by the City has gone through three  
14 stages: One, how much money did people put in the  
15 meters, to begin with, and then does the money that  
16 is in the meters stay there or does it get taken out  
17 before the regular collection and then, finally, the  
18 third step is how much money is taken out of the meter  
19 and delivered to the City.

20 If we had some guarantee that the first two  
21 steps were the same in each of the two time periods,  
22 money put into the meters is the same for Time 1, Time  
23 2, and that the money stays in the meter and doesn't  
24 get taken out, then we would have a reasonable assurance  
25 that the difference between revenues is a measure of

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2           possible theft.

3                           In this case, though, there is no such assurance  
4           and --

5                           MR. GLEN:    Objection.

6                           A           -- and in the absence of that, the comparison  
7           is not strictly valid.

8                           Q           Sir, have you been given any information  
9           which would indicate that there were differences in  
10          these two periods attributable to factors other than  
11          theft?

12                          A           Yes, I have.

13                          Q           Before you go beyond that, were you given  
14          information of the type which you could customarily  
15          rely on as an expert statistician in determining whether  
16          or not there might be confounding factors or biases  
17          affecting the comparison in the two periods?

18                          A           Well, yes.   The suggestion of possible factors  
19          must come from somebody knowledgeable in the field and  
20          I had the opportunity to read news accounts of New York  
21          City's Traffic Commissioner Thomas Guthrie and Assistant  
22          Commissioner Hochstein and they indicated that there  
23          were possible factors that would be in operation here  
24          that could be the cause of this bias, the Traffic Commissioner  
25          Guthrie, said that there was a change in the type of

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2 meter, there was increased security. I believe he mentioned  
3 that --

4 MR. GLEN: Objection and move to strike  
5 as to the double hearsay, what the commissioner allegedly  
6 said through a newspaper account.

7 THE COURT: Yes. It seems to me that neither  
8 of these persons were witnesses at this trial. You  
9 are relying on hearsay information completely?

10 MR. MEISTER: Under Rule 703 --

11 THE COURT: I will allow you to cross examine  
12 him. I suppose an expert can take into account anything  
13 that he thinks is relevant.

14 Q Please continue, Doctor.

15 A The removal of meters from high-vandalism  
16 to low-vandalism areas, from low revenue to high revenue  
17 areas. These are factors I take from the experts as  
18 possible confounders, and these are factors which I  
19 would seek data for to see indeed if they were constant  
20 in the two periods and, if not, to look with some suspicion  
21 at a comparison of the two periods.

22 Q Doctor, I am going to hand you an exhibit  
23 marked Plaintiff Brink's Exhibit 205 for identification  
24 and I ask you whether these are copies of the newspaper  
25 articles that you have just referred to quoting

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2 Traffic Commissioner Guthrie and Deputy Commissioner  
3 Hochstein.

4 A Yes, these are the articles.

5 MR. MEISTER: We offer them for the purpose  
6 of showing the facts upon which Dr. Levin is relying.

7 MR. GLEN: Objection. He testified the  
8 source of his informaton was reading in the newspaper,  
9 but if the documents go in, they will necessarily imply --

10 THE COURT: Yes, I sustain the objection.  
11 The witness has testified what he relied upon and I  
12 am allowing that to remain, his sworn testimony to tell  
13 you what he relied upon.

14 Q Sir, I want to ask you to assume with me  
15 a number of facts and then at the end I am going to  
16 ask you whether in your judgment as an expert statistician  
17 these factors might be biasing factors which would affect  
18 the validity of a comparison between these two periods,  
19 the Brink's period and the CDC period.

20 Would you assume, sir, that there was a gasoline  
21 shortage from May to December, 1979 and that during  
22 the months of June through September 1979 odd-even gasoline  
23 rationing was imposed in the New York City areas.

24 Would you assume also, sir, that a year later,  
25 in June to August of 1980, there was a strike of the

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Port Authority Trans-Hudson trains, which bring commuters  
into New York from New Jersey and that data from the  
Port Authority of traffic crossing the various bridges  
and tunnels servicing New York and New Jersey showed  
that in that period automotive traffic increased.

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Would you assume also, sir, that of the two ten-month periods there was an increase of 3.4 percent, or 875,000 cars per months, in arterial traffic in and around the New York City area.

Would you further assume, sir, that in the latter period, the CDC period, there was a 12 percent increase in summonses issued for overtime parking at meters, or an increase of 20,000 more summonses per month.

Finally, sir, would you assume that during the Brink's period there were 6.6 percent greater number of passengers using mass transit, subways and buses, or 8,600,000 more passengers per month than there was in the CDC period.

Would those factors, sir, in your expert judgment as a statistician, be factors indicating that there might be increased use of the parking meters in that period to the extent that you would require data to support the comparability or non-comparability of the two periods?

MR. GLEN: Objection. Calls for conclusions outside his field of expertise.

THE COURT: Overruled.

A Yes, I would think that these quite definitely



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are potentially confounding factors that would go to saying there was an increased usage in meters..

In fact, one of the very first lessons we teach statistician students is that you have to be very, very careful in uncontrolled situations about factors precisely of this nature that would cause a bias in the comparison.

Q        Sir, would you also assume that in that period -- would you also assume, Professor, that from one period to the other parking meters were systematically removed from the City from areas where they were not to be unproductive because they were low-revenue or high-vandalism areas, and parking meters were systematically installed in areas which were thought to be high-revenue, low-vandalism, or where there was an unsatisfied demand for parking.

Do you have an opinion you can express with a reasonable degree of certainty as an expert statistician as to whether those factors would be possible confounding factors or biases affecting the validity of a comparison of those two periods for purposes of determining --

A        Yes, I do. These factors again are confounding factors, very definitely.

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2 Q Sir, I hand you an exhibit, Exhibit 266  
3 in evidence, which purports to show a computer comparison  
4 of revenue-affecting defects during the ten months which  
5 are the Brink's period compared to the ten months in  
6 the latter year, which is the CDC period.

7 My first question is whether you have examined  
8 that before?

9 A Yes, I have.

10 Q Would you turn to the second page, sir,  
11 and I ask you, Professor, have you performed a calculation  
12 wherein you added up the greater number of lost meter  
13 days during the seven months shown there in the Brink's  
14 period --

15 MR. GLEN: Objection. I believe they are  
16 referred to as revenue generating days on that exhibit.

17 MR. MEISTER: No. I am asking the lost  
18 meter days, sir.

19 MR. GLEN: I don't think it is there.

20 A Yes, I have.

21 Q What is the total number of lost meter  
22 days due to revenue-affecting defects which was greater  
23 in the Brink's period than in the CDC period to the  
24 degree that that seven-month comparison can show you?

25 A May I refer to some notes I have prepared?

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1 rmlt 4

Levin-direct

2 Q Of course.

3 A The total number of additional lost meter  
4 days is 302,954 additional lost meter days in the Brink's  
5 period over the CDC period.

6 Q I ask you to assume that a witness for  
7 the City has testified that in his opinion during that  
8 period on average there should have been returned to  
9 the City 94.7 cents for each meter day.

10 Can you multiply the number of greater  
11 lost meter days by that assumed 94.7 cents to determine  
12 what effect that greater number of lost meter days would  
13 have on actual revenue if the figure of 94.7 cents per  
14 meter day is correct?

15 MR. GLEN: Objection.

16 The testimony of the City's witness took  
17 into account the differences in the number of days the  
18 meters were operating and there is no such testimony  
19 and the hypothetical cannot be based on that.

20 THE COURT: I will let him multiply the  
21 94.7 cents by the number of days. That is all I will  
22 permit him to do.

23 A The answer is \$286,897.

24 Q That is for the seven months where there  
25 was a comparison?

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1 rmlt 5 Levin-direct

2 A That's correct.

3 Q Is there a way of extrapolating or calculating  
4 what that would be on a ten-month basis, assuming that  
5 seven months is representative?

6 MR. GLEN: Objection.

7 THE COURT: I don't understand the objection.  
8 You are offering the two ten-month periods. Why shouldn't  
9 he be permitted to multiply out what the dollar amount  
10 is?

11 MR. GLEN: The hypothetical on which it  
12 was based assumed what a witness said and it has nothing  
13 to do, in fact, with what the witness testified to.

14 THE COURT: Well, get the witness' testimony  
15 and use the precise language of the witness now. We  
16 will take the time out and get the exact statement the  
17 witness made.

18 Mr. Meister, do you have it? You say you  
19 are relying on it. What is the citation of it?

20 MR. MEISTER: The only thing I am relying  
21 on is Dr. Fairley's assumption --

22 THE COURT: Since Mr. Glen made the objection,  
23 suppose you find it, Mr. Glen.

24 MR. GLEN: I'm working on it, your Honor.

25 THE COURT: I want the exact testimony

1 rmlt 6 Levin-direct

2 of the witness.

3 (Pause)

4 MR. MEISTER: I have it, your Honor. That  
5 is Page 1852:

6 "Q Did you obtain an average during  
7 the CDC period?

8 "A Yes. That is 94.7 cents."

9 MR. GLEN: That is not the point of my  
10 objection.

11 I will withdraw the objection and handle  
12 it on cross, your Honor.

13 THE COURT: All right.

14 A Yes, I just did the computation and the  
15 answer is for the ten-month period it amounts to \$409,853.

16 Q Sir, would you regard that difference in  
17 revenue-affecting defects of meters as a possible bias  
18 affecting the validity of these two ten-month comparisons?

19 A Yes.

20 Q Sir, adding up all these potential biases,  
21 do you have an opinion that you can state with a reasonable  
22 degree of certainty as to whether or not these two ten-  
23 month periods under this set of circumstances appear  
24 to be comparable?

25 A I do have an opinion.

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1 rmlt 7 Levin-direct

2 Q And what is that?

3 A All the factors that have been mentioned  
4 so far this morning lead me to believe that there is  
5 a strong possibility that these are not comparable periods.

6 Q Did you do any tests to determine or to  
7 illustrate whether or not within these two periods poten-  
8 tially biasing factors make the ten-month comparison  
9 a less than satisfactory period?

10 A Yes.

11 Q What did you do?

12 A Well, the first thing is, I compared the  
13 total revenue for Brink's and the total revenue for  
14 CDC in the ten-month comparison periods, and then I  
15 looked at the same comparison only using the last six  
16 months of the same time periods. So that would be from  
17 October to March in each year.

18 Q And that would be, sir, a period which  
19 would not include the portion of the gas shortage in  
20 which there was odd-even gas rationing, or the portion  
21 in 1980 in which there was the PATH strike --

22 THE COURT: May I respectfully suggest  
23 that you allow the witness to testify? You are certainly  
24 putting leading questions to him. Let the witness testify.

25 MR. MEISTER: Fine.

1 rmlt 8

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2 Q Doctor, I am going to show you a document  
3 marked Plaintiff Brink's Exhibit 280 for identification  
4 and I ask whether this is an enlarged copy of your comparison  
5 chart.

6 A Yes, it is.

7 MR. MEISTER: Your Honor, we will offer  
8 this in evidence.

9 MR. GLEN: No objection.

10 (Plaintiff's Exhibit 280 was received  
11 in evidence)

12 Q Doctor, may I display Exhibit 280 on this  
13 easel here and ask if you would be good enough to step  
14 down from the witness stand and point out to the Court  
15 and jury what that chart is and what in your judgment  
16 it shows?

17 A What this chart shows is a comparison of  
18 revenues received by the City and it is total revenues  
19 and it is in thousands of dollars.

20 So that means that wherever you see a number,  
21 you multiply it by a thousand.

22 So in June of 1979 through March of 1980,  
23 which was the Brink's period, total revenues was \$17,141,000.

24 In the next period it was \$18,160,000.

25 This increase, from 17 to 18 million dollars,

1 rmlt 9 Levin-direct

2 is a 5.9 percent increase in the ten-month period.

3 When we come over to the six-month comparison  
4 period, from October to March, the total revenue is  
5 \$10,482,000 and that goes up to \$10,755,000, a much  
6 smaller increase, that is, a 2.6 percent increase.

7 So the point here is that when you go from  
8 ten months and chop off the first four months, the period  
9 where these factors of the PATH strike and the gasoline  
10 rationing no longer is in effect, you see the percentage  
11 increase is much smaller.

12 (Continued on the next page)

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Levin-direct

Q Professor Levin, does that indicate to you anything about the comparability of the entire ten-month periods?

A Well, it suggests that the two periods are not meeting the ideal of comparability.

Q Now, sir, did you do another comparison of these ten-month versus six-month periods?

A Yes.

In addition to total revenue, I looked at average daily revenue.

Q What do you mean, sir, by "average daily revenue"?

A When I use the words "average daily revenue," what I mean is the amount of money collected on each collection day, on average. So I don't mean thirty days in a month because there weren't that many collections.

If there were twenty collections in a given month out of a total of -- and a total revenue \$1 million was received, then \$1 million divided by 20 would be the average revenue per collection day.

Q Did you make such a comparison for the ten-month periods compared to the later six months of those periods?

A Yes, I did.

1 prlt

Levin-direct

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2 Q I show you a document marked Plaintiff's  
3 Exhibit 281 for identification, with a copy of that  
4 for the Court, and ask whether this is the chart showing  
5 that comparison?

