The Status of Innovative Permitting to Encourage Beyond-Compliance Environmental Performance:

An Evaluation of Oregon's
Green Permits Program

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EXECUTIVE SUMMARY

The Oregon Department of Environmental Quality (DEQ) is implementing an innovative Green Permits program that encourages and rewards superior environmental performance by business or governmental facilities regulated by DEQ. Formally created by Oregon's Legislature in 1997, the program strongly emphasizes beyond-compliance environmental performance and the incorporation of environmental management systems (EMSs) into the permitting process. The program evolved through a pilot stage where significant time was spent developing policies and designing the overall approach to be used. It has now progressed through an early implementation phase, with three permits issued to date, and is at a critical juncture for deciding the next steps to be taken. By law, the program will sunset in December of 2003. This evaluation provides a summary of the Green Permits program that will contribute to answering the range of questions most relevant for deciding the next steps for the program.

In preparing this evaluation of the Green Permits program for DEQ, Kerr, Greiner, Anderson & April, Inc. (KGAA) interviewed stakeholders about their perceptions of the program and future steps that should be taken. Findings from these interviews were used to develop a general sense for whether the program should continue or be allowed to sunset. We also reviewed the record of performance by facilities under the current Green Permits, and analyzed the program's application and reporting requirements. This analysis provided factual background on the program's accomplishments and how the program has been implemented. Findings from this analysis were used to develop recommendations to improve implementation.

Based on the findings from this review, KGAA believes there is broad stakeholder support for continuing development and expansion of the Green Permits program, including for extending or eliminating the current legislative deadline (December 2003) for issuing additional Green Permits. In addition, KGAA has proposed some adjustments to aspects of the program's design and operation that could boost program participation and add to program effectiveness and efficiency.

Major Findings from Interviews

In interviewing stakeholders about the current status and future direction of the Green Permits program, KGAA focused on major issues related to program goals, accomplishments and implementation. These included the program's long-term status, environmental results, benefits/ costs for both participants and DEQ, eligibility standards, and implementation methods. In addition, we asked the stakeholders to suggest, based on their experience as participants or observers, ways in which the program could be improved. Interview questions were open-ended, and those interviewed often provided detailed responses on many of the issues.

The stakeholders KGAA interviewed included representatives from a cross-section of those organizations currently involved with the program, as well as those who have

provided a range of varying perspectives during the program's development and pilot phases: Green Permit -holders and applicants, facilities not currently involved in the program, an environmental NGO, DEQ permitting staff, and EPA Regional Office staff. Since EPA provided funding for the evaluation through a grant, the federal Paperwork Reduction Act limited the number of people we could interview.

The most general finding from the interviews is that most stakeholders believe the Green Permits program provides a valuable innovation in environmental management. They feel that the program could lead to significant improvements in environmental performance and an increasingly cooperative approach to environmental problems between the regulated community and DEQ. This view is based in part on specific current accomplishments of the program. But it is also based on expectations or hopes for the program's future growth and development. Much of the promise remains to be realized – partly, in the view of these stakeholders, because the program is both new and small.

While there is general agreement, for example, that there have been specific facility-level environmental gains from the permitting process, no one feels the Green Permits program has yet led to broad, measurable improvements for Oregon's environment. Most believe it is too early to project the program's environmental results, which will depend not just on the environmental performance changes at specific facilities, but also on the eventual levels of participation in the program.

Facilities that currently hold Green Permits count several specific elements among the program's current accomplishments: improved relationships with DEQ, public recognition, and facility-specific steps toward flexibility (e.g., a consolidated reporting schedule, a pending alternative RCRA compliance measure under negotiation with EPA). But most facilities, both participants and observers, hope for expanded implementation of the program's "regulatory flexibility" incentive. Some are dubious about DEQ's ability to gain EPA support for changes involving federal rules.

DEQ regional staff working with Green Permits facilities identified their increased real-world understanding of facility operations and of the connections between EMSs and environmental performance as a significant benefit of the program for DEQ. But they see a need for regular opportunities, currently lacking, to communicate about what they are learning with other agency staff.

Most of those interviewed pointed to the need to increase participation in the Green Permits program, and several suggested the need for a program design-change, as well as increased outreach and publicity for the program, to attract more applications. While people supported maintaining the stringency of the eligibility criteria for the two higher tiers of the Green Permits program, some raised questions about the appropriateness of the standards for the lowest tier. They suggested that, to attract the kinds of facilities into the Green Permits program that have the potential for substantial future improvements in environmental performance, facilities entering the lowest tier of GEMS

(Green Environmental Management System) permits should be required to fully develop an EMS after, rather than before, joining the program.

Major Findings from Case Studies and Review of Application/Reporting Requirements

The goal of evaluating the application and annual report information was to develop recommendations on ways to improve and simplify the collection and analysis of environmental performance data. During the evaluation, KGAA reviewed guidance and information developed by DEQ and also reviewed guidance and forms for the National Performance Track (NPT) program implemented by EPA. In addition to the forms and guidance, KGAA also reviewed data submitted by five facilities participating in the Green Permits program. There were three major findings from this review.

