

Table 1. Summary of base case analysis and sensitivity analysis results (all dollars in millions)

	Base Case	Higher Public Sector Labor Rate	Counting All Implementation Costs for SOx	Including 20% Transaction Costs	Private Sector Discount Rate	All Sensitivities (4% Rate)	All Sensitivities (12% Rate)
Interest Rate	4%	4%	4%	4%	12%	4%	12%
Discounted Costs	\$51.3	\$52.2	\$59.9	\$51.2	\$33.2	\$67.2	\$46.3
Discounted Benefits	\$186.2	\$186.2	\$186.2	\$186.2	\$99.2	\$186.2	\$99.2
Net Present Value	\$134.9	\$134.0	\$126.3	\$134.5	\$66.0	\$118.6	\$52.8
Discounted Benefit-Cost Ratio	3.63	3.57	3.11	3.60	2.99	2.75	2.14

gram in relation to its benefits. A sensitivity analysis was performed on this factor by changing the scaling ratio to 1, so that all program costs were balanced against just the SOx benefits. The net present value in this case was still \$126.3 million.

- *Uncertainty in benefit estimates.* One company's estimated benefits were assumed to be representative of the entire local industry's experience. If this assumption is incorrect, the estimate of industry savings (benefits) could be overstated (or understated).
- *Omission of environmental benefits.* The benefits actually quantified already exceed the program costs; addition of environmental benefits, if any, would only reinforce the result.
- *Omission of environmental justice costs.* These costs, if they occur, would be difficult to quantify. We cannot say how they would affect our analysis and, within the scope of our work, could not estimate their magnitude.
- *Uncertainty in agency cost estimates.* An hourly labor rate of \$50/hr was assumed for public agency employees. In a sensitivity analysis, this rate was varied to \$100/hr (the same rate used for private-sector labor), but the net present value was still \$134.0 million.
- *Uncertainty in industry cost estimates.* The District forecasts that future SOx control costs may rise sharply, but the analysis was based on industry control costs that are quite close to the future forecast number (\$2000–2400 per ton). However, it is impossible to verify the accuracy of even the District's forecast, and actual future control costs may be quite different from those estimated.

- *Omission of transaction costs.* No data were available on transaction costs in the RECLAIM market. However, a sensitivity analysis was done assuming a rule-of-thumb 20% transaction cost for Credits that were purchased by industry to meet emission caps. The net present value in this case was still \$134.5 million.
- *Sensitivity to discount rate.* In one case run using a 12% discount rate (a private-sector rate), the net present value dropped to \$66.0 million. Even this result indicates that the RECLAIM project was a good idea.

In a final test, all the sensitivity factors—higher public sector labor rate, omission of the cost ratio for SOx, and inclusion of transaction costs—were applied at once to the benefit-cost calculation. At a 4% discount rate, the net present value was still \$118.5 million; even at a 12% rate, the net present value was still \$52.8 million.

Conclusions

These results indicate that the RECLAIM program is a more cost-effective way to reduce SOx emissions from the Southern California petroleum industry than command-and-control regulations leading to equivalent emission reductions. Using conservative benefit and cost estimates, a positive net present value was obtained for all the scenarios examined—meaning that the industry (and the region) is better off under this portion of RECLAIM than under command-and-control. The two alternatives were assumed to result in the same level of regional air quality, which is achieved at lower cost under RECLAIM.

The uncertainties in the analysis suggest areas for further investigation. For ex-

ample, the positive results recommend expanding this analysis to include more industry sectors and the NOx portion of the program. Since the benefit and cost estimates were extrapolated from a single company's experience, further research might involve industry surveys to assess these values more accurately.

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Interactive Ethics

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Editors' Note: This column is a continuation of one that ran in the NAEP News prior to publication of Environmental Practice. In each issue, an ethical dilemma presented in a previous issue is addressed, and a new situation is introduced. The dilemmas presented in the final two issues of NAEP News will be reprinted as appropriate to provide continuity.

The Situation: What Did You Do In Seattle?

Reprinted from *NAEP News*, 23(4): July/Sept 1998

Two employers have sent people to a professional conference. They paid registration, hotels, travel, and meal expenses of almost a thousand dollars so that the two could go to Seattle for a week of whatever it is you do at a conference.