6 A Yes.

7 MR. MEISTER: We offer this in evidence.

8 MR. GLEN: No objection, your Honor.

9 THE COURT: Received.

10 (Plaintiff's Exhibit 281 was received  
11 in evidence)

12 Q Doctor, putting this on the easel, could  
13 you again step down and examine Exhibit 281 in evidence  
14 and explain it to the jury and the Court?

15 A Well, this is a chart of average revenues  
16 per collection day received by the City. Once again,  
17 the units are in thousands of dollars. On average,  
18 what this means is -- what this means is, on average,  
19 in the ten-month period, 82.8 thousand dollars was collected  
20 on each collection day.

21 Q And that, sir, is in the Brink's period?

22 A Correct.

23 In the CDC period, the figure went up by  
24 5.9 percent.

25 Moving over to the six-month period of

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Levin-direct

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2 time, once again we see that the increase goes from  
3 85.2 thousand dollars per collection day to 88.2, and  
4 that's a 3.5 percent increase. And so again we see  
5 a reflection of the lessening in the increase. And  
6 again, one conclusion that you can draw from this is  
7 that there is something different about these two time  
8 periods.

9 THE COURT: Before you leave that, may  
10 I ask you a question?

11 Both on the prior chart and this chart  
12 you have the 5.9 percent and the 2.6 percent. What  
13 is the dollar amount of the 5.9 percent and the 2.6  
14 percent?

15 THE WITNESS: Well, it would just be the  
16 differences in --

17 THE COURT: Well, I'm asking you to compute  
18 it. What is the dollar amount?

19 THE WITNESS: I see.

20 The difference is \$1,019,000.

21 THE COURT: What does 5.9 percent come  
22 to, in terms of dollars?

23 THE WITNESS: Well, if I understand your  
24 question, your Honor, is the additional \$1 million roughly--  
25 well, the additional \$1 million roughly is a fraction

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1 prlt Levin-direct  
2 of \$17 million, which is 5.9 percent.

3 THE COURT: And what is the 2.6 percent?  
4 Give me that figure again, please. Let me have my exhibit,  
5 please.

6 THE WITNESS: Yes, sir.

7 THE COURT: The 5.9 percent comes to what?

8 THE WITNESS: That's \$1,019,000.

9 THE COURT: And the 2.6 percent?

10 THE WITNESS: That is \$273,000.

11 THE COURT: On your other chart, the 5.9  
12 percent comes out to what? That's a comparison of average  
13 revenues per collection day.

14 THE WITNESS: That is 4.9 thousand dollars,  
15 so that would be \$4,900.

16 THE COURT: And the 3.5 percent is?

17 THE WITNESS: That would be \$3,000.

18 THE COURT: All right. Thank you.

19 BY MR. MEISTER:

20 Q Now, Doctor, on the basis of those comparisons  
21 shown on Exhibits 280 and 281, does that give you, sir,  
22 the basis to form an opinion as to whether or not your  
23 judgment before about the comparability or noncomparability  
24 of the periods is illustrated by those data?

25 A Yes, I do have an opinion.

1 prlt

Levin-direct

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2 Q And what is that?

3 A I think the charts clearly show that there  
4 is a non-constant trend going on here; things are changing.

5 Q Now, sir, I hand you a document which has  
6 been introduced into evidence in this case as Brink's  
7 Exhibit 63.

8 I represent to you, sir, that on the second  
9 and third pages, the first columns represent computations  
10 by a prior witness, of the dollars per meter day actually  
11 received by the City, the first and the second page  
12 for the Brink's period and the second one for the CDC  
13 period.

14 Have you examined that data?

15 A Yes, I have.

16 Q What did you do in your examination?

17 A What I did was, I took the ten numbers  
18 in the one period and the ten numbers in the other period  
19 and plotted them on a chart, much the same as the chart  
20 I drew earlier this morning.

21 I then looked at the data and asked the  
22 question: Is there any evidence of a trend here?

23 Q And what kind of a trend were you testing  
24 for?

25 A I was looking for a straight-line trend.

1 prlt Levin-direct

2 I used the method I referred to earlier, linear regression,  
3 to fit a straight line to the data points. This was  
4 how I approached the question of trend.

5 Q And, sir, did you do that by hand?

6 A No, I didn't. I actually used a computer.

7 Q Is that the computer that you customarily  
8 use in the ordinary course of your business?

9 A Every day, yes.

10 Q Is that computer programmed with a standard  
11 statistical formula to test data for trends?

12 A Yes.

13 Q And did you use that standard statistical  
14 formula?

15 A Yes, I did.

16 Q Is that the one known as the method of  
17 least squares?

18 A Yes, it is.

19 Q And what did you find?

20 A I found that there was a trend, in fact  
21 a strong trend, if I may refer to my notes again.

22 Q Please do, sir.

23 A Over the twenty-two month period, there  
24 was an upward slope, if you will, and the amount of  
25 that slope was .48 cents per meter day per month.

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Levin-direct

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2 In other words, every month that went along,  
3 on average, the revenue per meter day increased by .48  
4 cents.

5 Q What would that be, sir, comparing one  
6 month with the identical month twelve months later?

7 A Well, on a yearly basis, then, you take  
8 .48 and you multiply by 12 and you get 5.47 cents per  
9 meter day yearly increment.

10 Q Now, sir, did you employ any mathematical  
11 test to determine how strong or valid a trend this was?

12 A Well, yes. I have two ways of talking  
13 about that. The first is a measure of the correlation  
14 between time progressing and revenue increaseing, is  
15 known as the correlation co-efficient.

16 Correlation co-efficient is a number ranging  
17 from plus one through zero to minus one.

18 Now, plus one, in a corrleation co-efficient,  
19 means that it is a perfect correlation, you have perfect  
20 predictability.

21 Q Do you ever find that in real life?

22 A Only in artificial circumstances.

23 If I say 1, 2, 3, 4 and 2, 4, 6, 8, there  
24 is a perfect correlation there because you can predict  
25 what the next number is based on what preceded it.

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prlt Levin-direct

But in real life, no, one never finds perfect correlations.

A value of zero correlation means that there is no relationship. So that as time progresses, the revenues can fluctuate without any bearing on time.

Now, what I found for the 22-month period was a correlation co-efficient of .62.

Q Now, sir, do you have a judgment as to whether in the field of statistics that's a strong or a weak correlation?

A Yes, I do.

Q What is it?

A Judging from other areas in social science, a correlation of 60 percent, 62 percent, is considered a rather strong correlation.

Q Could you give us an example of something unrelated to parking meters with which we might be familiar where you could judge the correlation for a point of comparison?

A Yes, well, one very interesting example is in the area of college entrance examination scores. College students in preparing to go to college take exams. They are called SAT exams. You get a score on them. And then those who are successful in going



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2 to college, go and take their courses, and at the end  
3 of a year, they have a grade point average, which is  
4 a measure of their performance in scholastic endeavors  
5 at college.

6 Now, you would think that the SAT test,  
7 which has been explicitly designed to predict good perform-  
8 ance, who is going to be a good student, would have  
9 a high correlation with grade point average. Surprisingly  
10 enough, the correlation tends to be rather low in the  
11 area of between 40 percent, 50 percent correlation.  
12 So I use this as an example to indicate that correlations  
13 in social science is all not that high and that 60 percent  
14 is fairly high.

15 THE COURT: Does that mean that the performance  
16 doesn't equal the prediction?

17 THE WITNESS: Yes.

18 THE COURT: Is that called a predictability  
19 factor?

20 THE WITNESS: Predictability is involved.  
21 You make a prediction based on the SAT and if your criteria  
22 is the grade point average, then the 40 percent correlation  
23 that I mentioned indicates a rather poor result, yes.

24 (Continued on the next page)

1 PRJw Levin - direct

2 BY MR. MEISTER:

3 Q Doctor, was a chart prepared depicting in  
4 graphic terms this trend which you found on the 20 data-  
5 points in this 22 months as given to you by Dr. Fairly's  
6 exhibit?

7 A Yes.

8 Incidentally, I had another point to make. XX

9 Q Oh, please continue.

10 A If I may. I said there were two ways I looked  
11 at the degree of the relationship. The second method  
12 I looked at is a significance test. What this is is  
13 simply asking a question: Could I have made an error  
14 by just random chance producing a line with a big tilt?

15 Statisticians addressed this question by  
16 saying: Well, if there is no tilt at all -- and this  
17 was just random variation -- what probability do I have  
18 of making such an erroneous conclusion?

19 You look at that by what's known as the T  
20 statistic. My conclusion is that there is very, very  
21 small probability that the trend that I'm talking about  
22 was caused by chance.

23 Q Now, Doctor, I now hand you an exhibit marked  
24 as Brink's Exhibit 269 for identification and ask whether  
25 this is the chart which was prepared showing those data

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1 2 PRjw

Levin - direct

2 from Dr. Fairley's exhibit and your trendline superimposed  
3 on it?

4 A Yes, it is.

5 MR. MEISTER: We offer it in evidence.

6 MR. GLEN: No objection.

7 THE COURT: Received.

8 (Plaintiff Exhibit 269 was received  
9 in evidence)

10 BY MR. MEISTER:

11 Q Now, Doctor, could you step down and explain  
12 to the Court and jury what Exhibit 269 shows?

13 A Yes.

14 This is a comparison of revenue received  
15 by the City from Brink's and CDC and the unit here is  
16 collections per meter day. So along this axis here,  
17 the vertical axis, we have cents. This would be revenue  
18 in cents per meter day.

19 Q Now, sir, that chart is prepared on the basis  
20 that the very bottom is zero without any abbreviation.

21 Is that correct?

22 A That's correct.

23 Q So that is designed to show the entire accurate  
24 picture?

25 A That's correct.

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1 3 PRjw Levin - direct

2 Q Please continue.

3 A Along the bottom we have the months of the  
4 year set out from June of 1979 through March of 1981.  
5 And now the points that we are plotting here are the  
6 points which I believe you have seen before through  
7 Dr. Fairley's testimony.

8 What I have done is put on a trendline that  
9 goes through the entire body of data. You can see that  
10 the trendline shows an increasing tilt to it.

11 Q Is that the blue line there in the middle  
12 of the gray band?

13 A That's correct.

14 This is the trendline that I was referring  
15 to. If you look at a one-year change in time, you will  
16 note that the line increases by about 5.74 cents per  
17 meter day in that one-year period.

18 Q Now, sir, what is that gray band that is  
19 on either side of the trendline?

20 A The gray band is a measure of statistical  
21 uncertainty in the data.

22 What I mean is, you see that the points do  
23 not all lie exactly on the blue line; they bounce up  
24 and down, that is, above and below the line. That is  
25 caused by fluctuations, random fluctuations or some

1 4 PRjw Levin - direct

2 other factors which we don't know for sure, which cause  
3 things to differ from the average line.

4 The gray band is a measure that statisticians  
5 use to say: Well, what is the likely variation that  
6 I can expect from data such as these?

7 95 percent of the time we would expect points  
8 to lie within the gray band; 5 percent of the time,  
9 just by random chance, points will go outside of the  
10 band. So here you see a point that lies outside the  
11 gray band. This is not particular noteworthy. We  
12 would expect one in 20 points to be outside of this  
13 band. This band is called the 95 percent confidence  
14 band.

15 Q And, sir, the point you pointed to was January  
16 of 1981?

17 A I believe that's correct, yes. Or is it  
18 February? I believe it's February.

19 Q Would you perhaps look at Exhibit 61, the  
20 data which is in front of you, which would be the third  
21 page of that exhibit.

22 A It would be eight months into the comparison  
23 period. So yes, you're right, that is January.

24 Q Now, Doctor, is the consideration of trends  
25 within that 95 percent zone a standard statistical technique?

1 5 PRjw Levin - direct

2 A Yes, it is. It is a confidence band about  
3 an assumed correct progression line.

4 Q Now, incidentally, Doctor, when were you  
5 given the data contained in Exhibit 61 from Dr. Fairley?

6 A I believe that I saw it for the first time  
7 last week sometime.

8 Q And how long did it take you to take that  
9 data and put it into the computer to test for this single  
10 trend throughout the entire period?

11 MR. GLEN: Objection.

12 THE COURT: Well, I don't see that it makes  
13 any difference, but I'll let him answer, whether he  
14 took a week or a month.

15 A Well, in fact, it took me two minutes to  
16 enter the numbers into my terminal on the computer,  
17 and it took the computer a fraction of a second to come  
18 up with the result.

19 Q Now, sir, did you also examine the same set  
20 of data from Exhibit 61 to see whether this pattern  
21 could be explained by a different phenomenon, of instead  
22 of one single trend two periods, the Brink's period  
23 and the CDC period, in which there were separate data  
24 and separate trends or no trends?

25 A Yes, I did.

1 6 PRjw Levin - direct

2 Q And what did that comparison show?

3 A Well, just to preface my answer, it seems  
4 like an important question here might be: Is there  
5 one line or two lines? And I performed a statistical  
6 test testing whether or not the additional improvement  
7 in the fit when you use two lines rather than one line  
8 was significant.

9 This is just a way of saying whether or not  
10 we can say that the data have any strong evidence to  
11 suggest that there is anything but a single line here.