First, the GEMS program requirements are significantly more flexible than those for EPA's NPT program. There are several instances where the GEMS program allows facilities to develop their own information and choose to report in flexible formats, but the NPT program dictates specific information to be reported. It is likely that the flexibility provided in the GEMS program could impact the quality of data submitted by the facilities and the ability to document progress of specific facilities and the GEMS program as a whole. These impacts will increase if a larger number of GEMS permits are issued in the future.

Second, the GEMS EMS review is significantly more detailed than the EPA review. This was expected given the different scopes of the programs. The GEMS program review is often conducted as the EMS is being developed by the facility and the review helps shape the effort. The NPT review is retrospective and is conducted "after the fact" for only a portion of the facilities participating in the NPT program. The GEMS program is also more directly linked to the regulatory and permitting processes and attempts to provide a greater degree of flexibility and regulatory incentives. GEMS facilities and applicants described the EMS verification step as long, but not especially difficult.

Third, because of inconsistent data reported by GEMS facilities, it is difficult to show environmental accomplishments of the GEMS program – a concern that was expressed by some of those we interviewed. GEMS facilities report progress each year two different ways. The first method lists EMS targets from the previous year along with a discussion of progress made toward achieving the target during the current year. This includes both narrative targets, such as holding four community meetings, and quantitative targets, such as achieving a certain percent reduction. The second method used to report progress is to develop performance metrics and track progress from year to year. Examples of inconsistency-related problems include:

- Facilities do not use a consistent format to link current year accomplishments to prior year targets.
- Facilities change impacts and performance metrics from year to year.

Recommendations

In light of the findings from the interviews and KGAA's analysis of the performance of facilities in the Green Permits program, there are some changes that, if the program is to continue, could strengthen its future performance and increase the likelihood that it will fulfill its long-term goal of promoting voluntary, market-driven, beyond-compliance performance. Our recommendations are grouped under four broad categories, including broadening participation, expanding regulatory flexibility, promoting transparency, and program resource issues.

Broadening participation

If the Green Permits program is to succeed as a vehicle for changing the focus of many Oregon facilities from environmental compliance to beyond-compliance environmental performance, it will need to expand participation. It is important that the Green Permits program continue to attract facilities that are already leaders in environmental performance, both to serve as models for others and to provide them with incentives and flexibility for further improvement. But it is especially important that the program attract the facilities that have adequate, but not outstanding, environmental performance; improvements at these facilities could have a substantially greater impact on Oregon's environment. KGAA recommends the following steps to promote increased participation in the Green Permits program in the future.

Expand outreach to boost awareness of the program among the general public, companies, local government and other public organizations.
The Green Permits program should not be a well-kept secret. There are a number of low-resource options for increasing the program's visibility. Opportunities include:

- Low-cost publicity, such as using DEQ announcements of new Green Permits to describe the program and its goals, public radio spots, a link to the Green Permits program on the top page of DEQ's website, providing information on the program at public meetings, or issuing annual program reports.
- Outreach partnerships with other stakeholders, including facilities participating in the Green Permits Program and EPA's Performance Track program.

Remove barriers to participation in the Green Permits program for entry-level facilities.
There are two steps that could facilitate the development of a robust entry-level component of the Green Permits program:

- Modify the eligibility rules for Participant (entry) level GEMS permits to allow facilities to develop an EMS as part of required activities under the permit rather than requiring a facility to have already completed an EMS prior to the permit.
- Support a reduction by the legislature in the $5000 Green Permit application deposit requirement for GEMS Participant permit applications, since (assuming the above modification is made) the review and administration requirements for DEQ are likely to be extremely limited.

Streamline the EMS verification step for the Achiever and Leader GEMS permits.
Verifying the completeness of each EMS is a detailed and time-consuming step in the GEMS permit process. Reducing the level of detail in the review to priority elements, especially in the cases of third-party-certified EMSs, could both shorten and ease the process.

Promote increased training for facilities on the benefits and methods for developing and implementing EMSs.
In providing such training, DEQ should leverage existing resources, such as firms willing to serve as mentors, and seek external grant funding.

Expanding Regulatory Flexibility

While providing regulatory flexibility is an important component of the incentives for Achiever and Leader GEMS permits, some facilities are concerned about DEQ's ability to negotiate flexibility with EPA for applicable federal rules. There are steps DEQ could take define priorities and leverage opportunities for additional flexibility.

Establish priorities for developing more broadly applicable regulatory flexibility options.
DEQ should work with Green Permits program stakeholders to determine broadly applicable flexibility options that would be of greatest value. Much of the groundwork on regulatory flexibility options has already been laid by other states with EMS incentive programs, and DEQ could use this information as a starting-point for discussions.

Work with EPA's Performance Track program to identify and define regulatory flexibility alternatives and approaches that could benefit Oregon facilities.
Developing regulatory flexibility options in cooperation with state EMS-incentive programs is an EPA priority, and an opportunity for DEQ to leverage changes that could benefit Oregon facilities.

Promoting Transparency

Interview findings and KGAA's independent review of GEMS permit applications and annual reports identified potential ways to improve public accountability for the GEMS program without adversely affecting the flexibility of the program for facilities.

