

1 until 1985. I was employed as an Energy Research Analyst by
2 Pacific Gas and Electric Company from 1985-1987. I was
3 employed as a Rates Analyst by the City of Seattle Solid
4 Waste Utility from 1987-1990. In 1990, I became Director of
5 the Seattle office of Synergic Resources Corporation (SRC)
6 with responsibility for the Company's nationwide practice in
7 solid waste issues and the regional practice in energy
8 issues. I was promoted to Vice President in 1992. I am
9 currently Principal of Skumatz Economic Research Associates
10 (SERA) and manage the company's nationwide practice in solid
11 waste rates and planning issues.

12
13
14 **Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND.**

15
16 **A.** I am an Economist. I received a Bachelor of Arts in
17 Economics from the University of Wisconsin at Madison, and a
18 Master of Arts and a Ph.D. in Economics from the Johns
19 Hopkins University. A copy of my resume, which details my
20 work experience and publications is attached as Exhibit _____
21 (LAS 1).

22
23
24 **Q. ARE YOU FAMILIAR WITH THE SUBJECT MATTER OF DOCKET NO. TG-**
25 **940411?**

1 A. Yes. I am familiar with Washington Utilities and
2 Transportation Commission (WUTC) Docket TG-940411, in which
3 Seattle Disposal Co., Rabanco Ltd., d/b/a Eastside Disposal
4 and Container Hauling (Eastside) filed for increased
5 residential garbage and residential recycle rates. I have
6 reviewed the tariff revision adopted by the WUTC. I
7 submitted a declaration related to the matter in February of
8 this year.

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10 Q. WHAT AREAS WILL YOUR TESTIMONY ADDRESS?

11
12 My testimony will address several key areas: my experience
13 in solid waste rates, my work in rate incentives and impacts
14 on customer waste management behavior, and findings regarding
15 solid waste rate modeling and my conclusions regarding the
16 specific rates proposed by the WUTC in regard to this docket.

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19 Q. WILL YOU PLEASE SUMMARIZE THE CONTENT OF YOUR TESTIMONY?

20
21 My testimony demonstrates that, in my experience, rate
22 incentives provide strong motivation for residential
23 customers to recycle and divert waste from the landfill. The
24 evidence indicates that stronger incentives from more
25 aggressive rates tend to provide greater diversion levels.

1 Larger diversion levels can be realized if stronger
2 incentives are provided, even if the customers have already
3 had a long-standing incentive from variable can rates.
4 Customers react to rates, and continuing rate incentives
5 provide one of the best methods of causing and maintaining
6 higher recycling and waste reduction levels.

7
8 Although providing rates that reflect cost of service is one
9 principle of rate setting practice, the practice of setting
10 solid waste rates involves significant judgment in allocating
11 joint costs between customer groups and service levels. Cost
12 of service rate calculations can result in a range of
13 specific rate levels that are all cost of service justified.
14 Cost of service rates allow room for policy, and incentives
15 can be provided within cost of service rates in solid waste.
16 Revenue uncertainties can be mitigated through careful
17 estimation of service levels or through a widely accepted
18 practice of balancing accounts.

19
20 Finally, in examining the specific rate recommendations of
21 the WUTC in regard to this docket, I find that, using the
22 differentials provided in the filing, it appears that the
23 rates do not reflect cost of service, and generally result in
24 rates that overcharge mini-can customers and undercharge
25 large can subscribers. The rates proposed would, based on my

1 experience, have a detrimental impact and would lead to a
2 loss of momentum in the progress toward reaching the solid
3 waste management goals established by the King County
4 Comprehensive Plan.

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7 Q. WHAT EXPERIENCE DO YOU HAVE IN AREAS RELATED TO THIS
8 DOCUMENT?

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10 A. I have been involved in rate design and rate studies
11 including rate designs for solid waste services across North
12 America since 1985. I have performed solid waste rate design
13 and incentive feasibility studies for jurisdictions including
14 Victoria, B.C., Cincinnati, Ohio; Oak Park, Illinois;
15 Anchorage, Alaska; Fort Wayne, Indiana; Ventura, California;
16 Berkeley, California; and Pasadena, California. I have
17 performed detailed rate studies and implementation work for
18 Pasadena, Cincinnati, and Oak Park.