12 Well, I did that test. I found that there  
13 was no significant improvement in the fit, that is,  
14 going from one line to two lines. The conclusion then  
15 is that there is no sufficient weight of evidence in  
16 these numbers here to suggest that there is a need for  
17 two lines; a single line does the job just as well.

18 Q Now, sir, in your judgment, would that single  
19 line factor or trend, I should say, reflect all the  
20 operative factors in these two periods?

21 A Oh, yes.

22 Q And can you tell from the fact that there  
23 is a single line, sir, whether or not there was any  
24 theft in either period?

25 A No, there is no way to tell from these statistics

1 7 PRjw Levin - direct

2 whether or not there was.

3 Q And if you were to assume, sir, that there  
4 were thefts in the earlier period, the Brink's period,  
5 can you tell from this data how many dollars that would  
6 be?

7 A Oh, no, there is no way to tell that.

8 Q Well, sir, what's the next thing you did  
9 in analyzing this data?

10 A Well, what I turned to was a look at the  
11 total revenue collected by Brink's in the entire period  
12 of the Brink's contract.

13 Q Well, sir, before you did that, you -- well,  
14 before we get to that, you testified earlier of a concept  
15 of a controlled environment or a controlled situation.

16 A Oh, yes. Thank you for reminding me.

17 Q Did you examine to see whether or not there  
18 was anything which would be unaffected by any possibility  
19 of theft by Brink's or by CDC?

20 A Yes.

21 We talked about control, and what I mean  
22 here is, is there any place in this data that we could  
23 say, well, there is no question of theft going on, let's  
24 see what's happening there.

25 If, for example, we find a trend for increasing



1 8 PRjw

Levin - direct

2 revenues, aside from the whole question of theft, that,  
3 I think, will bear on the question of the comparison  
4 that has been drawn.

5 Well, Area 1-A, I am told, is an area that  
6 was collected by the City alone and by neither Brink's  
7 nor CDC.

8 Q Sir, did you examine 248 showing the collections  
9 from Area 1-A to determine whether it was the same number  
10 of meters?

11 A Yes, I did.

12 Q And was it?

13 A It was essentially the same number of meters.

14 Q Now, sir, what did you do in your comparisons  
15 on Area 1-A?

16 A I did the same thing that I did with those  
17 charts against the wall, I looked at the comparison  
18 of revenue in the ten-month period and then again in  
19 the six-month period.

20 Q We are going to hand you now a document marked  
21 Brink's Exhibit 283 for identification, and I'll ask  
22 whether this is the table showing that comparison of  
23 total collections from Area 1-A during that period.

24 A Yes, it is.

25 MR. MEISTER: We offer this in evidence.

1 9 PRjw Levin - direct

2 MR. GLEN: No objection.

3 THE COURT: Received.

4 xxx (Plaintiff Exhibit 283 was received  
5 in evidence)

6 BY MR. MEISTER:

7 Q Now, Doctor, I ask if you'd be good enough  
8 to step down and return to the easel on which we will  
9 display this exhibit, and would you be kind enough to  
10 explain it to the jury and the Court.

11 A Well, this is a comparison of total revenues  
12 received by the City from Area 1A alone. We have the  
13 same time periods displayed. The unit here is now just  
14 dollars. This is a single area, and we don't need to  
15 multiply by anything. So in the first ten-month Brink's  
16 period, there was \$70,990 collected; in the latter period,  
17 the CDC period, there was \$73,283 collected, and this  
18 represents a 3.2 percent increase.

19 The actual numerical value is \$2,293. And  
20 then on the right-hand side of the chart we have the  
21 six-month comparison, and there is now only a 2.72 percent  
22 increase. The dollar amount of the increase is \$1,125.

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(Continued on next page)

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Levin-direct

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2 Q Doctor, does that indicate to you that  
3 in this area which was never collected by Brink's and  
4 never collected by CDC there were factors which caused  
5 receipts of revenue from the parking meters by the City  
6 to go up over that ten-month period?

7 A Oh, yes, apparently so.

8 Q Does that also indicate to you anything  
9 about the ten-month comparison period compared to the  
10 last six months of that period?

11 A Once again, what it suggests to me is that  
12 the amount of money that people are putting in the meters  
13 is increasing with time and perhaps less so during the  
14 six-month period than during the ten-month period perhaps  
15 due to these many factors mentioned, the strike, the  
16 gasoline shortage, and so on.

17 Q Whatever these factors are which caused  
18 this increase, we know that it wasn't any different  
19 between Brink's and CDC --

20 MR. GLEN: Objection.

21 THE COURT: Sustained as to form.

22 MR. MEISTER: I will withdraw the question.

23 Q Doctor, you testified that you made another  
24 comparison of Area 1A.

25 A Yes. I did the very same thing as before

1 rmlt

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2 with average daily revenues, and this time just from  
3 Area 1A.

4 Q I hand you a document marked Brink's Exhibit  
5 284 for identification and ask whether this is your  
6 chart making that comparison.

7 A Yes, it is.

8 MR. MEISTER: We offer this in evidence.

9 MR. GLEN: May I, your Honor? Is 1A deleted  
10 from the two comparison studies, the computer studies?

11 MR. SCHNEIDER: May I hear the question?

12 MR. GLEN: I asked Mr. Meister about a  
13 stipulation we entered into.

14 MR. MEISTER: You are asking me what your  
15 expert relied on?

16 MR. GLEN: No, whether the stipulated data  
17 base included 1A.

18 MR. MEISTER: Exhibit 248?

19 MR. GLEN: Yes.

20 MR. MEISTER: Yes.

21 MR. GLEN: No objection.

22 (Plaintiff's Exhibit 284 was received  
23 in evidence)

24 Q Doctor, I am putting this chart on the  
25 easel again and ask if you can explain that chart, please.

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2 A Here we have a comparison of average revenues.  
3 This is the revenue per collection day, once again,  
4 from Area 1A.

5 In the earlier ten-month period there was  
6 \$816 per collection day. In the later period, there  
7 was \$827. This is a 6.9 percent increase, again, the  
8 same 6.9 percent that we saw a moment ago, and the dollar  
9 amount of that would be \$56 per collection day.

10 In the six-month period there is a larger  
11 increase, 8.9 percent. The actual dollar amount is  
12 \$71. The larger percentage here is basically due to  
13 the difference in the number of collection days.

14 You see, if there were the same number  
15 of collection days in the early period and the later  
16 period, this percentage would be the same as this percentage  
17 (indicating), but because there was a slight change  
18 in the number of collection days you get a somewhat  
19 different figure here than there.

20 Q Did you examine the data concerning the  
21 collections from Area 1A to form an opinion as to whether  
22 or not the differences in collections could be considered  
23 part of a trend?

24 A Yes, I did.

25 Q Did you do that by the same method as you

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described before concerning Dr. Fairlee's data?

A Yes, I did.

Q I hand you an exhibit marked as Plaintiff Brink's Exhibit 273 for identification and ask whether this is a graphic depiction of that analysis insofar as the total revenues received from Area 1A is concerned.

A That's correct.

MR. MEISTER: We offer this in evidence.

MR. GLEN: No objection.

(Plaintiff's Exhibit 273 was received in evidence)

MR. GLEN: We object to everything prior to June of 1979, your Honor. I didn't realize it included a different time period.

Q Doctor, in making your examination of a trend, did you limit your analysis to the period after June of 1979?

A No, I did not.

Q What is the reason for that?

A Well, when looking for trends you need as much data as you possibly can get that bear on the question. The ideal would be to go back many, many years and see what is the history, what is the trend in the revenues.

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Levin-direct

2 Q Were you informed, sir, that the period  
3 of the Brink's contract started on May 1, 1978?

4 A Yes.

5 MR. MEISTER: We renew our offer of the  
6 exhibit in evidence.

7 MR. GLEN: It is not comparable to any  
8 of the other exhibits or any of the testimony in the  
9 case, your Honor, and I believe therefore --

10 THE COURT: The witness, in order to get  
11 a trend, has to take into account a longer period; is  
12 that correct?

13 THE WITNESS: As much as you can.

14 THE COURT: Overruled.

15 Q Doctor, now displaying Exhibit 273 in  
16 evidence, could you go to that chart and explain it  
17 to the jury and to the Court, please?

18 A This a graph of total revenues received  
19 by the City just from Area 1a. The vertical axis is  
20 dollars in thousands. So this point right here, 6.5,  
21 would be \$6.5 thousand, \$6,500.

22 On the bottom we have time, going from  
23 May of 1978 through March of 1981. The points that  
24 have been plotted here are the total revenues received  
25 by month from Area 1A.

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1 rmlt Levin-direct

2 The blue line represents a trend line that  
3 was calculated that would best represent the average  
4 revenue by month.

5 Q And that was done by the same method as  
6 the other trend that you described before?

7 A By the use of linear regression, yes.

8 Q In your expert opinion, Doctor, is that  
9 a significant trend?

10 A Yes, it is.

11 Q Did you make a similar comparison for the  
12 average revenue per collection day received by the City  
13 from Area 1A for the same period?

14 A Yes, I did.

15 THE COURT: When you use the expression  
16 "similar trend" I take it that is an upward trend?

17 THE WITNESS: An upward trend, yes.

18 Q I hand you Brink's Exhibit 277 for  
19 identification and ask whether that is a chart of your  
20 analysis of revenues per collection day received by  
21 the City from Area 1A.

22 A Yes it is.

23 MR. MEISTER: We offer this in evidence.

24 MR. GLEN: No objection.

25 (Plaintiff's Exhibit 277 was received



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2 in evidence)

3 Q Sir, examining Exhibit 277, could you explain  
4 that also to the Court and jury, please?

5 A Yes.

6 Here we have a chart of the average daily  
7 revenue received by the City from Area 1A, that is,  
8 the amount of monies on each collection day, on average,  
9 by month.

10 The vertical axis is now just in dollars.  
11 So that in May of 1978 the point here is 775, and that  
12 means on average in that month there was \$775 delivered  
13 to the City by the City collection.

14 This is the same time period as before  
15 and a similar upward trend as demonstrated by the blue  
16 line.

17 Q Sir, in your expert opinion is that trend  
18 a statistically significant trend?

19 A Yes, it is.

20 Q On those exhibits, 273 and 277, which we  
21 now have before us, there appears to be a lot of variation,  
22 upward and downward, from the trend.

23 Did you use any other statistical techniques  
24 to see if there was a trend or to graphically demonstrate  
25 whether there was one?

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2 A Yes, I did.

3 Q What is that?

4 A I used a method known as moving averages.

5 It is a graphical technique that can show you what is  
6 going on in the data without fitting any lines or anything,  
7 no fiddling with the data, you just average some data  
8 points in each of several different five-month intervals.

9 I used five-month moving averages and what  
10 exactly I did was that I took a look at the first five  
11 months on the chart, May, June, July, August and September,  
12 and I calculated the average revenue for those five  
13 months and then put a dot on a chart.

14 Then I moved over one month, looking at  
15 June, July, August, September, October, calculated the  
16 average revenue for that period, and made another dot,  
17 and I kept on doing this moving the average along, until  
18 I got towards the end.

19 Q Is the five-month moving average another  
20 standard statistical technique used by expert statisticians  
21 for these purposes?

22 A Yes. Moving averages are quite standard.

23 Q I hand you Exhibit 274 for identification  
24 and ask whether this is a graphic depiction of your  
25 examination of the total revenue received on a monthly

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1 rmlt Levin-direct

2 basis by the City over this longer period and the five-  
3 month moving average thereof?

4 A Yes, it is.

5 MR. MEISTER: We offer this in evidence.

6 MR. GLEN: No objection.

7 (Plaintiff's Exhibit 274 was received  
8 in evidence)

9 Q Putting this Exhibit 274 on the easel,  
10 Doctor, could you explain that to the jury, please?

11 A This is the revenues received from Area  
12 1A and it is the five-month moving average chart I just  
13 was talking about.

14 We have a vertical axis in thousands of  
15 dollars. So this first point, over there above June,  
16 would represent just the average of the revenues in  
17 the five-month period from -- I'm sorry, it would be  
18 over July -- May, June, July, is in the middle, August,  
19 September.

20 What you see is perhaps what catches the  
21 eye first, this mountain-valley, mountain-valley effect.  
22 There is seasonality here in these data, but what you  
23 also notice is that this peak is less than this peak,  
24 is less than this peak, and likewise the valleys tend  
25 to increase.

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So what you see is, again, a trend.

Q Does the five-month moving average of the total revenue received by the City on a monthly basis from Area 1A indicate to you that there was an upward trend during the period of May 1, 1978 through that last period, which I believe is January of 1981?

A That's correct.

Q And the January 1981 point includes the data for January, February and March of 1981?

A That's correct.

Q Did you make a similar comparison, a five-month moving average analysis, of the average daily collection received by the City from Area 1A during the same time period?

A Yes.

Q And I hand you Brink's Exhibit 278 for identification and ask whether this is a copy of the graph showing the five-month moving average in that comparison.

A Yes, it is.

MR. MEISTER: We offer this in evidence.

MR. GLEN: One question on voir dire, your Honor.

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Levin-direct

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2 VOIR DIRE EXAMINATION

3 BY MR. GLEN:

4 Q By daily average, you mean the amount gotten  
5 each time there was a collection or the amount each  
6 time there was a collection divided by the number of  
7 days between collections?