Specify minimum "required" elements that must be included in permit applications.
The minimum requirements should include numeric baselines and goals for future reductions for each significant impact with objectives and targets, and baselines quantified using both absolute and normalized performance measures.

Require facilities to provide a complete "facility-wide" picture of environmental impacts.
Options include requiring facilities to discuss all environmental aspects at the site, not just significant impacts or those with future targets, or requiring facilities to identify and discuss criteria used for selecting significant impact. The latter option, while not

providing as detailed a picture for stakeholders, is still valuable and is likely to raise fewer concerns from facilities about the level of information to be made public.

DEQ should prepare forms and develop guidance for facilities to follow in preparing annual reports.
The goals should be to establish a clear link between targets and progress, and to require progress to be reported in absolute and normalized metrics.

DEQ should develop a method to summarize accomplishments of multiple facilities and issue an annual Green Permits program progress report.
Developing such an annual report is an essential step to communicating effectively with the public about the program's environmental results.

Program Resources

While the continuing costs of implementing the Green Permits program will be far lower than the costs of the development and pilot phases, there are still some necessary program activities that go beyond the review and management of the individual Green Permits. There are also outside funding sources that could cover a large proportion of these costs.

DEQ should maintain central coordination of the Green Permits program.
While regional staff manage individual permits, central coordination is still required for such roles as assuring program consistency, making program adjustments, training regional staff and negotiating regulatory flexibility issues with EPA Region 10.

Provide EMS training for DEQ staff with responsibility for managing Green Permits.
Staff with EMS training are not only essential for managing Green Permit facilities, but a long-term asset for the agency in its overall interactions with regulated facilities.

Take advantage of outside funding sources to support Green Permits program activities.
EPA grants, especially those from EPA offices with interests in innovations or pollution prevention, could provide support for activities such as program development, program measurement and evaluation, and EMS training.

I. INTRODUCTION

Overview of the Green Permits Program

The Oregon Department of Environmental Quality (DEQ) is implementing an innovative Green Permits program that encourages and rewards superior environmental performance. Oregon's legislature authorized the program in 1997. The legislation called for the implementation of a program that would "result in the use of innovative environmental approaches … to achieve environmental results that are significantly better than otherwise required by law." The legislation allows DEQ to provide or seek regulatory waivers where this would promote superior environmental performance by Green Permit facilities [ORS 468.503].

Tiered Permitting System

The program, as implemented, strongly emphasizes beyond-compliance environmental performance and the incorporation of environmental management systems (EMSs) into the permitting process.[1] A "tiered" approach offers different levels of Green Environmental Management System (GEMS) Permits. The key feature of the GEMS system is that continuously improving performance receives increasing benefits. Facilities may apply for one of three tiers of GEMS Permits – Participant (Tier I), Achiever (Tier II), or Leader (Tier III). All of the GEMS permits require that the facility have implemented a formal environmental management system (EMS). The basic distinction between the requirements for the three levels of GEMS permits is the scope of the facility's EMS and of its targeted range of superior environmental performance:

- GEMS Participant level -- basic EMS covering regulated pollutants.
- GEMS Achiever level -- ISO 14001 certification or comparable EMS. The EMS covers both regulated and unregulated pollutants.
- GEMS Leader level -- meets Achiever level requirements, and applies sustainability principles to the life cycle of activities, products and services.

All GEMS permit-holders[2] are eligible for:

- public recognition,
- a single point of contact with DEQ,
- enforcement discretion, and
- technical assistance (e.g., for EMS development, stakeholder involvement).

In addition, GEMS Achiever and Leader permit-holders may request:

[1] The exception is the Custom Waiver, which requires beyond-compliance performance, but not an EMS. No facility has applied for a Custom Waiver, however, so our evaluation focuses on the GEMS permits.
[2] A Custom Waiver permit provides only the specific regulatory waiver(s) requested by the permittee and approved by DEQ.

- expedited or flexible permitting,
- modified monitoring or reporting requirements, and
- waivers or replacements of specific regulatory requirements (though the scope of such waivers may be limited by federal regulations or statutes).

Leader (Tier III) GEMS permit holders are eligible for a "tailored regulatory relationship" to assist them in meeting their environmental goals – though the nature and scope of this benefit is unlikely to be defined prior to approval of a GEMS Leader permit.

Development and Current Status of Program

DEQ developed the Green Permits program design with the support of a public advisory committee representing business, environmental and community NGOs, and state and local government stakeholders. The agency initiated the program with three pilot facilities, finalizing regulations for the program in 1999 [OAR 340-014], and issuing the first Green Permits to the LSI Logic facility in Gresham and the Louisiana-Pacific facility in Hines, Oregon in December 2000. The rules adopted in 1999 require a Green Permit facility to: (1) demonstrate that it has achieved or will achieve environmental performance that is significantly better than otherwise required by law, (2) develop a public performance report at least once a year, and (3) plan and implement a program for ongoing communication with interested stakeholders to provide input into the facility's environmental program.