19

20 I performed detailed rate studies and implementation work for
21 the City of Seattle Solid Waste Utility. I pioneered the
22 concept of "Garbage by the Pound" and obtained grant funding
23 from the Environmental Protection Agency (EPA), Region 10, to
24 design and implement a garbage by the pound study for the
25 City of Seattle. The study, which included a test involving

1 Seattle Solid Waste Utility customers, was designed to
2 determine the impact of garbage by the pound rate design on
3 levels of waste reduction and recycling.

4
5 I have given single and multi-day workshops, presentations,
6 and training on the effect of rate incentives on waste
7 reduction and recycling for the Washington Utilities and
8 Transportation Commission, the Greater Vancouver, B.C.
9 Regional District, the British Columbia Ministry of the
10 Environment, the California Five Cities Council, EPA national
11 headquarters, and the County and City Managers Association.

12
13 I have drafted manuals on the effect of rate incentives on
14 waste reduction and recycling, and implementation of such
15 incentives for EPA national headquarters, EPA Region 10, and
16 the States of California and Illinois.

17
18 I also worked with a task force examining the commercial
19 sector rates charged by haulers operating within the City of
20 Seattle to determine whether the rates provided sufficient
21 incentives for commercial businesses to engage in recycling
22 activities.

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1 Q. PLEASE DESCRIBE WORK YOU HAVE CONDUCTED IN THE AREA OF THE
2 IMPACTS OF RATE INCENTIVES ON SOLID WASTE MANAGEMENT IN THE
3 RESIDENTIAL SECTOR.

4
5 I have conducted detailed studies of the reaction of
6 residential customers to incentive-based (either volume- or
7 weight-based) rates. Generally, I have found that there are
8 several reactions to variable rates: garbage tonnage
9 reductions; increases in recycling and yard waste diversion;
10 and reductions in garbage set outs. These results are
11 consistent with reinforcing the state and local solid waste
12 management hierarchy. The results show that incentive rates,
13 in conjunction with diversion programs, have led to reports
14 of between 25% and 65% reduction in the amount of tonnage
15 going to landfills or transfer stations (with an average of
16 44%). Customer surveys show that incentive rates lead to
17 waste diversion and careful purchasing on the part of
18 customers. One survey shows that 76% of customers reported
19 more careful decisions in purchasing to minimize waste, and
20 25% reported using additional efforts to reduce garbage.
21 This is the first rung on the waste management hierarchy
22 (waste reduction). Preliminary statistical work I have
23 conducted shows that incentive rates are a crucial link to
24 recycling. Extensive evidence shows that incentive rates
25 lead to greater recycling, but even with mandatory recycling

1 and mandatory yard waste programs, volume-based incentive
2 rates lead to an additional 8-13% percentage points of
3 diversion and recycling. In addition, garbage set outs from
4 communities decline dramatically. Reports from Hoffman
5 Estates, Illinois showed a decline from an average 3.1 units
6 set out (1.86 33-gallon equivalents) to 1.3 stickered bags (a
7 30% reduction). See Exhibit 30 ^(JAG-1) ~~(LAS-2)~~. *allh*

8
9 I have also published detailed work examining the reaction of
10 City of Seattle customers, and found that they reduced their
11 subscribed garbage cans from an average of 3.5 per household
12 per week to less than 1.7 cans per week in reaction to the
13 implementation of variable can charges. The first reduction,
14 to about 2.6 cans, came about in response to medium-incentive
15 rate differentials, where differentials for extra cans were
16 about \$3. However, when rates increased, and in particular,
17 when the rate for the extra can increased to \$5 in 1987,
18 customers reduced their subscriptions to about 1.5 cans (a
19 much larger percentage reduction). In addition, the City's
20 recycling rate increased from about 14% to over 26% during
21 this period. Finally, in 1989, when more aggressive rate
22 incentives were implemented (the rate for additional cans
23 increased to \$9), and the City introduced yard waste
24 collection and expanded the recycling program, customer
25 subscriptions fell to 1.0 cans per household per week.