8 A Not the latter. It was the former. Each  
9 time there was a collection day, that is.

10 Q So that each dot represents the actual  
11 date on which a collection was made? You just drew  
12 a line to connect the dots?

13 A Each dot represents the total revenue collected  
14 in a given month divided by the number of days a collection  
15 was made.

16 Q If in one month there were two collections  
17 and in another month four collections, you would have  
18 a dot very high or very low because you would be dividing  
19 by either 2 or 4?

20 A It would depened on the numerator, but  
21 you would use 2 or 4 in the denominator.

22 THE COURT: Isn't that cross examination?

23 MR. GLEN: If in fact the major variant  
24 is the number of collections, then the diagram is totally  
25 misleading.

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THE COURT: Reserve that for cross examination.

MR. GLEN: All right.

MR. MEISTER: May the exhibit be received,  
your Honor?

THE COURT: What number is that?

MR. MEISTER: 278.

THE COURT: All right.

(Plaintiff's Exhibit 278 was received  
in evidence)

Q Sir, displaying Exhibit 278, does that  
analysis have the five-month moving average of money  
received per collection by the City from Area 1A confirm  
the analysis that you made in Exhibit 274 concerning  
an upward trend?

A Yes, it does.

Q Would your testimony about what the slope  
of the line means that you gave with respect to Exhibit  
274 be essentially the same for Exhibit 278?

A Yes. What you see is the peaks increasing,  
the valleys increasing. There is a trend.

Q Sir, on the basis of these six exhibits  
and the comparisons that you made and the charts that  
you made concerning Area 1A, did you form an opinion  
that you can state with a reasonable degree of certainty

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Levin-direct

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2 as to whether there were factors operative over this  
3 period of time which caused there to be a trend of increased  
4 revenue?

5 A Yes, I formed an opinion.

6 Q And what was that opinion?

7 A My opinion is that there is a very clear  
8 likelihood that there are factors operating causing  
9 this trend, all factors taken into account, which vitiate  
10 the comparison of the two periods.

11 Q Sir, to your understanding was Area 1A  
12 the only area which was always collected by the City  
13 and never by Brink's or CDC?

14 A To the best of my knowledge, yes.

15 MR. MEISTER: Your Honor, we are now going  
16 to turn on a slightly different place in the testimony.  
17 I would estimate Dr. Levin's testimony will take another  
18 twenty or twenty-five minutes.

19 THE COURT: At which point we will take  
20 our luncheon recess and resume at 2 o'clock.

21 (Luncheon recess)

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AFTERNOON SESSION

2 p.m.

B R U C E L E V I N, resumed.

(In open court - jury present)

THE COURT: Mr. Meister.

MR. MEISTER: Thank you, your Honor.

DIRECT EXAMINATION (Continued)

BY MR. MEISTER:

Q Professor Levin, before lunch you were discussing the trend which you found in the collection and revenues received from Area 1A; is that correct?

A Yes.

Q And, sir, that was the area where you were informed was always collected by the City and never by Brink's or by CDC?

A Yes.

Q Sir, could you tell us, do you find the existence of a trend in Area 1A has some relationship to the question of whether the data can be analyzed to show whether there was any theft in the Brink's collections and, if so, how much?

A Well, what we learned from our study of Area 1A is, first of all, there is no question of Brink's versus CDC; this was just collections made by the City.



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Levin-direct

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2 So that having found the trend, this must  
3 be caused by some other factors, that is, presumably  
4 more money being put into the meters or any of another --  
5 or any other factors that could be going into the trend.  
6 But the trend is there irrespective of Brink's/CDC thefts.

7 Q Doctor, does the fact that there is a trend  
8 in Area 1A necessarily mean that there would be a trend  
9 affecting the other areas of the City?

10 A No, not necessarily.

11 Q Would you regard it as significant in determin-  
12 ing the validity of a comparison of ten months versus  
13 ten months of the other areas of the City?

14 A Well, yes. I mean, I think it goes back  
15 to what Traffic Commissioner Guthrie had pointed out:  
16 that there must be factors here in operation, which  
17 he listed, that could be the cause of the increase in  
18 revenue.

19 Q And, sir, would one of those possible factors  
20 be a long-term trend affecting the amounts of monies  
21 that people put into parking meters throughout the City?

22 A Yes, it could.

23 Q Now, could you tell us, sir, if there were  
24 such a long-term trend would the effect of that trend  
25 be eliminated by comparing ten-month periods in one

1 prlt Levin-direct

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2 year followed by the very next year?

3 A No, that does not eliminate that trend.

4 Q And what would be the effect of such a  
5 trend if one were to exist?

6 A Whatever the increase is year by year,  
7 when you compare two years side by side, well, the trend  
8 says you would expect this much of an increase. Well,  
9 you'll find that much of an increase, plain and simple.

10 Q Now, sir, if there is such a trend can  
11 you as a statistician say what the cause or causes of  
12 that trend are?

13 A No, unfortunately not. Saying what is  
14 the cause of something is a very difficult conclusion  
15 to draw, and satatisticians alone cannot make that conclusion.

16 Q And, sir, in your judgment, if there is  
17 a trend, is that trend accounting for all the factors,  
18 whatever they might be?

19 A Well, they are all in there. Whatever  
20 is causing that trend, it's being reflected in that  
21 line.

22 Q Now, sir, we turn to the next question:  
23 Did you examine the data to see if there  
24 is an indiation that there was such a long-term trend  
25 affecting the parking meters in the City other than

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1 prlt Levin-direct

2 Area 1A?

3 A Yes, I did.

4 Q And those were the parking meters that  
5 you were informed were sometimes collected by Brink's  
6 and sometimes collected by CDC and perhaps also at times  
7 collected by the City?

8 A Yes.

9 Q What did you do?

10 A I looked at the graph, similar to what  
11 I did in Area 1A, for the entire period of the Brink's  
12 contract, starting in May of 1978 and going right on  
13 up through the CDC period, ending in March of 1981,  
14 and I formed a chart showing the monthly total revenues  
15 and another chart showing the average revenues per collection  
16 day.

17 Q And, sir, on the basis of that larger group  
18 of data, did you attempt to determine whether or not  
19 there was a long-term trend affecting the collection  
20 of revenues from all areas other than Area 1A?

21 A Yes, I did.

22 Q How did you do that, first?

23 A Well, I used the same method as we have  
24 been using all along, a method of linear regression,  
25 to fit a line that best describes the average revenue

1 prlt Levin-direct

2 per month.

3 Q And, sir, based on your examination of  
4 the total revenue data received by the City from all  
5 of these other areas regardless of who collected it,  
6 did you determine that during the Brink's period of  
7 May 1, 1978 through let's say the end of March 1980,  
8 whether there was a trend?

9 A Yes, I did determine that.

10 Q And what was that trend? What was that  
11 determination, first?

12 A Well, I determined that there was a trend,  
13 and it was a highly significant trend. Referring to  
14 my notes, the total revenue increased on a monthly basis  
15 is by 17.96, almost \$18,000, per month.

16 Now, on a yearly basis, that means that,  
17 per year, there was a \$215,000 increase in total revenue.  
18 This is the trend that I have been talking about.

19 In terms of correlation co-efficient --

20 Q I'm sorry, sir, when you say \$215,000,  
21 you mean per month?

22 A Per month, that's right.

23 I'm sorry, it's \$215,000 per year. The  
24 monthly figure was \$18,000 per month.

25 The correlation is 69 percent. So again,

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Levin-direct

2 there's a strong trend being discussed here.

3 Q Now, sir, is the trend that you just discussed  
4 the trend for the average daily collections or for the  
5 total daily collections?

6 A That was for the total.

7 Q Sir, did you prepare a chart or have a  
8 chart prepared of the trend showing the total collections  
9 for the City?

10 A Yes, I did.

11 Q Sir, I'm showing you Brink's Exhibit 271  
12 for identification.

13 Is that the chart that you prepared showing  
14 the total collections from all areas, other than from  
15 Area 1A, with your trend line superimposed on it?

16 A That's correct.

17 MR. MEISTER: We offer this in evidence,  
18 your Honor.

19 MR. GLEN: No objection, your Honor.

20 THE COURT: Received.

21 (Plaintiff's Exhibit 271 was received  
22 in evidence)

23 Q Doctor, could you step down and go to that  
24 exhibit and explain it, please, to the Court and to  
25 the jury?

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2 A Yes.

3 This chart is total revenues received by  
4 the City in all areas except for Area 1A. On the vertical  
5 axis we have dollars in thousands. So that this first  
6 point here, at approximately 1,375, means thousands  
7 of dollars, so it would be \$1,375,000. That was the  
8 place where this blue line is.

9 The actual value of the collection from  
10 May of 1978 was somewhat below that number.

11 On the horizontal axis we have time again.  
12 What's represented in the blue-shaded area is the Brink's  
13 period of contract, and in the yellow is CDC.

14 I have plotted here the actual collections,  
15 month by month, showing March, a short month and heavily  
16 snowy month, swings up and down, and so on, and this  
17 is April and May, and we finish out the year.

18 Also plotted on this chart is the trend  
19 which I fitted using only the Brink's period points.  
20 So I covered up all of the CDC points here and fitted  
21 my straight line as best as possible, determined by  
22 the method of least squares.

23 Q And, sir, can you explain the gray band  
24 on either side of the trend line?

25 A Yes.

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Levin-direct

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2           Once again, this band represents our best.  
3 summary of the random variation involved. Since the  
4 points obviously don't lie exactly on the straight line,  
5 there are fluctuations above and below, this gray band  
6 is a measure that statisticians use to indicate the  
7 uncertainty attached to making a prediction on the basis  
8 of this line.

9           The point here is that 95 percent of the  
10 data points ought to lie within the band and 5 percent  
11 can be expected to lie outside the band.

12           Q    Now, sir, I want to go back please to the  
13 number which you testified to before, which you said  
14 was the significance of this slope. I don't mean the  
15 correlation, I mean the number of dollars per month.

16           A    Yes.

17           Q    You testified, sir, that the trend line  
18 increases at the rate of \$17,960 a month?

19           A    That's correct.

20                   (Continued on the next page)

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Levin - direct

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2 Q And does that mean, sir, that over a 12-  
3 month period, each month would be what value higher,  
4 according to the trend, than the identically named month  
5 the year before?

6 A It would be the figure times 12. The answer  
7 I get is \$215,520.

8 Q Now, that would be a value for each month;  
9 is that correct?

10 A That would be the amount that this line moves  
11 up in a 12-month period. And since this is a straight  
12 line, it's going to be that much higher into this month,  
13 May to May, here, and the same amount higher here, here,  
14 here, here and all the way up.

15 Q Now, sir, if this trend continued in the  
16 CDC period, do you have an opinion which you could state  
17 to a reasonable degree of certainty as an expert statistician  
18 as to what general effect that trend would have on ten  
19 months of revenue received in the CDC period compared  
20 to the same named months the year before in the Brink's  
21 period?

22 A Yes.

23 If what is being stated is that in this region  
24 revenue was higher than in this region, I say, well,  
25 sure the trend is predicting precisely that.



2 PRjw

Levin - direct

2 Q And how much of an increase in dollars would  
3 that trend predict over a ten-month period compared  
4 to the identically named ten-month period the year before?

5 A Well, I think that, roughly speaking, three-  
6 quarters of the total differential that we saw in the  
7 ten-month period can be accounted for by this trendline  
8 right here.

9 Q Well, sir, let's just try to do it with numbers  
10 if we could.

11 You testified, I believe, that, according  
12 to the trend, a month would be approximately \$215,500  
13 higher than the identical month the year before.

14 Is that correct?

15 A Yes.

16 Q And would that be true, according to the  
17 trend, for each successive month?

18 A Yes.

19 Q And then, sir, would that trend generally  
20 account for a difference for -- in a ten-month -- of  
21 ten times that monthly figure?

22 A That's correct.

23 Q And what would that multiplication be?

24 A Well, if I just multiplied by ten, I get  
25 \$2,155,000.

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1 3 PRjw Levin - direct

2 Q And that, sir, represents what?

3 A This is the amount of the difference that  
4 can be attributed solely to the effect of the trend.

5 Q And that's the trend established throughout  
6 the Brink's period, looking at the entire Brink's period  
7 of total monthly revenues; is that correct?

8 A Correct.

9 Q Now, sir, did you also examine, as you did  
10 with Area 1B, the average daily collections for that  
11 period to see if there was a trend there?

12 A Yes, I did.

13 Q And what did you find?

14 A I found that indeed there was a trend, in  
15 fact, even more strongly evident.

16 Q I hand you Brink's Exhibit 275 for identification  
17 and ask you whether this is a chart which you prepared  
18 depicting the trend which you found when you examined  
19 average daily collections over the entire Brink's period?

20 A Yes, it is.

21 MR. MEISTER: Your Honor, we offer that  
22 in evidence also.

23 MR. GLEN: No objection.

24 THE COURT: Received.

25 (Plaintiff Exhibit 275 was received

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4 PRjw

Levin - direct

2 in evidence)

3 BY MR. MEISTER:

4 Q Dr. Levin, could you step down and go to  
5 Exhibit 275, please, and explain that chart to the jury  
6 and to the Court?

