Pollution Prevention Measurement in Washington State

Task 1: Testing Pollution Prevention Measurement Methodologies through Review and Analysis of Facility Pollution Prevention Plans and Annual Progress Reports

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Reduce Waste

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Summary

Washington State is one of four states participating in the federal Environmental Protection Agency's (EPA) "Waste Minimization Measurement" project. Washington's Department of Ecology (Ecology) and EPA signed a cooperative agreement for Ecology to participate in the program, and Ecology received $70,000. Ecology's project formally began in October 1993. This is the final report as required by the cooperative agreement.

Washington's pilot project was to test various methodologies to measure pollution prevention successes. There were two fundamental tasks for Washington's project. Task 1 tested pollution prevention measurement methods through the review and analysis of 287 Pollution Prevention Annual Progress Reports, and an additional 150 newly filed Pollution Prevention Plans, from facilities throughout the state. Task 2 applied and evaluated a variety of pollution prevention measurement methods to approximately ten, pre-selected, volunteering facilities.

Background

In 1990, the Washington State Legislature established a state policy to encourage the reduction of hazardous substance use and hazardous waste generation. Ecology implemented this policy through its pollution prevention planning requirements. Certain hazardous waste generators and hazardous substance users must prepare plans to voluntarily reduce their hazardous materials use and hazardous waste generation. Plans were due according to the amount of hazardous waste generated by a facility in the previous reporting year. In 1992, hazardous substance users and facilities which generated more than 50,000 pound of hazardous waste prepared plans. In 1993, facilities which generated between 7,000 and 50,000 pounds prepared plans, and in 1994, facilities which generated between 2,640 and 7,000 pounds of waste prepared plans. New users and generators are required to submit plans the year following the year they become a hazardous substance user or hazardous waste generator.

After Ecology staff reviews plans and accepts them as adequate, facility operators must submit annual progress reports. Plan implementation is voluntary.

TASK 1 Objective - Testing Measurement Methodology

The objective of Task 1 was to test a statewide measurement methodology to determine if it is a valid approach for meeting the legislative requirement for annually reporting progress toward the statewide goal of 50 percent reduction in hazardous waste generation. Task 1 was divided into three sub-tasks.

Sub-task A tested a method of measuring pollution prevention goals and actual reductions on 150 new pollution prevention plans and 287 annual progress reports.

Sub-task B assessed hardware and software data management needs.

Sub-task C required the preparation of a report documenting the findings under sub-tasks A and B with recommendations on the continued use of established or alternative measurement/data management methodologies. Project staff developed conclusions on the success of pollution prevention achievements using the state's policy approach. This report satisfies sub-task C.

Project Activities

Review of Database

Staff began to work on Task 1 in October of 1993. One of the first activities was to review a database designed to measure pollution prevention. The database was designed months before this portion of the measurement project began. It included several interrelated tables with standard forms, scripts, and reports. Facility names and identification numbers and reduction goals from the first 287 planning facilities were entered into the tables.

Over time, some company names and/or identification numbers changed. Project staff reviewed the names and identification numbers in the database for accuracy and updated them as necessary. Project staff then added the facility names and identification numbers of the 150 new planners to the tables, so that data regarding plan goals could be added.

Data from eight facilities were entered to initially test the tables. Staff used this data to examine the standard scripts, forms, and reports and to become oriented to the database. Some minor script errors were discovered and it was necessary to correct the errors. The revisions were made, and the tables were ready for data entry of the remaining progress reports and plan goals.

Annual Pollution Prevention Progress Reports : Review and Analysis

Guidance for Reporting Progress in Pollution Prevention, #93-38 was prepared in June, 1993 to help facilities report data in a consistent format. Facilities were encouraged to use this document to prepare their Annual Progress Reports. Staff at Ecology's four regional offices sent data from Annual Progress Reports to project staff for data entry and analysis. Regional staff first reviewed these documents for adequacy, and forwarded completed data entry forms to project staff.

Not all facilities used the recommended format. Regional staff transferred the required data onto forms for computer data entry. This process worked well for companies that had simple operations and opportunities for reductions. However, it proved to be more difficult to transfer information for large companies with a great number of processes, substances and wastes.