1 Almost 90% of Seattle's customers subscribe to the mini-can
2 or one-can service levels, and the mini-can made sense for
3 almost a quarter of Seattle's customers. And when even
4 better incentives were offered through the pilot test of
5 "Garbage by the Pound", we found an additional 15% reduction
6 in the number of pounds of garbage put out for collection.
7 See Exhibit _____ (LAS 3).
8

9 Q. TO WHAT DO YOU ASCRIBE THESE CHANGES IN BEHAVIOR?
10

11 Customers change behavior to minimize their bills. Customers
12 in Seattle reacted to new rates proposals in a manner that
13 showed they were rational. When rates for extra cans
14 increased, they selected a mix of services (garbage, yard
15 waste, and recycling) that reduced the impact of the rate
16 increases on their bills. Customers make selections among
17 the waste management options and change their behavior to the
18 extent that the impact on their bill is reduced up to the
19 point that the effort is worth it. And they make sensible
20 choices. When the yard waste program was introduced in
21 Seattle with \$2 per month charge it was feared that customers
22 might not subscribe. However, the evidence clearly shows
23 that customers can make rational economic decisions.
24 Customers reduced their extra garbage can subscriptions
25 (saving \$9) and signed up for the yard waste collection. In

1 doing this, customers reduced their bills by \$7 over what
2 they would have been, and Seattle's yard waste program had
3 over 62% participation and considerably more yard waste than
4 anticipated was diverted. Seattle's recycling and diversion
5 rate jumped to almost 39%. Recycling and yard waste
6 participation were increased significantly because customers
7 could reduce their bill by participating.

8
9 There are several important lessons from this evidence.
10 Customers react to rates, and greater differentials or
11 greater incentives are important to generating this behavior.
12 Second, incentive rates are one of the best methods of
13 causing and maintaining customer behavior that is consistent
14 with the waste management hierarchy. Rates are monthly
15 reminders to customers to make appropriate waste management
16 decisions, and evidence shows that the pocketbook is an
17 excellent mechanism to affect behavior.

18
19 However, there are thresholds. Customers reacted sluggishly
20 to \$1.50 and \$3 differentials. They reacted more
21 dramatically to \$5 and \$9 differentials. Rate incentives
22 must give clear economic signals that are consistent with the
23 waste management hierarchy and are clearly understandable to
24 customers. Then customers will change waste management
25 behavior consistent with the signals provided.

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In addition, differentials between garbage rates and diversion need to be high to provide incentives for separating the waste. The high yard waste participation results from the relatively large dollar savings customers could realize from modifying behavior and separating yard waste.

Q. WOULD YOU PLEASE DESCRIBE THE EFFECTS OF RATE INCENTIVES AND DISINCENTIVES, BASED ON STUDIES YOU HAVE PERFORMED AND YOUR PROFESSIONAL EXPERIENCE?

The role of rate incentives in solid waste has been a focus of my work for the last several years. I have conducted case studies, quantitative analyses, and reviewed literature to develop an understanding of the roles of incentives in solid waste.

I have reviewed the rate practices in Alameda County, California. This group of communities is urban or suburban, and offers variable can service for customers. A review of the rates offered in these communities shows that it is fairly common for garbage service to be priced relatively aggressively. Many of the communities charge "a can is a can", or even more aggressive rate schedules for garbage

1 service. Some of the rates are shown in Exhibit ____ (LAS
2 4). A number of these communities show impressive diversion
3 rates from their recycling efforts, even under the strict
4 measurement standards set by California legislation.

5
6 One relevant example is provided from a discussion with the
7 Acting Recycling Supervisor of Oakland, California. Oakland
8 used to charge "a can is a can" differentials (e.g., in 1985,
9 their rates were \$6.40 per can). When they changed rates in
10 1991, they introduced a lower-priced mini-can (20 gallons for
11 \$10.08) and increased added a premium of 20% beyond a "can is
12 a can" for cans beyond the first. After the rate incentives
13 were increased, the diversion rates increased from 13% to an
14 estimated 30% by 1993. Differentials, incentives, and
15 disincentives were understood by customers and incorporated
16 into their behavior.