7 A Yes.

8 This is a chart of average daily revenue  
9 received by the City for all areas except Area 1A. And  
10 once again, the average daily revenue here means revenue  
11 collected on a day of collection, on average, by month.

12 We have the vertical axis in dollars of thousands  
13 so that the first datapoint for May of 1978 is at approxi-  
14 mately 57 or 58 thousand of dollars per collection day.

15 On the horizontal axis we have the same periods  
16 of time (Brink's is in blue; CDC is in yellow). And  
17 once again, I fitted a trendline using only the points  
18 in the Brink's period, in particular, from May of 1978  
19 up to March of 1980, not including the month of April.

20 One thing you will notice the large dip on  
21 the previous chart, in February, was disappeared, and  
22 this is because correcting for the number of collection  
23 days, February had -- which is a short month to begin  
24 with, and I understand there were heavy snow days in  
25 which the collections were't made. So the dip in that

1 5 PRjw

Levin - direct

2 revenue can be accounted for by the number of collection  
3 days.

4 Well, there are still variations up and down,  
5 above and below the line. But in general, I think it's  
6 clear that this is an upward trend and it is a significantly  
7 statistical trend, that is, that this upward tilt is  
8 caused by chance fluctuation alone.

9 The band here again indicates a measure of  
10 uncertainty, so that 95 percent of the datapoints are  
11 expected to lie within the span:

12 Q Now, sir, based upon these two charts, Exhibit  
13 271 dealing with total revenues and Exhibit 275 currently  
14 on the easel, dealing with average daily revenues, do  
15 you have an opinion that you can express to a reasonable  
16 degree of certainty as an expert statistician as to  
17 whether there was a general trend increasing revenues  
18 during the period that Brink's was collecting the contract?

19 A Oh, yes, I have an opinion.

20 Q What is your opinion?

21 A I think it's quite clear that there is a  
22 definite trend upward through the period of Brink's.

23 Q Now, sir, did yo do any other analyses to  
24 detect or illustrate that trend?

25 A Yes, I did.

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1 6 PRjw Levin - direct

2 Q What?

3 A I looked at a chart of moving averages, much  
4 as I did for Area 1A alone. This time, I took moving  
5 averages in five-month periods for the total revenue  
6 and also for the average daily revenue per collection  
7 day.

8 Q Now, sir, I hand you a document marked 272  
9 for identification as a Brink's exhibit, and I ask whether  
10 this is the chart of revenues on a five-month moving  
11 average for the period of the Brink's contract and subsequent  
12 through March 1981, from all areas other than Area 1A?

13 A Yes, it is.

14 MR. MEISTER: We offer this in evidence.

15 MR. GLEN: No objection.

16 THE COURT: Received.

17 (Plaintiff Exhibit 272 was received  
18 in evidence)

19 MR. MEISTER:

20 Q Doctor, could you step down and explain that  
21 chart, please, to the jury and to the Court?

22 A Yes.

23 Here we have a moving average chart of total  
24 revenues received by the City from all areas except  
25 Area 1A. The vertical axis is in thousands, and the

1 7 PRjw

Levin - direct

2 first point represents the five-month average of revenues  
3 obtained from May, June, July, August and September  
4 of 1978. And so this represents, on average, \$1,400,000.

5 The moving average chart shows, in addition  
6 to variation up and down, a clear tendency for an increase  
7 in revenues. This dip here, I should explain -- a five-  
8 month moving average contains the low month of April  
9 and the high month of May in certain of these points.  
10 For example, if I look at the moving average centered  
11 about February, well, that would be December, January,  
12 February, March and April. So that's going to contain  
13 a low number.

14 Each of the moving averages that covers April  
15 will have the influence of April and those covering  
16 the month of May will have the high influence of May.  
17 So this little jag here is being caused by those peculiar  
18 months.

19 As we move further along the chart, show,  
20 April is no longer included once we start looking at  
21 the moving average about July and thereafter. And  
22 so what we find is that the trend continues up until  
23 this point, and after that, it starts going back down.

24 Q Sir, for the record, would you just state  
25 what you meant by "this point"?

1 8 PRjw

Levin - direct

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2 A This point here being centered above approxi-  
3 mately June or July?

4 Q Of what year, sir?

5 A Of 1980.

6 Q Now, sir, in your judgment as a statistician,  
7 does that five-month moving average of total revenues  
8 received by the City from all areas other than Area  
9 1A confirm that there was a trend during the Brink's  
10 period for increasing revenues?

11 A Oh, yes.

12 Q And, sir, I hand you now Brink's Exhibit  
13 276 for identification and ask whether this is the chart  
14 that was prepared based on your analysis of the five-  
15 month moving average for the average daily collections  
16 received by the City for all areas other than Area 1A?

17 A Yes, it is.

18 MR. MEISTER: Your Honor, we offer this  
19 in evidence.

20 MR. GLEN: Voir dire?

21 THE COURT: Yes.

22 VOIR DIRE EXAMINATION

23 BY BY MR. GLEN:

24 Q By "daily revenue" you are talking about  
25 the revenue achieved in a particular collection on a

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9 PRjw Levin - direct  
particular day; is that correct?

A It is the average of the total revenue in a given month divided by the total number of collections in that month, collection days in that month.

Q So it's total revenue divided by collection days, not by calendar days or the days the meters were operating; is that correct?

A The number of days that collections were made.

MR. GLEN: No objection.

THE COURT: Received.

(Plaintiff Exhibit 276 was received in evidence)

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Levin - direct

2771

2 Q Doctor, could you one more time please step  
3 down and examine Exhibit 276 and explain it to the Court  
4 and jury?

5 A Yes.

6 Here we have another five-month moving average  
7 chart and it is the average daily revenue per collection  
8 day received by the City from all areas except Area  
9 1A.

10 Now, the units are still in thousands and  
11 so if we look at the first point, that would be at approxi-  
12 mately \$63,000 per collection day, as an average of  
13 the five months May, June, July, August and September  
14 of 1978.

15 As we move along each point represents the  
16 average of the appropriate five-month interval, and,  
17 again, we see something very similar to what we saw  
18 on the chart before, except I think perhaps it is even  
19 clearer this time that there is a definite upward swing.  
20 It is pulled down by the peculiar months of April and  
21 May and then continues on to this level in the CDC period.

22 Q Thank you, Doctor.

23 Let me ask you this, Doctor: As an expert  
24 statistician, what is the point of determining whether  
25 or not there is a trend in the revenues collected by

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1 2 RMjw Levin - direct

2 Brink's during the period of May 1978 through March  
3 of 1980?

4 A Well, the point of that is to get at the  
5 critical issue mentioned at the beginning of my testimony:  
6 There are certain assumptions involved in looking at  
7 a ten-month comparison of revenues that speaks about  
8 theft or intercompany differences. Those assumptions,  
9 to repeat, are that the amount of money put into the  
10 meters is constant and the amount of money remaining  
11 in the meter before it is collected by the contractor  
12 is constant.

13 By looking at these trends, from 1A in particular,  
14 and also from the entire body of data, I think we can  
15 conclude the amount of money being put into the meters  
16 is, in all likelihood, not constant.

17 This trend indicates that revenue is increasing  
18 at a rather continuous rate. Sure, there are swings  
19 up and down, life is never perfect, but on the whole  
20 the trendline indicates that the comparison of the two  
21 ten-month period may likely be biased by this upward  
22 trend.

23 Q Sir, does that mean that in this later period  
24 in which CDC was making collections in accordance with  
25 the trend --

2773

1 3 RMjw

Levin - direct

2 MR. GLEN: Objection. Could we have a question  
3 and not testimony from counsel, your Honor?

4 Q --that you would expect to find greater revenues  
5 received?

6 A Well, you can't say exactly what is going  
7 to happen. Nobody can predict the future. But there  
8 is certainly no surprises when I see that the CDC points  
9 are up here just where the blue line says they ought  
10 to be.

11 Q In accordance with the trend, sir, what is  
12 the ten-month cumulative difference which your trend  
13 would predict in total revenues?

14 A Well, that was the roughly \$2 million figure  
15 that we calculated a moment ago.

16 Q What was the actual revenue difference in  
17 the ten-month period of the CDC, ten months versus the  
18 Brink's ten months?

19 A The difference would be 18,160,000, minus  
20 \$17,141,000, or approximately \$1 million.

21 Q Sir, based upon that analysis, do you have  
22 an opinion that you can state to a reasonable degree  
23 of certainty as an expert as to whether all or any part  
24 of that revenue difference in the ten-month period of  
25 June, 1980 to March 1981, compared to June of 1979 to

1 4 RMjw

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Levin - direct

2774

2 March of 1980, can be attributed exclusively to theft?

3 A There is no way to make that conclusion on  
4 statistical grounds alone.

5 Q What does the trend indicate should be the  
6 difference in that period?

7 A Roughly \$2 million.

8 MR. MEISTER: No further questions.

9 MR. GLEN: Could we have a couple of minutes,  
10 your Honor?

11 THE COURT: Yes.

12 (Pause)

13 CROSS EXAMINATION

14 BY MR. GLEN:

15 Q I want to make sure, just at the beginning,  
16 Professor, according to your trendline, CDC turned in  
17 in each ten-month period \$1 million less than it should  
18 have? Is that what you just proved?

19 A No, I didn't say that it turned in \$1 million  
20 less than it should have.

21 Q You said it could be expected to turn in  
22 \$2 million more per year if the trend which you got  
23 off of the Brink's period were projected into the CDC  
24 period?

25 A That's correct.

5 RMjw

Levin - cross

2775

2 Q When you made that trend, the trend up here  
3 on the board, you didn't use any actual data from the  
4 CDC period?

5 A That's correct.

6 Q You just took this line and sent it off into  
7 the future?

8 A Right.

9 Q If that is valid, then shouldn't CDC be up  
10 there along the trendline someplace?

11 A Well, it is up there along the trendline  
12 in this period here --

13 Q That is right after -- that first big hump  
14 is the first month of CDC collections and this is the  
15 last month of Brink's (indicating)?

16 A Yes.

17 Q The intercompany period?

18 A That's right.

19 Q The big hump, over the the expected line,  
20 the first month of CDC comparing with the last month  
21 of Brink's?

22 A That is May of --

23 Q When you went off to the future with the  
24 trendline you didn't use any actual data from the CDC  
25 period?

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1 6 RMjw

Levin - cross

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2 A That's correct.

3 Q You did say, Doctor -- do you prefer Doctor  
4 or Professor?

5 A Doctor is fine.

6 Q You did say, didn't you, Doctor, that if  
7 you continued the trendline into the future every year  
8 if the trend is correct you should generate \$2 million  
9 more in revenue, right?

10 A Other things remaining constant, yes.

11 Q CDC generated \$1 million more than Brink's  
12 did as reflected by the money they turned in, right?

13 A Yes.

14 Q So there is a \$1 million discrepancy?

15 A Between?

16 Q Between expectation, according to your trend-  
17 line, and reality.

18 A Yes.

19 Q Does the fact that there is a \$1 million  
20 discrepancy out of an expected \$2 million difference  
21 give you a pause as to the validity of your calculation?22 A Well, as know we, extrapolations are very  
23 risk things --24 Q We didn't know that until you just said that,  
25 Doctor. You did extrapolate, didn't you, on four different

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7 RMjw

Levin - cross

2 charts?

3 A I extended --

4 Q At the same slope?

5 A Yes.

6 Q Risky practice?

7 A It is risky to assume that things remain  
8 constant.

9 Q Well, have you read any newspaper articles  
10 about what happened in the CDC period?

11 A Just the two I mentioned.

12 Q Neither of which talk about -- I shouldn't  
13 say that. What in those newspaper articles leads you  
14 to account for a \$1 million gap in CDC revenue collection?

15 A I have no information as to what was going  
16 on in that period.

17 Q So that we have 22 months of Brink's and  
18 you draw a line, carry it out for ten months of CDC  
19 and in that ten months there is an inexplicable loss,  
20 a mysterious disappearance, of \$1 million during CDC.  
21 Maybe we are suing the wrong people? You have no way  
22 as a statistician to explain why CDC is \$1 million below  
23 what you would have expected, except that it is a risky  
24 business?

25 A I have no explanation for why CDC fell below

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1 8 RMjw

Levin - cross

2 the trendline.

3 Q Let's find No. 275, Doctor. This chart is  
4 entitled "Average Daily REvenue Received by the City,"  
5 No. 275, and we have defined by average daily revenue  
6 you do not mean the daily revenue per day; it is the  
7 total amount per month divided by the number of collections,  
8 right?

9 A It is per collection day.

10 Q This also runs from the first month of the  
11 Brink's contract to March of 1981, right?

12 A Correct.

13 Q This line is the same type of line as the  
14 one we were just talking about, it is your best least  
15 squares analysis, if I may, or regression analysis,  
16 of the trendline throughout Brink's extrapolated not  
17 using CDC data for the CDC period, is that correct?