The original guidance and data entry forms directed facilities to use standard worksheets to report their pollution prevention progress. Two worksheets were used to report data on actual reductions. *Worksheet 4A, Progress Towards Goals,* was used to contrast base year totals with five-year goals and actual reductions in the reporting year. This worksheet provided a format to report base year, five-year goal and reporting year amounts for hazardous substance use and hazardous waste generation, recycling and treatment. This method worked well to capture the overall reductions of substances and wastes. However, it was difficult to tell if reductions listed on this form were achieved as a result of implementation of pollution prevention opportunities or due to other reasons.

Facilities used *Worksheet 5B, Opportunities and Reductions* to describe pollution prevention opportunities that began during the reporting period. Facilities used this form to report on the opportunity, processes affected, substance/waste affected, actual reductions and the five-year goal reduction. It also contrasted the reduction with the five-year reduction goal. However, reduction totals on this sheet were inconsistent with totals listed on other worksheets.

In November of 1993, staff determined that the Annual Progress Report guidance and related data entry forms needed to be revised to resolve the apparent inconsistency of reporting forms. In addition, the progress report forms did not always clearly identify the reason reductions were

achieved (i.e., through reduced substance use, substance released, waste generation, recycling or treatment.) The original forms were also overly complicated and sometimes asked for information not required by law.

Regional and project staff formed a workgroup to analyze the Annual Progress Report guidance and data entry forms, and to identify needed changes. The workgroup considered a number of alternatives before agreeing on changes to the guidance and data entry forms necessary to record actual reductions and other details. The amended annual progress report guidance document and data entry forms are available from Ecology. Facilities began using this format in September of 1994 to report progress in pollution prevention.

Pollution Prevention Plans: Review and Analysis

Waste reduction goals and other information for the facilities which submitted plans in 1992 were entered into the tables prior to the start of the project. Information from the facilities which submitted reduction plans for the first time in September of 1993 was submitted for the database. Ecology regional staff reviewed these new plans for adequacy as they were submitted. The reduction goals from the new plans were transferred by regional staff to data entry forms. The data entry forms were then sent to project staff for data entry and further analysis.

Unlike the progress report data entry forms, project staff found that information from these forms was easy to extract and record in the database. These forms worked well to identify both baseline hazardous substance and waste amounts as well as reduction goals. Goals for recycling and treatment were also included. Facilities will continue to use this form in the future to report plan goals for reduction of hazardous substance use, hazardous waste generation, recycling and treatment.

A majority of the data entry occurred by Spring of 1994. This allowed project staff more time to review and analyze the data. Staff checked the data to ensure that records were complete and accurate. As errors were discovered, staff reviewed the original data entry forms and made corrections as necessary. Corrections were communicated to regional offices to ensure that corresponding data matched the information in the database.

Production Factors

Ecology required facilities submitting plans and progress reports to list a production factor so that data could be normalized. Production factors were reported in a variety of ways. Facilities based their production factors on values such as employment, total sales, pounds of product, number of product produced, or worker hours per year. Because facilities based production factors on such widely divergent standards, project staff decided that aggregate statewide pollution prevention goals and actual reductions would be based on absolute numbers rather than be normalized for production. The production factors could have been used to normalize an individual facility's numbers from year to year, but they could not be used to normalize the statewide totals.

Scope of Database

The database currently includes the progress reports of 248 facilities which submitted plans in 1992. It also incorporates the reduction goals of 409 facilities (287 which reported in 1992, plus 122 which reported in 1993). When this report was written, Ecology staff were working with the remaining facilities to submit adequate pollution prevention plans and progress reports.