17
18 In Alameda County, the rates incorporate a separate line item
19 for recycling, which customers may not opt out of. However,
20 a phone call with the Director of Solid Waste and Recycling
21 indicates that Susquehannah County, Pennsylvania,
22 incorporates a separate charge for recycling participation.
23 In this County, customers pay 50 cents less for recycling
24 bags than for garbage (\$2). Even with only a 50 cent

25

1 differential, their recycling diversion is over 16%.
2 Customers do participate when differentials are provided.
3

4 As mentioned before, a similar phenomenon is found for yard
5 waste participation. Even when separate charges are levied
6 for yard waste collection, customers participate. Seattle's
7 62% participation the day the program was introduced (with
8 its accompanying \$2 charge) is evidence of this incentive.
9

10 Finally, I have conducted a great deal of work on
11 elasticities, in both solid waste and energy. The work I
12 have done on elasticities in solid waste show that the
13 reaction of residential customers' tonnage to prices is in
14 the range of $-.09$ to $-.14$. See Exhibit ____ (LAS 5). This
15 means that, in general, fairly significant rate levels and
16 differentials are needed to provide incentives to customers
17 to affect their behavior.
18

19 However, evidence from Seattle's customer reactions and from
20 other communities, both in terms of can set outs and in terms
21 of tonnage reductions, shows that differentials in rates
22 provide strong incentives to reduce waste and modify set out
23 behavior.
24
25

1 In my work on variable can set out elasticities that was
2 published in my EPA manual (See Attachment _____, LAS 6)., I
3 found that lower can levels had lower elasticities. This
4 implies that when customers are already on lower can levels,
5 it takes a differential to get them to reduce. In my work on
6 Seattle rate studies, I found that the elasticity for
7 switching from two cans to one can was about -1, about -1.5
8 for three cans to two, and about -2 for higher can levels.
9 This implies that, even with the same differential in rates,
10 the number of customers switching to smaller cans would be
11 lower for those already on few cans. Reducing differentials
12 for small can levels will lead to a slowing in progress
13 toward reducing customers' garbage set outs.

14
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16 Q. IN A MARKET WHERE INCENTIVES HAVE EXISTED FOR AN EXTENDED
17 PERIOD, WHAT WILL HAPPEN IF INCENTIVES ARE INCREASED?

18

19 My work on the Garbage by the Pound experiment showed that,
20 given an incentive, small can customers were very willing and
21 anxious to reduce the amount of waste in their cans. Under
22 the standard variable can program, customers on mini-cans
23 could not pay less, even if they did not fill their cans.
24 When the Garbage by the Pound experiment started, customers
25 were able to see savings from every pound of waste diverted.

1 We found overall reductions (after a mature variable rate
2 system) of about 15% in the average pounds per week set out
3 over the course of the experiment. However, the mini-can
4 customers reduced their waste by 23% (or 2.1% per week
5 average), and the higher can customers reduced by an
6 impressive, but smaller 1.4% per week. See Exhibit ____ (LAS
7 3). Incentives need to be continued and enhanced if low use
8 customers are to continue to be encouraged to reduce set
9 outs.

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11
12 **Q. DO INCENTIVES HAVE TO BE MAINTAINED, OR MAINTAINED AT A**
13 **CERTAIN LEVEL, TO MAINTAIN SPECIFIC LEVELS OF WASTE REDUCTION**
14 **AND RECYCLING?**

15
16 I am unaware of specific data to support this conclusion
17 because I am unaware of any communities that have
18 significantly reduced incentive levels. However, based upon
19 my experience, incentives need to continue to be provided if
20 low use customers are to be expected to continue to be
21 encouraged to reduce set outs. I base this conclusion on the
22 results of the Garbage by the Pound experiment, which found
23 that customers especially noted that the experiment provided
24 them with the opportunities to understand what they were
25 paying for, and provided them a continuing incentive to

1 reduce waste. This experiment also showed that providing a
2 stronger incentive was effective, even for customers that had
3 already had a long-standing incentive system (variable can
4 rates). In addition, improved diversion was noted for
5 Seattle, Oakland, and other communities, after differentials
6 were increased. Maintaining customer behavior consistent
7 with the waste management hierarchy is improved through
8 maintaining incentives, and providing them on a recurring
9 basis.