To date, all permit approvals and applications have been for GEMS Tier II (Achiever) permits. While no facilities have yet applied for Custom Waiver or GEMS Participant or Leader permits, some current permit-holders and applicants have expressed interested in applying for GEMS Leader permits.

Three facilities have received Green Permits, and DEQ is reviewing two additional applications. The current GEMS facilities are LSI Logic in Gresham, Louisiana-Pacific Corporation (LP) in Hines, and EPSON Portland Inc. (EPI) in Hillsboro. The pending applications are from Wacker Siltronic Corporation in Portland, PacifiCorp Medford Facility (PacifiCorp) in Medford and Oregon Air National Guard Kingsley Field in Klamath Falls. Additional private facilities and local government agencies have expressed interest in applying for GEMS permits in the future.

Table 1: GEMS Permit Applications/Approvals/Reports

Site	Application Received	Public Notice	Final Permit	Annual Report 1	Annual Report 2
LSI Logic	November-99	September-00	December-00	April-01	April-02
Louisiana Pacific	December-99	September-00	December-00	April-01	April-02
PacifiCorp	February-00				
Epson Portland	September-00	July-01	November-01	May-02	
Wacker Siltronic	February-00	February-02			
Kingsley Air Guard	October-00	July-02			

Potential Sunset for the Green Permits Program

There is some uncertainty about the future of the Green Permits program. When the Oregon legislature enacted the Green Permits program in 1997, it included a sunset provision for the end of 1999, after which DEQ could no longer issue new permits. The legislature subsequently amended that provision, extending the deadline to December 2003. The Legislature has not yet taken further action to amend the 2003 sunset date.

Role of EPA

In May of 2000, the U.S. Environmental Protection Agency (EPA) and DEQ signed a Memorandum of Agreement (MOA) "concerning regulatory innovation and the Oregon Green Permits program." The MOA defines how EPA and DEQ will coordinate when Green Permit applications include requests for regulatory flexibility involving federal requirements. EPA's primary legal concern is to ensure that the permits are consistent with federal regulations.

> *The Agencies agree that each Green Permit … that would affect requirements under a federally approved, authorized or delegated program will be developed so that it constitutes a permit or permit modification that is valid and enforceable under federal law.*
>
> *Furthermore, where a Green Permit would affect the regulatory requirements of a federally approved, authorized or delegated program, the agencies agree to follow the applicable federal procedures for rule or program changes.*

The MOA also reflects EPA's strong support for the Green Permit program's innovative approach to promoting beyond-compliance environmental performance.

Program Management

DEQ's regulatory permitting programs are decentralized. While policy and program development for the air, water and waste programs are headquaters functions, permits for each of the programs are written in the three regional offices. The Green Permits

program follows a similar model. A central office coordinator has the lead for program design, coordination, and outreach to stakeholders (including the Green Permits Advisory Committee). Regional staff take responsibility for review and management of the Green Permits, and serve as the single point-of-contact for coordinating DEQ's interaction with GEMS facilities.

Green Permits Program Evaluation

The Oregon Department of Environmental Quality initiated this review to evaluate the current status of the Green Permits Program and to identify modifications in the design or operation of the program that could strengthen it in the future. The program has evolved through a pilot stage where significant time was spent developing policies and designing the overall approach to be used, and has now progressed through an initial phase of program implementation. This evaluation comes at a critical juncture for deciding the next steps to be taken.

The evaluation was supported by a grant from the U.S. Environmental Protection Agency (EPA) Office of Policy, Economics and Innovation (OPEI) through the National Environmental Performance Track program. DEQ retained Kerr, Greiner, Anderson & April (KGAA) to conduct an evaluation consisting of four components:

- Interviews of Green Permit program stakeholders to obtain their perspectives on the program's progress, including options for enhancing the program's value, efficiency and effectiveness.
- An assessment of Green Permit application and reporting requirements and procedures, including a comparison of these requirements and procedures with those of EPA's National Environmental Performance Track program – a federal voluntary program (partly modeled on the Green Permits program) similarly focused on EMSs and beyond-compliance environmental performance.
- Case studies of the relevant plans, experiences and performance of each of the GEMS permittees and of one of the current GEMS permit applicants.
- Specific recommendations for program improvements.

II. INTERVIEWS OF GREEN PERMIT PROGRAM STAKEHOLDERS

While the Green Permits program is still relatively new, many stakeholders have participated over several years in deciding how the program could best implement the legislative goal of superior environmental performance. Many served on the Green Permits Advisory Committee (GPAC), which helped shape program design. Some have assisted directly in program implementation or in the development of individual Green Permits.