18 A That's correct.

19 Q You didn't factor this data into here?

20 A I didn't even look at CDC when I drew that  
21 line.

22 Q CDC is a ten-month period, in reality?

23 A Yes.

24 Q These points are real, aren't they?

25 A Yes.



1 9 RMjw

Levin - cross

2 Q Pointing to the, what do you call them, change  
3 points or whatever -- the ten dots --

4 A They are the average daily revenue figures.

5 Q Figured once a month? It is not a smooth  
6 line, it connects once a month figures?

7 A That's right.

8 Q Is it part of the risk of extrapolation that  
9 out of ten months of CDC reality only two meet expectation?

10 A I don't understand what you mean by meet  
11 expectations.

12 Q You are the one that drew the line out into  
13 the future.

14 A Yes.

15 Q Only ten months into the future after 22  
16 months of reality and in eight of those ten months CDC  
17 didn't do what you said would be expected.

18 A That's correct.

19 Q Is that part of the risk of extrapolation?

20 A Well, the assumption of extrapolation would  
21 be if everything goes along as it had, this is what  
22 we would expect.

23 Q Assume with me, Doctor, that there is one  
24 difference between the blue period and the yellow period,  
25 the Brink's period and the CDC period. Assume with

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Levin - cross

2780

2 me that during Brink's some Brink's employees stole  
3 money from the parking meters and assume with me that  
4 during the CDC ten months there is no theft, no theft  
5 during CDC, some theft during Brink's.

6 Assuming that difference and everything else  
7 being the same, would that have the effect of raising  
8 the expected CDC collections or lowering the expected  
9 CDC collections compared to Brink's?

10 A Well, I don't know. I would need the data  
11 to answer your question.

12 Q Let's assume these are thousands of dollars --  
13 right?

14 A Correct.

15 Q Average daily revenues. Assume with me  
16 that there is theft at the rate of somewhere in the  
17 neighborhood of 8 percent throughout the Brink's period  
18 and it is constant --

19 A Per collection day?

20 Q Per collection day.

21 Does that raise the trendline or lower the  
22 trendline -- not the slope, but the whole line itself?

23 A Well, yes, if you assume a constant amount  
24 of theft in the one period alone and all other things  
25 are equal, it would have the effect of lowering the

1 11RMjw

Levin - cross

2781

2 blue period from what it might have been had there been  
3 no theft.

4 Q Let's take 8 percent of 65 and that is what --  
5 8 percent sales tax on 65 dollars, \$10? ~  
6 100

6 A 5.2, I get.

7 Q Let's lower the trendline by five and let's  
8 keep the trendline the same because under the hypothetical,  
9 theft is equal through the blue period and we don't  
10 have to change the yellow period because that is data  
11 that didn't go into the trendline. V

12 Assuming 8 percent Brink's theft, that trendline  
13 starts looking pretty good for CDC in reality, you start  
14 hitting right along the middle, don't you?

15 MR. MEISTER: Objection. I think he has  
16 it backwards. If you say the actual points are lowered,  
17 then the trendline would be 8 percent higher than it  
18 is. Is that the point?

19 MR. GLEN: I am trying to follow the witness  
20 and I am not sure where we are going.

21 Q If we have 8 percent assumed Brink's theft,  
22 right, what is the effect on this line, up or down?

23 A If what you are assuming is that, let us  
24 say, there is an idea value that Brink's might have  
25 collected in the absence of theft and you are just

1 12RMjw Levin - cross  
2 pushing all those points down by a constant amount,  
3 I should say a percentage figure will change the distance  
4 that you push the points down.

5 Q The amount of money out there in the world  
6 to be collected is out there, or it is here and they  
7 only collect that --

8 A Well, it is your hypothetical and you tell  
9 me what you are assuming.

10 Q Let me try it differently.

11 If you assume that Brink's stole and you  
12 assume that CDC did not, does that assumption vary the  
13 expectation for the CDC amount that it ought to collect?  
14 How does the variable cut? If you assume Brink's was  
15 stealing and you assume CDC was not, does it change  
16 your graphs at all?

17 A I would say no, for the following reason,  
18 that the graphs reflect whatever was in there. It reflects  
19 theft, it reflects other factors. So I would wind up  
20 drawing the same graph.

21 Q The graph reflects what is in there up to  
22 this point and from there out the blue line is conjecture?

23 A It is an extension of the line.

24 Q If in fact we use these points -- let me  
25 see if I understand the system -- does it mean the line

13RMjw

Levin - cross

2 goes like this and flips down or does it mean the line  
3 goes like this (indicating)?

4 A Under what circumstance?

5 Q Assume you actually use the CDC data when  
6 you are making your trendline, does it mean you get  
7 one trendline with a different slope or do you get two  
8 trendlines?

9 A I actually did that and it did bring the  
10 trendline down a little bit.

11 Q If you have one trendline?

12 A Yes.

13 Q If you have two trendlines, one for the blue  
14 period, the Brink's period, and one for the CDC period,  
15 would they be parallel?

16 A No.

17 Q If you took a look at that on your hypothesis,  
18 the Brink's trend would go up, up, up and when we get  
19 a new company the trend starts decreasing?

20 A Slightly.

21 Q Do you have any reason to account why that  
22 would be reality, why under the CDC ten months we have  
23 a decreasing trend?

24 A I have no explanation for that.

25

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1 rmlt 1 Levin-cross

2 Q Because you are not a parking meter expert?

3 A That is correct. However, I would point  
4 out that we do notice swings up, swings down, and variations  
5 do occur. There is nothing particularly outrageous  
6 about the CDC swing down. It is just in the data.

7 As you say, I have no explanation for that.

8 Q You started back in May of 1978. Assume  
9 with me, will you, that for May of 1978 through around  
10 January or February of 1979 between 16 and 30 percent  
11 of the City's parking meters were inoperable at all  
12 times.

13 A Yes.

14 Q If 16 to 30 percent -- let's use 20, for  
15 the sake of illustration -- if 20 percent of the City's  
16 parking meters were inoperable, what effect would that  
17 have on the difference between -- strike that.

18 And starting in March or so of 1979 between  
19 3 and 5 percent of the meters were inoperable, would  
20 that in your opinion have any effect on the way to draw  
21 your trend line?

22 A Well, no, I would still draw the same trend  
23 line.

24 Q Would it be an explanation for why Brink's  
25 revenues during the 20 percent meter defect period were

1 rmlt 2

Levin-cross

2 low compared to Brink's revenues when we only had a  
3 3 to 5 percent repair probably?

4 A It may be a possible explanation. I could  
5 not quantify it, however, without the data.

6 Q How about the data I gave you, 20 percent  
7 as against 5 percent, 15 percent more operable meters  
8 on the street from May 1978 through March of 1979 than  
9 from March of 1979 through May of '80?

10 A That is not sufficient data for me to come  
11 to the conclusion you seek. It depends on many other  
12 things, the amount of money being put into the meters,  
13 for example, where the meters are located and so forth.

14 Q But the mere fact that there is a marked  
15 change in the amount of meters which are operable and  
16 ready to receive coins during what we call the middle  
17 period on this graph, that is not enough data for you.  
18 It is more data than you had when you drew the graph?

19 A This graph reflects whatever was going  
20 on.

21 Q If there is only 60 percent of the meters  
22 working in May 1978 and it brings in that amount of  
23 money, that is all the graph shows, 60 percent of the  
24 meters working and it brought in that amount of money?

A Whatever was there is on the graph.

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1 rmlt 3 Levin-cross

2 Q If 95 percent of the meters are working  
3 in December of 1970, it simply reflects that fact and  
4 the difference between there and there may be attributable  
5 to fixing the meters or theft or attributable to anything,  
6 right?

7 A That is correct.

8 Q This is on an average daily collection  
9 revenue basis. Let's take a look at what that means  
10 for a second, if we may.

11 MR. GLEN: Can I use your drawing pad,  
12 Mr. Meister?

13 MR. MEISTER: Sure.

14 MR. GLEN: Thank you.

15 Q I want to see if I understand this area  
16 collection, daily collection concept.

17 Assume we put in a new meter on day one  
18 and we collect it on day five, we collect it on day  
19 fifteen, and then we take the meter out. On day five  
20 we collected \$1,000. The average collection day you  
21 would record, then, is \$1,000, right?

22 A This would be a revenue for the entire  
23 month?

24 Q The meter goes in --

25 A My average per collection day is obtained



1 rmlt 4 Levin-cross

2 from a monthly total revenue and it is not on a per  
3 meter basis.

4 You are talking about a single meter here.

5 Q Let's assume that for some crazy reason  
6 there is only one meter in existence in the month we  
7 are talking about, because I am not sure I understand  
8 your system.

9 We have a whole system consisting of one  
10 meter which went in on day one and came out on day fifteen.  
11 That is the whole system. On day five we collected  
12 \$1,000. On day fifteen it was collected and we collected  
13 \$1,000.

14 What I don't understand from your explanation  
15 to me earlier is, the average collection day over the  
16 whole system for one month -- is it \$2,000?

17 A \$2,000 is the total revenue and there are  
18 two collection days.

19 Q The average is \$1,000 per collection day?

20 A Correct.

21 Q On this hypothetical the meter day, the  
22 amount put in one meter in a day, from days one through  
23 five, equals \$200 per day and days six through fifteen  
24 equals \$100 a day; is that correct, because here you  
25 are collecting ten days and you get \$1,000 and here

Full-Year Soy Formula

VL

1 rmlt 5 Levin-cross

2 you collect five days and you get \$1,000.

3 A That is correct.

4 Q On your charts done on average daily revenues,  
5 these two points would appear the same?

6 A If you had the same collection each day,  
7 correct.

8 Q Whereas reality measured on a meter day  
9 basis, the collections in the first five days are at  
10 a rate twice as high as in the second ten days?

11 A You are using the word "reality" and I  
12 say this is the reality, \$1,000 were collected.

13 Q Fair enough.

14 You are counting the amount of bucks handed  
15 in from the meter on whatever day it happens to be collected,  
16 which is different than figuring out how many dollars  
17 were in the meter on an average daily basis? They are  
18 just different commodities, right?

19 A That's correct.

20 Q If one wished to examine the average daily  
21 revenue meter itself --

22 A Per diem.

23 Q Isn't that what daily means, in Ukranian  
24 or whatever language --

25 A I would like to distinguish my use of daily

1 rmlt 6 Levin-cross  
2 meaning per collection day from yours.

3 Q Okay.

4 If we were to do charts, for some crazy  
5 reason, and I wanted to chart fifteen days of collections,  
6 my chart -- and if this were 200 and this 100 -- my  
7 chart would look something like that (indicating)?

8 A Yes.

9 Q And your chart would look like this (indicating)?

10 A Yes.

11 Q If I connected my first and last point,  
12 I would go like that and if you connected your first  
13 and last point, you would go like that (indicating)?

14 A Correct.

15 Q Two different quantities, apples and oranges?

16 A There is a relationship between the two  
17 quantities. What that relationship is is not clear  
18 because of all these other factors that influenced the  
19 total revenue.

20 Q Just on two different kinds of measurements  
21 we get two different slopes by connecting our dots?

22 A Sure.

23 MR. GLEN: Why don't we mark this XA for  
24 identification.

25 Let's get to chart 269 -- I'm sorry, but

Full-Year Soy Formula

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1 rmlt 7 Levin-cross

2 there are so many of them.

3 This chart, as I understand it, is a comparison  
4 of revenue received by the City using the City's expert's  
5 numbers for revenue per meter day; is that correct?

6 A Yes.

7 Q I gather that you made this chart up after  
8 Mr. Meister or one of his colleagues informed you as  
9 to the testimony given by the City's witness?

10 A Yes.

11 Q To the best of your knowledge, your figures  
12 and his figures are the same figures for this chart's  
13 purposes, right?

14 A Yes.

15 Q I believe you testified on direct examination  
16 that you attempted to fit a single trend line through  
17 the City's per meter day revenue calculations from June  
18 of 1979 through March of 1981; is that correct?

19 A Correct, with the exception of the missing  
20 points, obviously. There were no points and so I didn't  
21 use them.

22 Q Your line goes through the two missing  
23 points?

24 A Yes.

25 Q Does that have any implication?

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[ ]

1 rmlt 8 Levin-cross

2 A No.

3 Q Simply that instead of comparing Brink's  
4 performance and CDC's performance by themselves, you  
5 chose to assume it was one continuous performance? Isn't  
6 that why there is no break there?

7 A Yes.

8 Q Of course there was an event in the real  
9 world that occurred between March of 1980 and June of  
10 '80, the companies switched, right?

11 A Yes.

12 Q But you didn't have any data there. Okay.  
13 Now, if I read this chart correctly, and  
14 I know you will correct me if I read it wrong, assuming  
15 that the first month of June 1979 appears to be right  
16 on the mark, which is just by accident, right?

17 A Yes.

18 Q There are one, two, three, four, five months  
19 of Brink's below the line, one month of Brink's above  
20 the line, two months of Brink's right on the line?

21 A Correct.

22 Q Five below -- no, six below, one month  
23 above, two on the line?

24 A Well, how are you counting the ones on  
25 the line?

Full-Year Soy Formula

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1 rmlt 9

Levin-cross

2 Q One here and one here (indicating).

3 Do you want to count this one on the line,  
4 too?

5 A I don't want to quibble. It looks like  
6 it is on the line.

7 Q I will give you this one and you give me  
8 the next one. You get the first quibble. That is only  
9 nine and there must be another one in here. Where is  
10 the other one?