10

11

12 **Q. WHAT IS YOUR EXPERTISE REGARDING RATE STUDIES AND COST OF**
13 **SERVICE MODELS?**

14

15 I have conducted detailed solid waste rate studies and cost
16 of service modeling work for the Cities of Seattle,
17 Washington; Cincinnati, Ohio; Berkeley, California; and Oak
18 Park, Illinois, among others. I have also reviewed
19 commercial rates and incentives for Seattle, and conducted
20 rate analyses for Pasadena, California and other communities.

21

22

23 **Q. WOULD YOU PLEASE DESCRIBE THE STEPS INVOLVED IN DETERMINING**
24 **COST OF SERVICE RATES?**

25

1 The process of determining rates involves four basic steps.
2 Step 1 is to estimate demand for service. This step analyzes
3 the demand for each type of service offered for each customer
4 class. It generates estimates of the number of tons or cubic
5 yards disposed (by program or customer type), customer counts
6 by type, and number of service units used. Step 2 is to
7 calculate revenue requirements. This step analyzes the costs
8 that would be incurred meeting the demand for service
9 estimated in the demand step. The revenue requirements step
10 evaluates all the activities that would be required to
11 provide the services on a cost-center basis. This module
12 considers staffing and equipment requirements, production and
13 cost relationships, and estimates the total costs. These,
14 along with financial considerations, provide an estimate of
15 the total amount of revenues that need to be collected from
16 all sources, including rate and non-rate revenues. Step 3 is
17 cost allocation. This step analyzes how the revenue
18 requirements calculated in step 2 are to be distributed
19 between and within customer classes and service levels.
20 Relationships are developed that allow the service provider
21 or agency to attribute the system's costs (or revenue
22 requirements) based on the type of service delivered and the
23 customer class served. The last step is to develop the form
24 and relationships of the rates to be charged and calculate
25 the rate levels to cover revenue requirements. Generally,

1 these steps will need to be performed and refined several
2 times before the system reaches "equilibrium". I have
3 published a manual describing in detail the steps needed to
4 conduct a variable can rate study. See Exhibit ____ (LAS 6).

5
6 The determination of rate levels depends on assumptions and
7 relationships derived in each of these steps. However, one
8 of the areas with perhaps the most "judgment" involved is
9 step 3, in which the total costs of providing service are
10 "allocated" between customer types and services provided.
11 The basis on which costs are incurred are very joint in
12 nature. It would not make sense to charge each customer the
13 full cost of driving the truck to their house from "base".
14 Determining the share of those costs, and the wide range of
15 other costs, that should be attributed to each individual
16 customer or types of customers involves making estimates of
17 cost relationships and attributing them between customers.
18 Determining whether certain cost elements should be allocated
19 proportionally, or based on tonnage, or based on number of
20 customers, accounts, or cans is based at least partly on
21 judgment.

22
23 Because joint costs are involved and estimates and judgments
24 are needed, cost allocation is a combination of a science,
25 art, judgment, and policy. Therefore, cost of service rates

1 are virtually never one indisputable set of numbers in the
2 field of solid waste, or in any utility. Rather, they are a
3 range of rate calculations that are all justifiable on cost
4 allocation rationales. As an example, for one rate study I
5 worked on, alternative justifiable cost allocation
6 assumptions could be used to support rates for extra cans
7 that varied between about \$3 per can up to about \$6 per can.
8 And then, for policy reasons -- to provide even stronger
9 incentives for recycling and diversion -- we actually
10 proposed extra can rates that were higher than the cost of
11 service estimations.

12
13 Thus, cost of service is an art, rather than pure science and
14 does not lead to one pure, indisputable answer. Cost of
15 service by its nature, allows significant room for policy.