Statewide Goals and Progress

Some first year facilities amended their 1992 reduction goals through the 1993 annual progress report process to have higher or lower goals. Staff added the original and amended goals of first wave planners to plan goals from facilities reporting for the first time in 1993. The combined reduction goals from 409 planners are listed below:

Hazardous substance reduction goal
74,990,115 pounds

Hazardous waste reduction goal
75,838,627 pounds

Hazardous waste recycle goal
15,112,517 pounds

Hazardous waste treatment goal
4,108,114 pounds

Facilities also reported the reduction of hazardous substances used and hazardous waste generated, recycled and treated. These numbers were reported from 248 facilities reporting progress for the first time in 1993:

Hazardous substance reduction through 1992
35,318,104 pounds

Hazardous waste reduction through 1992
24,933,410 pounds

Hazardous waste recycled through 1992
6,196,733 pounds

Hazardous waste treated through 1992
3,796,946 pounds

Facilities submitting annual progress reports also indicated the number of pollution prevention opportunities they implemented. Sixty-eight percent, or 169 of the 248 facilities that have reported to date indicated they had started 987 reduction opportunities by December 31, 1992. The remaining 32 percent, or 79 facilities, that have reported said they had yet to implement an opportunity.

Information reported in annual progress reports listed the specific chemical substance or waste prevented through implementation of pollution prevention opportunities. In many cases, facilities reported actual reductions of substances and wastes that exceeded expectations. These data were recorded in the database, and allowed staff to combine the actual statewide reductions of substance and waste amounts for specific chemicals that were achieved directly as a result of the implementation of pollution prevention opportunities. Facilities reported avoidance of the hazardous materials and wastes listed in the table included on page 6.

Watershed Approach

During the course of Task 1, project staff saw an opportunity to coordinate pollution prevention with an Ecology initiative to better manage water quality. In July of 1993, Ecology started to manage water quality through use of a watershed approach. This approach coordinates water quality monitoring, inspections and permitting to support water quality protection activities on a geographic basis. Washington State has been divided into sixty-two Water Resource Inventory Areas (WRIAs). The Water Resource Inventory Areas represent the major watersheds in the state. Ecology combined groups of watersheds to form twenty-three Water Quality Management Areas (WQMAs).

In an effort to coordinate pollution prevention activities with the watershed approach, project staff identified the watershed for each facility required to prepare a pollution prevention plan. Staff used existing agency software to locate the Water Resource Inventory Area and Water Quality Management Area for each facility required to prepare a pollu-

tion prevention plan. Staff then added this information to the database to allow pollution prevention goals and actual reductions to be sorted by watersheds.

Project staff found the highest goals for pollution prevention were in the Cedar/Green, South Puget Sound and Columbia Gorge watersheds. These areas represent the urbanized areas of Seattle, Tacoma and Vancouver. Staff will continue to monitor pollution prevention activities of facilities across the state with respect to the watershed approach.

Conclusions

A. Testing the Measurement Methodology

Staff used a measurement methodology developed prior to initiation of the Task 1 to record pollution prevention goals and actual reductions reported by facilities. During the project, staff used a database to record reduction goals of 122 (81 percent) of the 150 facilities reporting for the first time in 1993. This system was also used to record the actual reductions reported by 248 (86 percent) of the 287 facilities in their first annual progress reports submitted in 1993. The original reduction goals of 287 facilities had been entered into the database prior to the project.

The measurement methodology used during the project worked well to calculate and aggregate statewide numbers for pollution prevention goals and actual reductions. Staff used the database to determine the total statewide reduction goals for hazardous substance use, hazardous waste generation, recycling and treatment, and contrasted these numbers with actual reductions reported by facilities in their progress reports. Staff also used the database to determine the number of pollution prevention opportunities implemented by facilities during the first reporting period.

Toward the State 50 Percent Reduction Goal

Staff used the measurement methodology to determine the success, to date, of the state's policy approach. In 1990, the Washington State Legislature set a goal to reduce hazardous waste generation by 50 percent by 1995. Staff have determined that the facilities in Washington State generated some 268 million pounds of hazardous waste in 1990. The current hazardous waste reduction goal contained in the facility plans is slightly less than 76 million pounds of waste. This number reflects the reduction goals of 409 facilities through 1998. If facilities meet their current goals, they will reduce the generation of hazardous waste to around 192 million pounds by 1998. This is a reduction of approximately 28 percent.