To assess the perspectives of these stakeholders on the program's progress, the importance of continuing it, and any modifications that could improve future performance, KGAA conducted open-ended interviews with several of those involved or interested in the program's development. While the requirements of the federal Paperwork Reduction Act limit the number of interviews that can be conducted in a federal grant-supported project, those interviewed included representatives of the following groups:

- Facilities holding Green Permits
- Facilities currently applying for Green Permits
- Facilities/organizations considering applying for Green Permits in the future
- Facilities/organizations not currently planning to apply for a Green Permit
- DEQ staff involved in managing or developing individual facility Green Permits
- Environmental/community groups
- EPA staff responsible for coordination with DEQ on the Green Permits Program

Interview topics included:

- Continuation of Green Permits Program after December 2003 sunset date in current legislation
- Environmental results of the Green Permits Program
- Actual or anticipated benefits/limitations of Green Permits Program for permittees
- Costs of participation in the Green Permits Program
- Program implementation challenges and benefits for DEQ
- Eligibility standards for Green Permits
- Specific implementation issues: qualifying, applying, reporting
- Modifications needed to improve program performance and participation

The interviews demonstrated broad support for the program. All of those interviewed, however, identified changes that should be made to strengthen the program – though the suggested remedies often varied widely between respondents. Suggested modifications spoke to a range of issues, including program participation levels, types of benefits and requirements, consistency in measurement of program results, and efficiency of specific program operations.

Should the Green Permits program be extended beyond the December 2003 sunset date currently set by legislation?

Under the 1997 statute creating the Green Permits Program, the authority to issue new permits expired after December 1999. That date was subsequently extended to 2003 [ORS chapter 553, section 11]. While facilities currently holding Green Permits would be able to retain them, no new facilities would be able to join the program, and continuing DEQ staff support for the program would be at risk.

There is strong support for continuing development of the Green Permits program.

All but two of those interviewed strongly support extending the program past December 2003.
The following are some of the comments in favor of continuing the program.

From participating facilities:

> *The program shouldn't sunset. It promotes a more holistic approach to improving the environment.*
>
> *The program is in its infancy compared to standard regulatory approaches; it should be given at least 10 years to fully develop.*
>
> *The program gives facilities something to strive for.*
>
> *It's an awesome program for being so young. It needs many more years to mature.*
>
> *There's a tipping point at which you get a swing toward change; we need to reach that point with EMSs. You can get to that point more quickly if you have an innovative program like this that tries to pull people into it.*

From facilities not currently in the program:

> *Green Permits is attractive to companies with EMSs that are not interested in ISO certification. It also provides an opportunity to involve smaller cities in EMS efforts.*
>
> *The program needs to remain viable. Any time a facility joins the Green Permits program, there is an incremental benefit to the environment.*
>
> *Green Permits is a stellar DEQ program. It needs to be given more time to prove itself – at least another four years.*

> *People need positive stories about how an EMS can help an organization, and the benefits of beyond-compliance performance. This is a good way to broadcast that message.*

DEQ and EPA staff stressed that the program was now in a position to benefit from the lessons learned during the start-up efforts with the first few facilities. EPA staff pointed out that the program had served as an important model for the development of EPA's National Environmental Performance Track.

Two respondents expressed reservations about the program, but did not advocate abolishing it. One respondent expressed concern that the program's incentives were not sufficient to attract new participants, and that a program with few members would not serve the original goal of helping to define an alternative approach to achieving environmental improvements. Another respondent felt that the gains for both facilities and the environment have been limited, and that the value of the program should be reviewed in the context of Oregon's current budget problems.

All of those interviewed, including the program's strongest advocates, felt that modifications to the program are needed to improve program performance and increase participation (see below).

What environmental improvements have resulted from the Green Permits Program?

The Green Permits program is designed to "reward facilities that go the extra mile to reduce their impacts on the environment." Ultimately this is expected to reduce long-term environmental impacts [*Green Permits Program Guide*, 3]. Respondents were questioned about the track record for the program up to this point.

None of those interviewed believes that the Green Permits program has yet led to broad, measurable improvements for Oregon's environment, although several pointed out facility-specific environmental gains. Most said it is too early to tell.

Most respondents pointed to both the small number of facilities currently in the program and the recent date for issuance of the first permit (December 2000), and stated that it was too early to make an assessment. Both DEQ and GEMS facility staff pointed to the potential for the program to encourage more facilities to adopt EMSs, and to the likelihood that program participants would not limit their EMSs to minimum compliance-level goals.

One DEQ staff noted that one of the problems for achieving major environmental improvements through the program was that participants were already "the A students." Moves to A+ could be valuable, but the resulting improvements from any individual facility weren't likely to be dramatic.

One representative for an environmental group felt that the program had produced "no harm and no gain" for the environment, and was not optimistic about a better track record in the future.

Some GEMS participants and DEQ staff working with the facilities pointed to specific environmental improvements at facilities (e.g., process wastewater reclamation by a semi-conductor, establishment of zero-waste-landfilled goal) that were the outcome of discussions over the facilities' GEMS permits ("but for the Green Permit, some of these changes would not have happened"). They felt these illustrated the potential long-term environmental benefits from the program as it expands.

What are the Green Permits program's major benefits/limitations for Participants?

Respondents commented both on incentives and requirements under the Green Permits program. The program offers several incentives to GEMS facilities -- with increased incentives for higher tiers. Currently, all GEMS permits and applications are at the Achiever (Tier II) level. Incentives automatically available for this level include public recognition, technical assistance (e.g., for EMS development, stakeholder process), enforcement discretion and single point-of-contact with DEQ. In addition, GEMS Achievers may apply for special services (e.g., consolidated compliance reporting, expedited permitting) or regulatory flexibility (e.g., flexible permit conditions, modified monitoring or reporting requirements), though some of these changes may require EPA agreement.