11 Let's assume five, three and one, or five  
12 one and three, for purposes of illustration.

13 Your testimony is that a trend line which  
14 accommodates five points below a line, including some  
15 which are, if I may guesstimate, some 6 cents and 5  
16 cents on a basis of 87 cents below the line -- a trend  
17 line that picks up five points below the line and one  
18 above, you say that is a statistical correlation to  
19 reality of .61?

20 A No. I was using the correlation over both  
21 periods combined.

22 Q Now I understand.

23 On the CDC side there are clearly two points  
24 below the line and there are clearly five points above  
25 the line, and possibly one right on it. That is five

rmlt 10 Levin-cross

above, two below, one of which is slightly below and one of which is enormously below?

A Yes.

Q Your statistical correlation employs .62, that is not five about and two below? Your statistical correlation is everything.

A Right.

MR. MEISTER: I have to object to Mr. Glen's testimony and I wish he would account for all ten data points.

MR. GLEN: I can't figure out where they are on this line.

MR. MEISTER: Well, that is why we have a witness.

MR. GLEN: You have a point there.

Q I guess that is one more above the line that I didn't count (indicating)?

A Correct.

Q Six up and two below, one on the line, and there is one missing. What is the tenth?

A I believe it is February.

Q So there are two below. So it is six and three. But you are not contending that if you drew a trend line just for CDC you would come out with this

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1 rmlt ll Levin-cross

2 trend line.

3 A No.

4 Q You are not contending if you do a trend  
5 line just for Brink's you would come out with this one.

6 A Correct.

7 Q You are only contending that if you assume  
8 the entire 22 months the relevant period that you can  
9 draw a trend line that has a .62 statistical correlation,  
10 assuming that all points are to be viewed on the same  
11 assumption?

12 A Assuming there is a single line, there  
13 it is.

14 Q But most of the Brink's points are low  
15 and most of the CDC points are high?

16 A In this two narrow ten-month periods, yes.

17 Q You testified you attempted to fit two  
18 simultaneous trend lines, one for Brink's and one for  
19 CDC, right?

20 A That's correct.

21 Q Were those lines basically horizontal?

22 A They were essentially, yes.

23 Q Horizontal means that trend?

24 A They were not exactly horizontal but I  
25 believe I am in agreement with Dr. Fairley if you were



1 rmlt 12 Levin-cross

2 to choose to fit two separate lines, you would get these  
3 lines.

4 Q The real issue between you and Dr. Fairley,  
5 if someone says to a statistician of high repute, as  
6 both of you are, "Is there a trend line you can fit  
7 across this 22-month period?" The answer is yes, there  
8 is, and this is this one here with a statistical correla-  
9 tion of .62?

10 A Correct.

11 Q On the contrary, if statisticians of yours  
12 and Dr. Fairley's ability were asked to fit two trend  
13 lines, the best line for Brink's and the best line for  
14 CDC, assume a discontinuity or gap between them, you  
15 would both agree that you have essentially no trend  
16 in either period, is that correct?

17 A Essentially, yes.

18 Q So if we can explain why there is a difference  
19 between the blue world and the yellow world, you and  
20 Dr. Fairley would both agree that within the blue world  
21 of Brink's there is no trend and within the yellow world  
22 of CDC there is no trend?

23 A Well, that is not exactly --

24 MR. MEISTER: I object to the framing of  
25 the question in terms of blue world and yellow world.

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1 rmlt 13

Levin-cross

2 If you are talking about --

3 MR. GLEN: I withdraw the characterization.

4 MR. MEISTER: If he is talking about the  
5 ten months of June to '79 to March of '80 in a per meter  
6 day analysis, I would not have that objection.

7 MR. GLEN: I am doing within a per meter  
8 day analysis because both this witness -- I agree it  
9 is only for this purpose -- has accepted Dr. Fairley's  
10 per meter day analysis.

11 MR. MEISTER: Are you limiting your question  
12 to these which are the only ten-month periods that Dr.  
13 Fairley examined?

14 MR. GLEN: Yes.

15 Q My question, to make it perfectly clear,  
16 is ---

17 THE COURT: Put the question again.

18 MR. GLEN: Yes, your Honor.

19 Q Dr. Levin, if one were by the methods of  
20 linear regression and least square analysis to attempt  
21 to find the best fitting trend line to account for the  
22 Brink's performance on a per meter day basis, from June  
23 of 1979 through March of '80, and a second discrete  
24 line, separate line, to account for the CDC performance  
25 on a per meter day basis from June of 1981 -- June of

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1 rmlt 14

Levin-cross

2 1980 through March of 1981, it is your testimony that  
3 each of these lines would be best described as horizontal  
4 showing no trend?

5 A If that is where you are restricting your  
6 line to be, yes.

7 (Continued on the next page)

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2 Q When you began your analysis of this problem,  
3 did you seek out a parking meter expert to identify  
4 for you the relevant factors involved in parking meter  
5 collection?

6 A No, I did not.

7 Q Now, if such an expert had told you, for  
8 example, that a 12 percent increase in summonses, which  
9 amounts to, in the New York City system, an increase  
10 of one summons per meter every three months, would in  
11 his expert opinion have no effect on parking meter revenues,  
12 would that data have assisted you in your analysis?

13 A What data?

14 Q The data that a 12 percent increase in  
15 summonses has no effect on meter revenue.

16 A No.

17 In fact, if the expert were to come to  
18 me with that statement, I would say: Gee, that doesn't  
19 accord with common sense. Show me your data relating  
20 to summonses with revenue.

21 Q You would either believe him or not. But  
22 since you are not a parking meter expert and you didn't  
23 consult with a parking meter expert, when you said factors  
24 to be taken into account include a 12 percent increase  
25 in summonses, in response to Mr. Meister's question,

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you were making a common-sense assumption?

A I was assuming that that might be a potentially confounding factor.

Q You were also assuming that a gas shortage might be a potentially confounding factor?

A Yes.

Q And if a parking meter expert were to tell you that, in his opinion, the gas shortage that occurred in New York did not have an effect on meters or in fact was as likely to have an effect on increasing meter use as decreasing meter use, you would have said: Oh, go on. Because it doesn't accord with your common sense, but that would have ruled the factor out; right?

A No, it wouldn't have ruled the factor out. What it means is that if there is a statement that X has no effect on Y, I say: Well, how are we to evaluate that assertion?

Q But you would not evaluate it as a statistician--

MR. MEISTER: Let him finish his answer.

Q Were you not finished with your answer?

A No.

Q Please go on.

A The best interchange between the statistician and the client is, well, if you are making an assertion,

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1 prlt

Levin-cross

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2 test it out. Where is your data?

3 In the absence of data, the interchange  
4 of information is at best got to be qualified by saying:  
5 Yes, these are my conclusions if you're right.

6 Q Now, following along on this, Dr. Levin,  
7 let's assume that our hypothetical parking meter expert  
8 you were talking to said:

9 One thing that you have to look for is  
10 whether the meter rates stay the same and whether you  
11 get the same amount of time for each coin you put in.  
12 That accords with your common sense view of reality,  
13 right?

14 A Yes.

15 Q And so if your hypothetical meter expert  
16 said to you, would you want data so that you could test  
17 whether over this 23-month period there was any change  
18 in meter rates or change in the timing of the meter?

19 A Well, sure. I would say: Well, let's  
20 see how the revenue relates to the timing changes or  
21 the coinage.

22 Q But not having a meter expert at your command,  
23 you didn't ask for that data, did you?

24 A Correct.

25 Q And you didn't analyze that data, did you?

1 prlt

Levin-cross

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2 A I had no access to that data, right.

3 Q You do happen to know whether Dr. Fairley  
4 had that data and used it?

5 A Which data now are we referring to?

6 Q Meter rate changes and changes in the amount  
7 of time that you can buy with each coin.

8 A No, I don't know if Dr. Fairley did or  
9 did not.

10 Q But you didn't. And you didn't have, did  
11 you, access to -- you didn't in fact have, did you,  
12 data on increases and decreases in the number of meters  
13 in the plant, did you?

14 A No, I didn't.

15 Q Did you have any data on increases or decreases  
16 in arterial traffic and bridge crossing use during any  
17 period involved here?

18 A Yes, I did.

19 Q Did you use it?

20 A It was impossible to use because one doesn't  
21 know how that related to revenue.

22 Q The data you had showed certain decreases  
23 in traffic during certain months; right?

24 A Yes.

25 Q And it's impossible to use because you

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1 prlt Levin-cross  
2 don't know, being just a statistician -- not just a  
3 statistician, being a statistician rather than a parking  
4 meter expert -- excuse me, being a statistician rather  
5 than a parking meter expert, you don't know whether  
6 there is any correlation between bridge crossings and  
7 meter use, do you?

8 A There may be; there may not be.

9 Q Now, you testified, Doctor, that you made  
10 comparisons on two 10-month periods, which I believe  
11 are the ones that are up there on the board now, right,  
12 and also on two 6-month figures; is that correct?

13 A With different figures, but the same periods,  
14 yes.

15 Q Yes.

16 And you also stated during direct examination,  
17 I believe, that the more data that you had, the better.

18 Is that correct?

19 A Right.

20 Q Now, would you agree with me that all other  
21 things taken aside, ten months of data is more data  
22 than six months of data? That would be true, wouldn't  
23 it?

24 A Yes.

25 Q Did Mr. Meister or any of his associates



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Levin-cross

1  
2 suggest to you a reason why the four summer months --  
3 June, July, August and September -- would best be eliminated  
4 from your 10-month comparison so you could make a 6-  
5 month comparison?

6 A I'm sorry, I didn't understand your question.  
7 Could you just --

8 Q Well, where did the idea come from to compare  
9 six months and six months rather than ten months and  
10 ten months?

11 A Well, when I first sat down with Mr. Meister  
12 and associates, the issue being discussed was:

13 Here we have a proposed comparison between  
14 two 10-month periods and what are the biases that can  
15 occur when you have uncontrolled and non-comparable  
16 periods?

17 My response was:

18 Well, you have to make exhaustive enumeration  
19 of all possible factors, which I fully realize is well  
20 nigh impossible or at least impractical. But then we  
21 started listing explicitly what possible factors which  
22 (a) accord with common sense and which (b) the traffic  
23 commissioner himself mentioned, and the PATH strike  
24 and the gasoline rationing period were two major factors  
25 that came about.

1 prlt

Levin-cross

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2 So it was information given to me that  
3 the PATH strike and the gasoline rationing essentially  
4 ended after four months into the period, so that's where  
5 the six months came from.

6 Q Now, was it your professional judgment  
7 that because Mr. Meister told you about a PATH strike  
8 and a gas shortage, that it was more relevant to eliminate  
9 four out of ten months of data, 40 percent of all of  
10 your data, you would get a better, more accurate result  
11 because of two factors that he mentioned than by using  
12 the data for the full 10-month periods?

13 Was that your statistical decision or was  
14 that Mr. Meister's decision?

15 A No.

16 I --

17 MR. MEISTER: Objection.

18 Excuse me, there was no testimony that  
19 it was either person's decision. You are mischaracterizing  
20 prior testimony. There has been no testimony here that  
21 either of those comparison periods in Dr. Levin's opinion  
22 is valid.

23 THE COURT: I lost the last part.

24 MR. MEISTER: There has been no testimony  
25 here, your Honor, that either of those comparison periods

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Levin-cross

2 in Dr. Levin's opinion is valid; quite the contrary.

3 MR. GLEN: I'm not --

4 THE COURT: Well, he was questioning him  
5 about the use of six-month periods.

6 MR. MEISTER: But he was asking him whether  
7 it was his idea or my idea that a six-month period was  
8 mor valid than a ten-month period, and there has been  
9 no testimony that Dr. Levin thought either was valid.

10 THE COURT: Well, what's the problem?

11 MR. MEISTER: It's a compound disjunctive  
12 question. It's like when did you stop beating your  
13 wife or do you eat --

14 THE COURT: Rephrase the question.

15 MR. GLEN: Yes, sir.

16 BY MR. GLEN:

17 Q Dr. Levin, if I recall correctly, we have  
18 seen some charts which purport to compare revenues obtained  
19 in two 6-month periods and two 10-month periods.

20 Is my recollection correct?

21 A Yes.

22 Q Were those charts prepared either by you  
23 or under your direction?

24 A Under my direction.

25 Q Now, you eliminated from the 10-month periods

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1 prlt

Levin-cross

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2 four months, the same four months in two different years.

3 Is that correct?

4 A Correct.

5 Q And you eliminated those four months after  
6 a discussion with Mr. Meister in which you elicited  
7 certain statements regarding variables.

8 Is that what you testified to?

9 A Well, what exactly happened was, I was  
10 attempting to show the pitfalls in making non-comparable  
11 comparisons. I said:

12 Well, for example, if you can assert that  
13 the PATH strike and the gasoline rationing may have  
14 ended after four months, let's use as an example the  
15 6-month period and show how different it may be from  
16 the 10-month period.