One person went out every night partying with other night owls. He (or she) never got

to the conference center before noon and left at four with the next night's party. His expense account report was littered with bar tabs and meals for six at fancy restaurants. He came home with three partnering commitments in his pocket.

The other person attended every event and every session. He (or she) even chose the sessions that were of more interest to the company than to himself. He asked questions, participated in interactive workshops, joined discussion groups, picked up handouts, and took notes. He stayed in the room at night typing these notes into the laptop so he could distribute them to his coworkers upon his return. He came home with a deeper understanding of national policies and applicable solutions to problems.

The Response

In *What Did You Do in Seattle?* we presented the problem of two people attending the same conference and exhibiting very different behaviors. One was essentially a party animal and the other was extremely diligent in attendance, notes, and collection of information. The intimation that one of these people was acting unethically was actually a set up. Having heard a number of comments about this topic, it was chosen to expose a nuance of ethics that escapes many of us and has even escaped the exact language of the NAEP code. Only a very few of the respondents spotted this, most taking one side or the other of the question as presented.

The nuance lies in the ethics of expectations. As an employer, you expect your staff to follow directions and achieve goals that you have set out for them. The achievement of these goals is what makes one a good employee but it is also an ethical responsibility of the professional employee. In our situation, neither employee can be said to have been acting ethically unless we were to know what the boss expected that person to accomplish.

If the attendee had received directions to go to the conference, make friends and get new contracts, the studious person would have acted unethically, not the party animal. A conflict would only arise if the boss expected one result and was delivered an-

other. Our code speaks to ethics relating to expectations as well. And here is where the safeguards are most often challenged. If a client expects a result that you cannot provide, the ethics of expectation must take second place to the ethics of the professional performance of your science. Our example deals with business ethics.

A New Situation: *My Mother, My Employee*

For our next situation, we will break with format a little and ask for your comments on where ethics plays a role in the following inequity.

I run a small ecological consulting company. We have only three employees and are just getting started. Because of this, my mother has decided to help out by coming in and doing the cleaning for us. The only place she is not allowed to clean is in the small laboratory that we have set up for our water sampling program. That area and all the chemical cleaning of jars and gear is left to my employee.

My employee is a trained professional. She has a degree in chemistry and six years of experience in a laboratory. My employee has rights guaranteed by the federal right to know laws and she has been forced to read every MSDS that comes in the building. We all agree that she should be fully aware of the chemicals to which she is being exposed.

My mother is a wonderful person. She has an Associates degree in Art Appreciation. She handles some of the same chemicals as my employee. She buys them at the corner grocery store where my 17-year-old nephew stocks the shelves. She also brings these chemicals home and cleans the house where my children live.

My trained professional is required to read a Material Safety Data Sheet and be briefed on hazards, and my mother is offered a label printed with a very small type font.

Send your comments to Tom Cuba, Delta Seven Inc., PO Box 3241, St. Petersburg, FL 33731. E-mail Delta-Seven@worldnet.att.net. Watch for the response in a future issue of Environmental Practice.

NAEP Committee and Working Group News

Compiled by Gary F. Kelman

This section of *Environmental Practice* will focus on the work of the various committees and working groups that make possible the multitude of activities performed by NAEP. These activities serve to provide and enhance the benefits members gain from the Association. In this issue, some of the more recent activities of the groups will be spotlighted. Anyone wishing to contact or join any of the committees or working groups can e-mail the Committee Coordinator, Gary Kelman, at kelman1@erols.com.

Permanent Conference Committee Announces Locations for Future Conferences

The Permanent Conference Committee announced the locations for the next few NAEP annual conferences. Year 2000: Portland, Maine; Washington DC in 2001; and Reno, Nevada in 2002. A survey is currently being developed that will include questions regarding future conferences and member preferences.

Chapters Committee Develops Chapter Accreditation Program

The Chapters Committee has been progressing in two areas: facilitating a new chapter in San Antonio, Texas and developing a Chapter Accreditation Program. The San Antonio chapter is developing by-laws, articles of incorporation and the actual request to the Board of Directors for Chapter approval. For more information on individual chapters, look for the NAEP Chapter News section in this journal.

The Chapter Accreditation Program is being developed to identify specific requirements for all chapters. These requirements will include the number of NAEP members required, meeting frequencies, education and communication recommendations. This program will provide direction to all chapters and will create the consistency needed to strengthen NAEP as an organization.