In addition to the effectiveness or adequacy of incentives, facilities also commented on specific program requirements. The most important were the program's stakeholder, application and reporting requirements. (Views on application and reporting requirements are discussed in a separate section below).

Participants believe that the Green Permits process—particularly the single point-of-contact—improves relationships between facilities and DEQ.

All GEMS permittees and applicants stated that improved relationships between DEQ and Green Permit facilities are a major benefit of the program – either changing the relationship from adversarial to cooperative, or improving an already positive relationship. This was the most frequently mentioned program benefit by program participants. They view DEQ's single point-of-contact for GEMS facilities as a major factor in building this relationship. One GEMS facility environmental manager commented:

> *Normally you have a regional contact person and program people, maybe in headquarters, for specific issues. And there may be difficulties in either locating the right person, or getting everyone on the same page. In other states, it's*

roughly the same structure. With DEQ's single-point-of-contact, that just doesn't happen.

This view is also shared by DEQ permit-writers involved with the program, one of whom commented that relationships with Green Permit facilities are particularly good because the permit writer has the opportunity to learn about the real world operations of the facility in the course of reviewing the facility's EMS.

The potential of improved relationships or a single point-of-contact with DEQ holds less importance for representatives of local governments or other public organizations considering the Green Permits program; they felt that they already had positive relationships with DEQ.

GEMS participants feel that public recognition is a significant value of the program, but some facilities not in the program see recognition as providing little benefit.

One GEMS facility not only advertises its participation in the Green Permits program, but also includes a statement on the wrapping for the facility's products that they are manufactured at a Green Permits facility. Other participants value the recognition, but not all feel it extends much beyond DEQ and EPA staff.

Among facilities or organizations not currently participating in the Green Permits program, one felt that recognition would be a significant benefit of joining. Three others felt that recognition would be an insufficient reason to expend the resources required to apply and participate.

Several respondents volunteered that recognition by the public of Green Permits participation is limited due to insufficient DEQ publicity.

Some GEMS participants regard enforcement discretion as a major benefit.

Respondents identified two benefits of enforcement discretion:

- A GEMS facility would be allowed to correct a violation without receiving a Notice of Noncompliance, and use its EMS to identify and correct the source of the problem.
- A GEMS facility would be low on the inspection-priority list.

Most facilities view the potential for consolidated reporting as extremely valuable. But for most, coordinated timing alone is insufficient; they are looking for reduced reporting burden.

While facilities strongly endorsed the benefit of consolidated reporting, only two expressed support for consolidating the timing of reports, and one of these viewed consolidated timing as "a baby step" along the road to "real" consolidated reporting. There were several visions of "real" consolidation that would have value for facilities: a single report that would summarize all data required for EPA or DEQ; reduced frequency

through "exceptions" reporting that would report only changes or violations; consolidation of reporting involving all federal, state and local environmental requirements.

One GEMS permittee regarded coordinated timing, by itself, as a significant benefit, and had reached agreement on a coordinated schedule with DEQ.

Most organizations expressed interest in the "regulatory flexibility" benefit for GEMS Achiever and Leader permits, but many are skeptical of DEQ's authority to provide these benefits, particularly where they involve federal rules.

There was substantial interest both in regulatory flexibility generally and in some specific regulatory flexibility options (e.g., expedited permitting, extended permit periods, consolidated permitting, reduced monitoring, reduced reporting). A number of facilities mentioned LSI's effort to obtain approval of an alternative approach to meeting regulatory requirements, requiring agreement from EPA, from specific RCRA air emission rules under the Green Permits program – commenting positively on the possibility that it could happen, but with reservations about the length of time required to negotiate an agreement with EPA.

Two GEMS participants were particularly interested in the possibility of expedited permitting; one cited this potential incentive as a huge benefit from the perspective of operations managers. Due to the current economic situation, neither facility would currently be in position to make use of this incentive.

Some GEMS facilities view the Green Permits stakeholder process as providing an effective way to reach out to the community, while others see the process as difficult and of limited value.

Those seeing value in the stakeholder process feel that the Green Permits process and DEQ staff have helped them figure out more ways to communicate with the public. The environmental manager at one of these facilities commented:

> *The Green Permits stakeholder process provides a structured way to have access to the community. Having a community advisory committee provides a focal point for that. If you're always communicating with the community, people are more likely to give you the benefit of the doubt.*

Not all agreed. One of those who sees the stakeholder requirement as an unnecessary burden commented that it was the one thing in the Green Permits program that should be changed.

Some facilities not currently in the program were uncertain about how the requirement would affect them.

Beyond relations with DEQ or specific incentives, GEMS participants pointed to other facility-specific benefits.

Examples of facility-specific observations on the advantages of participation in the Green Permits program include:

- Participation in the program provides support for promoting environmental efforts at the facility.
- The verification step in the application process facilitated review and approval by ISO auditors.
- Participation in the Green Permits program ultimately saves the facility money.