17 So it was only by way of an example of  
18 the pitfalls that this chart was prepared.

19 Q But in order to use that example, you gave  
20 up four months of data for each company; is that correct?

21 A Yes.

22 Q Four months of actual revenues for each  
23 company; is that correct?

24 A Yes.

25 Q Or four months of the revenues calculated

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1 prlt

Levin-cross

2 on some model basis, in your case average collection  
3 days and in Dr. Fairley's case meter days.

4 You gave up that opportunity in order to  
5 make a 6-month comparison; right?

6 A I didn't give it up. I did the 10-month  
7 comparison.

8 Q You did the 10 and you did the 6?

9 A Yes.

10 Q They are just two different comparisons,  
11 one with 10 months of data and one with 6 months of  
12 data; right?

13 A Correct.

14 Q Now, you did some work with some charts  
15 involving an Area 1A. You don't happen to know how  
16 many meters are in 1A, do you?

17 A Approximately 45, if I'm correct.

18 Q Let's assume 48.

19 You don't happen to know where 1A is, do  
20 you?

21 A I believe it's in this very area.

22 Q Let's assume that it's in front of the  
23 Criminal Court building. Let's further assume that  
24 during the study period in which you were looking at  
25 1A, the New York Criminal Courts began Saturday arraignments.

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Levin-cross

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Let's further assume that the meters in  
1A operate Monday through Saturday.

Would the fact that -- strike that, please.

Would the hypothetical or the supposed  
fact that the Criminal Court began Saturday arraignments,  
in your view, tend to increase expected collections  
after Saturday arraignments began or decrease expected  
collections after Saturday arraignments began or have  
no effect on collections?

A It would be impossible for me to say. I  
could conjecture on common-sense grounds, but that's  
not quite the job of the statistician.

(Continued on the next page)

1 T3apm

PRjw

Levin - cross

2 Q Not being a parking meter expert, you would  
3 have only your common sense view that if the courts  
4 were open another day, it might increase collections;  
5 right?

6 A Well, if I also had the data to support the  
7 question, I could make a determination. But in the  
8 absence --

9 Q But the data that you have on 1A, if I recall  
10 it correctly, shows a 7 percent increase between  
11 Brink's and CDC; doesn't it?

12 A Yes.

13 Q And we always agreed here that 1A was always  
14 collected by the City, never by Brink's and CDC.

15 Now, you found, did you not, that there was  
16 a trend --

17 A Yes.

18 Q -- of increase of collections in 1A?

19 A Yes.

20 Q You don't know what, if any, factors caused  
21 the trend of the increase in 1A, do you?

22 A Correct.

23 Q One factor might be increased money put in  
24 the meters?

25 A Correct.

Full-Year Soy Formula

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1 2 PRjw Levin - cross

2 Q Another factor might be the addition of Saturday  
3 arraignments causing more people to use the meters generally,  
4 right?

5 A It is possible.

6 MR. GLEN: Your Honor, may I have a couple  
7 of minutes to figure out what my colleagues have written  
8 to me here?

9 THE COURT: Yes.

10 (Pause)

11 MR. GLEN: Thank you, your Honor.

12 BY MR. GLEN:

13 Q Sticking with the 1A area for a moment.

14 Did you in your direct examination say to  
15 Mr. -- in response to a question of Mr. Meister, that  
16 an evaluation of the performance in 1A might be useful  
17 because it might serve as a control?

18 A Yes.

19 Q And the reason, I believe -- and correct  
20 me if I'm wrong -- is the reason that it might serve  
21 as a control because the City collected there, neither  
22 Brink's nor CDC collected, so the so-called intercompany  
23 difference doesn't operate in 1A; is that correct?

24 A That is the sense in which I use the word  
25 "controlled."



BRjw

Levin - cross

2 Q Assume with me that there are 48 meters in  
3 1A. There may be 45. Well, I'm the one who added the  
4 three meters, so let's assume 48.

5 Assume with me that there are 70,000 meters,  
6 on the average, in the total New York City parking meter  
7 plant.

8 What percentage of 70,000 meters is 48 meters?  
9 Could you figure that one for me, please?

10 A 48 divided by 70,000 is the number .00068.  
11 It's about 7/100ths of a percent.

12 Q Less than one-tenth of one percent of all  
of the meters?

14 A Yes.

15 Q If one of those 48 meters was out during  
16 the Brink's period, hypothetically, and was fixed during  
17 CDC, that would account for a two percent increase right  
18 there?

19 A Yes.

20 Q But would it be, as a matter of statistician  
21 worth, would it be reasonable to pro rate over a universe  
22 of 70,000 meters a change in the repair rate of one  
23 meter in one area, accounting for less than one-tenth  
24 of one percent of the entire plant?

25 A I never said I did or would.

Full-Year Soy Formula

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1 4 PRjw

Levin - cross

2 Q Why then is it a valid control to look at  
3 1A?

4 A It is a control in the sense that if you  
5 say that everything is status quo and really we have  
6 two separate lines and the difference due to theft,  
7 in order to evaluate that statement, I say: Well, your  
8 assumptions have to be tested. Ideally, with as much  
9 data as possible. We don't have the data, so we don't  
10 really know. One thing we can say is that if there  
11 is this difference in 1A, which is admittedly not a  
12 random sample, it is just a particular happenstance  
13 that this was an area with no intercompany differences,  
14 and if you find an increase, well, that sheds some doubt  
15 upon the assumptions that you are making in the first  
16 conclusion.

17 Q And if you run your trend of one line out  
18 to get an expected increase of \$2 million in revenue  
19 and you only come up with an increase of \$1 million,  
20 that would tend to cast some doubt on the one-line hypothesis,  
21 wouldn't it?

22 A No.

23 It only so casts some doubt on the validity  
24 of the far extrapolation of the line.

25 MR. PERROTTA: No questions.

1 5 PRjw Levin - redirect

2 MR. CLYDE: No questions.

3 THE COURT: Any redirect?

4 How long will you be on redirect now?

5 MR. MEISTER: Perhaps ten minutes, your  
6 Honor.

7 THE COURT: If you think it will take longer,  
8 we will take our mid-afternoon recess. I think you  
9 should conclude within ten minutes. We are getting  
10 to be quite argumentative now.

11 REDIRECT EXAMINATION

12 BY MR. MEISTER:

13 Q Doctor, I'm showing you a document which  
14 is in evidence as City Exhibit II, which has been represented  
15 as being a depiction of the state of the off-street  
16 meter plant at May 22, 1981.

17 I ask you, sir, to look at the description  
18 of Area 1A and tell the Court and the jury whether the  
19 meters there are operable on Saturday.

20 A What it says is the rates are \$1 per hour,  
21 three-hour meters, 8:00 a.m. to 7:00 p.m., Monday through  
22 Friday. I would assume, therefore, that they are not  
23 operable on Saturday.

24 Q So, therefore, the assumption that Mr. Glen  
25 asked you in your hypothetical -- I mean, in his

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1 6 PRjw

Levin - redirect

2 hypothetical question doesn't comport with the data  
3 as shown by Exhibit II, does it?

4 A Right.

5 Q And if that's the case, whether or not there  
6 were Saturday arraignments in the criminal court, would  
7 be irrelevant, wouldn't it?

8 A It would seem so.

9 Q Now, sir, just so we are clear, you never  
10 testified, did you, that the trend in Area 1A necessarily  
11 means that there was a trend outside Area 1A?

12 A That's correct.

13 Q All that you have testified to was that that  
14 gives rise to the possibility and requires the exploration  
15 of additional data?

16 A Correct.

17 Q And, sir, dealing with a comparison of the  
18 two ten-month periods and the two six-month periods,  
19 you didn't rely on either comparison, did you?

20 MR. GLEN: Objection, leading.

21 THE COURT: Objection sustained.

22 Now, there is no point in going back what  
23 he relied on. That's going to be repetitious in redirect.  
24 I'm not going to all it. Put questions with respect  
25 to matters that were brought out on cross examination.

7 PRjw

Levin - redirect

2 MR. MEISTER: I thought this was brought  
3 out on cross examination, your Honor.

4 BY MR. MEISTER:

5 Q Mr. Glen asked you, sir, on cross examination  
6 about eliminating four of the ten months in those ten-  
7 month periods.

8 Did you rely on either the six-month comparison  
9 or the ten-month comparison in determining your trend?

10 MR. GLEN: Objection; leading.

11 THE COURT: I'll allow it.

12 A No, I did not.

13 Q What was the purpose of making the ten-month  
14 comparison and the six-month comparison on the same  
15 chart?

16 A The purpose was to show how drastic a difference  
17 can occur due to possible factors that are varying from  
18 one time period to the other time period.

19 Q And, sir, as a general rule statistician,  
20 do you tend to look at less data or more data if you  
21 are trying to determine whether or not there's a trend?

22 A Oh, as much data as you can possibly get.

23 I'd like to also say one other thing, if  
24 I may, which is that this question of: Is there one  
line or two lines --

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1 8 PRjw

Levin - redirect

2 MR. GLEN: Objection.

3 There is no question posed.

4 THE COURT: Objection sustained.

5 Q I'll pose a question, Doctor,

6 What was it that you were about to say?

7 MR. GLEN: Objection.

8 THE COURT: That question is objectionable.

9 Put a question to him and I'll allow it.

10 Q Doctor, would you like to elaborate further  
11 on Mr. Glen's question concerning one trendline or two  
12 trendlines?

13 A Yes, I would.

14 Q What would you like to add to clarify the  
15 testimony that Mr. Glen brought out?

16 A I --

17 MR. GLEN: Objection, just on general principles.

18 THE COURT: We might as well get the answer.

19 Explain why you took these two six-month  
20 periods as against the two-month period when you said,  
21 as I understood it, that longer periods of time are  
22 required in attempting to come to a judgment.

23 You collapsed the period instead of extending  
24 it.

25 THE WITNESS: That's correct, your Honor.

1  
2 MR. MEISTER: No.

3 THE WITNESS: What I wanted --

4 THE COURT: Now, your counsel is saying  
5 I'm wrong and you say I'm correct.

6 Now, what's the answer?

7 THE WITNESS: The answer is, in order to  
8 establish a trend, as I said initially, you want to  
9 take as long as possible a period as you can. My sole  
10 purpose in collapsing it to a six-month period was to  
11 demkonstrate the pitfalls in making non-controlled  
12 comparisons.

13 BY MR. MEISTER:

14 Q Now, sir, in the field of statistics when  
15 you have to make studies and comparisons in fields in  
16 which you are not an expert, do you customarily rely  
17 on the word of a so-called expert?

18 A Well, no. I mean, if the expert is making  
19 statements, I ask him: Show me your published papers,  
20 show me your data, show me the documented numerical  
21 support for the point.

22 Q And if the expert doesn't give you data to  
23 support his conclusions, would you conclude that his  
24 conclusions are so much hot air?

25 A Well, I mean, you know, if the expert can't

1 10PRjw Levin - redirect

2 come up with the goods, it certainly casts suspicion  
3 on his reputation.

4 Q And, sir, in considering whether there were  
5 factors other than those to which Mr. Glen points of  
6 this intercompany difference which accounted for the  
7 rising trend of revenues from the period of May 1, 1978  
8 all the way through the Brink's period and the CDC period,  
9 did you rely to some degree on someone else's opinion?

10 A I relied on someone else's opinion to suggest  
11 possible confounding factors, not to say whether or  
12 not they are or are not, but just to bring up to my  
13 attention factors which may not come to my attention  
14 since I'm not an expert in the field.

15 Q And whose opinion did you rely on in that  
16 sense?

17 A Well, it was the traffic commissioner and  
18 the assistant traffic commissioner.

19 Q And that's the traffic commissioner and the  
20 assistant traffic commissioner of the City of New York?

21 A That's correct.

22 Q And what are the factors that they pointed  
23 to upon which you relied to reach a conclusion that  
24 there may be confounding factors?

25 MR. GLEN: Objection.



11PRJw

Levin - redirect

2 THE COURT: Objection sustained.

3 The witness has already testified to it.

4 Q Sir, I'd like for you to look one more time  
5 at Exhibit 271 in evidence, which is your chart of total  
6 revenues received on a monthly basis by the City from  
7 all areas other than Area 1A. I'm lining the pointer  
8 up over the trendline which you have shown, based on  
9 the Brink's points.

10 Is that correct?

11 A Yes.

12 Q Sir, if those points are depressed because  
13 some people from Brink's, let's assume, stole and stole  
14 significant sums of money, where would that trendline  
15 sit were it not for those thefts?

16 A Assuming that you remove the thefts or that  
17 you take the stolen money and put it back, it would  
18 shoot it up.

19 Q Up here somewhere?

20 A That's approximately correct.

21 Q And in that circumstance, sir, the monies  
22 collected by CDC would fall even further below the trendline,  
23 wouldn't they?

24 A Under those assumptions, yes.

25 MR. MEISTER: No further questions.

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12PRjw Levin - recross

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RE CROSS EXAMINATION

BY MR. GLEN:

Q Did you consult with any experts, either those that were full of hot air or those that were not full of hot air, to decide what factors to look at?

A The only guidance I used was the ones I have mentioned.

MR. GLEN: No other questions, your Honor.

THE COURT: All right, you are excused.

THE WITNESS: Thank you, your Honor.

(Witness excused)

THE COURT: We'll take our mid-afternoon recess.

(Recess)

(Continued on next page)

endt3b