16
17 **Q. ALTHOUGH MORE AGGRESSIVE RATES PROVIDE BETTER INCENTIVES,**
18 **DON'T THEY DEVIATE FROM COST OF SERVICE AND PUT THE SERVICE**
19 **PROVIDER AT FINANCIAL RISK?**

20
21 **A.** Charging each customer the average cost of providing service,
22 and mandating payment, would result in low financial risk.
23 Given that a relatively high percentage of the costs of
24 garbage collection service is represented by the cost of
25 getting the truck and staff to the house, the flatter the

1 rates, the more certain the revenue recovery. However, flat
2 rates reflect neither cost of service, nor provide an
3 economic incentive to manage waste appropriately.
4

5 As mentioned before, cost of service rates are represented by
6 a range of rates, some with higher differentials than others.
7 Better incentives are provided by more aggressive rates. A
8 desire to provide incentives can make recovery of full costs
9 less certain. However, these financial risks can be managed.
10 One method is through accurate estimation of customer service
11 choices. With the years of experience in a wide variety of
12 communities, the haulers in this area have good quality
13 information on historical customer selections in terms of
14 variable can subscriptions.
15

16 However, even without perfect information on customer
17 reactions, providing better incentives does not necessarily
18 result in financial risk. For many years, the Joint Refuse
19 Rate Review Committee (JRRRC) in Alameda County has been
20 operating to review solid waste rates for over a dozen
21 communities in Alameda County. In order to remove the issue
22 of financial risk to the hauler, the hauler maintains a
23 "balancing account". If costs are greater than revenues,
24 these are tracked, and the hauler begins charging interest
25 until another rate change is put in place and at that point,

1 these costs may be recovered. The process works in a similar
2 ways in the other direction. This is a process that has also
3 been used successfully for years in the electric industry,
4 and allows mitigation of financial risk under a system of
5 incentives. Financial risk is manageable, and the impressive
6 gains realized by incentive-based rates allows the
7 communities to achieve their waste reduction and diversion
8 goals.

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11 **Q. HAVE YOU REVIEWED THE COST OF SERVICE INFORMATION PRESENTED**
12 **AS PART OF THIS SUBMITTAL?**

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14 Yes, I have examined the WUTC Staff Report on TG-931585 to
15 examine the incentives, and the apparent appropriateness of
16 differentials provided. See Exhibit ____ (LAS 7).

17

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19 **Q. PLEASE DESCRIBE THE RESULTS OF YOUR REVIEW OF THE COST OF**
20 **SERVICE AND RATE DESIGN INFORMATION PRESENTED IN THE**
21 **SUBMITTAL.**

22

23 The rates, as proposed by Eastside, provide a situation under
24 which customers who reduce waste and recycle would pay more
25 than those who simply put out more waste as garbage.

1 In addition, my analysis shows that the rates (either as
2 proposed by Eastside or as recommended/approved by the WUTC)
3 do not appear to reflect cost of service. Even without
4 sufficient information to do a careful analysis of the rates
5 calculations, the rate differentials show that the levels
6 charged are undercharging high can levels and overcharging
7 smaller can subscriptions. See Attachment _____ (LAS 8).

8
9 The table shows that, using the differentials provided by the
10 WUTC and Eastside's recommended rates, that no matter which
11 can level is assumed as the "correct" cost of service rates,
12 the rates proposed generally overcharge low can levels and
13 undercharge the higher can set outs.

14
15 Q. DO YOU FEEL THAT THE RATES PROPOSED BY THE WUTC WILL SLOW
16 PROGRESS TOWARD WASTE REDUCTION AND RECYCLING GOALS?

17
18 A. Bills are important, and customers will change behavior to
19 reduce bills. The rates that are proposed in this filing do
20 not provide an incentive to reduce the amount of garbage set
21 out. In fact, they create an active disincentive for low
22 levels of garbage. Customers who produce low levels of
23 garbage through careful buying, recycling, and yard waste
24 separation will pay higher bills than those who simply throw
25 all their garbage in the trash. This is an incentive that is

1 specifically contrary to the waste management hierarchy,
2 goals stated in legislation, and in the County's
3 comprehensive plans. Further, the rates will work against
4 the need to maintain levels of incentive if waste reduction
5 behavior is to be expected to be encouraged to persist.
6 Based on my experience, I would anticipate that the rates
7 would have a detrimental impact and would lead to a loss of
8 momentum in the progress toward reaching the solid waste
9 management goals in the County.

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11 Q. DOES THIS CONCLUDE YOUR TESTIMONY?

12

13 A. Yes.

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