How significant are the costs of participation in the Green Permits Program?

In addition to any internal costs incurred by facilities in applying for and meeting the terms of a Green Permit, the statute creating the Green Permits program requires an initial deposit of $5,000 by an applicant at the time it submits its proposal. This charge is to cover DEQ's costs for reviewing and managing the permit [ORS 468.521].

Most facilities regard the time required for applications and reports as more significant than the $5,000 deposit at application, but several suggested the deposit could be a barrier for participation of smaller facilities.

No GEMS participants regarded the $5,000 cost of application as a substantial cost, although one suggested that current economic conditions might increase scrutiny of what would normally be a minor cost. Some public organizations noted that the expenditure would require review and approval by more senior and/or political authorities, but that obtaining approval would not be difficult. Two organizations not currently in the program felt the entry fee was too expensive unless participation conveyed more benefits than it does currently.

Representatives of three facilities, including two program participants, mentioned that, beyond the $5,000 up-front cost, both the application process and annual reporting require considerable (though unspecified) time/resources. One of these felt, however, that the EMS/Green Permits effort had increased profitability.

While few respondents believed that the costs were significant for larger facilities, there was concern that the $5,000 fee could be an impediment for smaller companies.

What are the major challenges and benefits of program management for DEQ?

DEQ staff led the program development, pilot and permit approval efforts for the Green Permits program, working closely with facilities applying for and obtaining GEMS

permits. Continuing program management includes part-time efforts of a headquarters coordinator and of regional staff assigned to each GEMS permittee and applicant to support permit development and serve as the single DEQ point-of-contact for the facility. Program startup costs were estimated at $227,000 (two-thirds from federal grants) between January 1997 and October 1999.

DEQ staff managing Green Permits feel they have gained better real world understanding of facility operations and of the connections between EMSs and environmental performance.

DEQ staff responsible for Green Permit facilities believe their work with GEMS facilities has increased their ability to provide service for companies making beyond-compliance efforts that sometimes don't fit with routine approaches – a view of their role strongly endorsed by GEMS participants. While this applies especially to those staff directly responsible for working with GEMS facilities (all of whom received training similar to that for ISO 14001 lead auditors), these staff believe that this knowledge is also "percolating" to other inspectors and permit-writers who are working with Green Permits facilities.

DEQGEMS permit staff stated that DEQ should develop ways for them to communicate about the Green Permits program to other DEQ staff.

GEMS permit-writers find that, outside of other permit-writers and inspectors with responsibilities for GEMS facilities, there is little awareness of the program within DEQ.

DEQ and EPA staff both view the Green Permits program as an initiative through which DEQ has been able to engage EPA in testing the potential of regulatory flexibility strategies for Oregon facilities.

One EPA staff called the Region 10 (Seattle EPA) office's relationship with the Green Permits program the best between Region 10 and any state program (regulatory or non-regulatory) in the four-state region. Staff referred both generally to the MOA between DEQ and EPA for the Green Permits program, and specifically to the effort to obtain some form of waiver for a RCRA requirement for LSI.

Both DEQ and EPA staff expressed concerns, however, that the site-specific rule approach ultimately agreed to for LSI's regulatory flexibility request is too cumbersome and lengthy.

DEQ permitting staff commented that managing the development of GEMS permits requires considerable time, but that much of the time required so far has been due to program start-up.

DEQ permit-writers said they have put substantial time into developing facility permits, but that a lot of this has been due to the pilot status of the program – the need to define,

for example, the processes for EMS verification while working with the facilities. One permit-writer estimated a 10-15% expenditure of time on the Green Permits program, but said that a lot of that had been during the pilot phase, so it was difficult to isolate the lower amount of time it had taken for subsequent on-going management of the permit (e.g., serving as single point-of-contact). All felt that the process would become more efficient with experience, particularly now that the pilot efforts to develop program guidance and procedures were largely completed. On the other hand, they pointed out that the more customer service provided to GEMS facilities (e.g., working on requests for regulatory flexibility), the more the time that would be required.

One permit-writer noted a potential obstacle to improved efficiency in handling future permits – staff turnover. In particular, the staff with the initial responsibility for Green Permits all received modified lead-auditor EMS training, which laid the groundwork for them to effectively review facilities' EMSs. The permit-writer was concerned that if newly-assigned staff don't receive equivalent EMS training, there is a risk that they will be both less effective and less efficient in working with Green Permits facilities.

Are the eligibility standards for Green Permits appropriate*?*

Most people feel that "the bar should not be lowered." But some added that, to make the benefits commensurate with the eligibility standards, incentives needed to be increased.

Most of those we interviewed objected to any effort to weaken the program's eligibility requirements. They believe that high standards for participation are essential both to justify program benefits and to provide a significant environmental performance goal for facilities considering participation. There were, however, two caveats to this general agreement:

- This view applies primarily to GEMS Achiever and Leader permits. One respondent noted that facilities not able to meet these standards could enter the program at the GEMS Participant level (Tier I). Others suggested that lowering the criteria for Tier I could provide an incentive for more facilities to begin the transformation toward developing EMSs and beyond-compliance goals, which would ultimately enable them to join the higher tiers.
- In addition, a few people felt that, while it is important to maintain the current standards for participation, the actual benefits for participants aren't commensurate with the effort required to obtain a GEMS permit. The appropriate solution, however, is not dilution of the entry requirements, but enhancement of the benefits.