Many facilities reporting progress for the first time in 1993 exceeded their expectations, perhaps because the early goal estimates were conservative. Actual reductions reported by these facilities in future years may likewise be higher than originally planned. As other facility goals are added in succeeding years, the aggregate, statewide hazardous waste reduction total will continue to increase.

B. Assessing Hardware and Software Data Management Needs

The hardware and software data management needs of the measurement methodology were assessed during the project. Project staff used a 486DX personal computer with 4 megabytes of random access memory to process data. This computer was used to access project software on a local area network. This system performed well during the course of the project and no problems were experienced.

Paradox software (version 3.5) was used to create the measurement database. Several interrelated tables were used to record a variety of information. The first set of tables was used to record data on general information such as the facility identification number, facility name, site location, mailing address, site contact and phone number, standard industrial classification code, etc. The second set of tables was used to record data on facility goals for reduction of hazardous substance use, hazardous waste, recycling and treatment. The third set of tables was used to record information on actual reductions reported by facilities in their progress reports.

The tables created with Paradox software worked well to record facility goals and actual reductions. Staff used this system to calculate the goals and actual reductions of facilities across the state. The

software allows the user to sort the information in an endless number of ways. For example, the data can be sorted by geographic region, industry type, and size. Staff has also used the software to analyze the types and amounts of substances and wastes planned for and reduced by facilities. Project staff found the Paradox software flexible and relatively easy to use.

During the project, staff saw some opportunities to improve the original Annual Progress Report guidance and data entry forms. Staff revised the guidance document and data entry forms. Facilities used the amended forms during the reporting cycle which began in September, 1994. These new forms will be analyzed and evaluated as information is recorded in the future to determine if further adjustments are necessary.

Other databases at Ecology contain information about waste generation and toxic substances. Resource Conservation and Recovery Act (RCRA) regulated wastes are recorded in a database using a SAS mainframe application, while the Toxics Release Inventory (TRI) is in a database that uses Focus software. Information cannot be accessed directly between the different systems. However, each system is able to export/import data to and from the other systems.

To transfer information, staff sends tables over the local area network for conversion and use. It is not necessary to have direct access to these other databases. Ecology staff use the RCRA waste and TRI data contained in these other systems to determine the facilities that have to prepare pollution prevention plans. In addition, the RCRA waste data was used to establish the 1990 waste generation baseline, and it will be used in the future to monitor yearly totals. While the information in these systems is useful, the software programs are flexible enough to allow easy conversion of the data. However, these other systems do not directly measure facility reduction goals or progress.

C. Recommendations

The measurement methodology tested during Task 1 is a valid approach for meeting the legislative requirement for annually reporting progress toward the statewide goal of 50 percent reduction in hazardous waste generation in 1995. The system was used to record pollution prevention goals and actual reductions reported by facilities. Staff used this data to calculate statewide, aggregate pollution prevention goals and reductions. The overall goals can be used to forecast future reductions. Reductions reported by facilities can be compared to the 1990 hazardous waste generation baseline to measure pollution prevention progress. Forecasts and progress measurements can be made annually as additional facilities prepare pollution prevention plans and subsequently report their progress.

Facilities in Washington State are making progress in preventing pollution before it starts. The measurement methodology tested in Task 1 shows facilities are planning significant reductions, many of which have already been achieved. Data collected to date show that progress is behind schedule. In 1990, the state legislature set a 50 percent reduction goal for 1995. The goal will not be met within thistimeframe.

Ecology recommends the continued use of the measurement methodology to measure pollution prevention goals and actual reductions reported by facilities across the state. Minor adjustments were necessary to the original data entry forms that facilities use to report progress. These changes will facilitate data entry of annual progress reports beginning in September of 1994.

Publications

To receive a copy of any of the documents referred to in this publication, contact:

Department of Ecology
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P O Box 47600
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Guidance for Reporting Progress in Pollution Prevention, June 1993, Publication #93-38

Guidance for Reporting Progress in Pollution Prevention, Publication # 93-38, Revised March 1994

Reducing Hazardous Waste and Hazardous Substances In Washington: 1992 Annual Progress Report, Publication # 93-103