While several facilities indicated interest in applying for GEMS Leader permits, DEQ staff stated that the criteria have yet to be clearly defined.

Comments by DEQ permitting staff suggest that criteria for GEMS Leaders (Tier III) are, as one put it, still in the "We'll know it when we see it" stage of development. Another noted: "It's hard to define sustainability. How far is enough?"

DEQ staff commented that the GEMS Participant level (Tier I) has not worked to bring in facilities for development of EMSs.

The original expectation was that Tier I, requiring only a "basic" EMS, would serve as an introductory step for facilities to enter the program. But the real line appears to be between facilities that have or have not largely completed the development of an EMS, and Tier I has not served as an introductory level.

Have application and annual reporting requirements improved understanding of facility operations, issues and accomplishments by DEQ and the public?

DEQ provides guidance for the GEMS permit applications, including draft application forms, in the *Oregon Green Permits Program Guide* (January 2000). While the application requirements for each GEMS tier are somewhat different, DEQ and GEMS applicants have only had experience so far with GEMS Achiever (Tier II) applications. While DEQ provides detailed guidance, the agency allows applicants to use their own formats as long as they include all required information. One of the longest steps in the application process is a detailed review by DEQ of the facility's EMS to verify that it meets ISO standards or is comparable (see discussion in section III below).

The *Program Guide* also provides applicants guidance on environmental reporting and performance measurement. But the *Program Guide* does not provide draft forms, specific minimum requirements or proposed options for GEMS annual reports for the facilities to follow.

Most GEMS participants feel that the application process – particularly the EMS verification step – is long, but not especially difficult. One facility, however, advocated simplifying the process.

All GEMS participants commented on the length of the application process, and three specifically noted the time required for the EMS verification step. Two felt that this was a function of the start-up effort, that DEQ staff are extremely knowledgeable about EMS, and that the process would get shorter with increased experience. One, however, while acknowledging the importance of the verification step, contrasted the length of the DEQ process with EPA's on-line application process. One DEQ staff noted that as an increasing number of facilities tend to seek ISO certification, the verification process should become less time-consuming.

Two respondents raised additional issues:

- A DEQ permit-writer said that the process by which facilities move from the complete list of aspects and impacts in their EMS to those identified as "significant" was not sufficiently clear.

- A facility objected to the need to set numeric goals for the areas in which it planned to make environmental improvements, or any requirement that these goals remain consistent for more than a one-year period, since production goals change rapidly, and the facility uses a bottom-up approach with staff identifying new projects on a regular basis.

Several DEQ staff and GEMS facilities noted problems with consistency or completeness in what is included on annual Green Permits reports.

Both GEMS participants and DEQ staff commented on reporting discontinuities. Among the problems they identified were:

- Inconsistent metrics or lack of continuity from one report to the next.
- Lack of meaningful data due, at least in part, to uneven economic performance that resulted in problems such as reduced production levels or shutdowns.

One facility commented, for example, that the total pollution loadings from the facility for the previous year looked good, but that the facility had reduced over half of its production.

Suggestions for improving the quality of these reports included:

- Adopt the requirement of EPA's Performance Track for consistent reporting of goals and metrics over several years [suggested by GEMS participant].
- Require the use of both normalized and absolute metrics [suggested by DEQ permit-writer].
- Provide opportunity on annual reports to show on-going environmental benefits from changes made in an earlier year [suggested by two GEMS participants].

What modifications to the Green Permits Program would improve program performance and increase participation?

While support for continuing the Green Permits Program was extremely strong, all of those interviewed had suggestions as to how it could be improved. Since people were requested to suggest what seemed most important to them, there is a wide range of suggestions. Some suggestions came up repeatedly, others only from one person.

DEQ should take steps to give the program a higher profile and increase public awareness (mentioned by half of those interviewed).

Both participants and non-participants commented that there is very little publicity by DEQ about the program, so that the public knows little or nothing about it. There were a number of specific suggestions about steps to increase awareness:

- Involve the DEQ public affairs office to both highlight the overall program and initial awards of Green Permits, and to do follow-up stories on GEMS facilities.

- Develop joint DEQ/industry efforts to communicate about the program. Strategy should include steps for presentations to major industry associations and other forums (e.g., Associated Oregon Industries, Northwest Environmental Conference, Semiconductor Health & Safety Association). Two facilities specifically volunteered to participate in such efforts.
- Include information about the Green Permits Program at all DEQ training programs.
- DEQ should issue annual reports on environmental results of program.

DEQ could also boost program participation by providing more support for development of EMSs and by making it easier for facilities to qualify for the lowest-tier GEMS permit

Several facilities pointed to the importance of creating more of a momentum for the development of EMSs. The companies suggested different approaches, all of which would involve some level of cooperative industry/DEQ efforts:

- DEQ could provide training for EMSs and encourage participation of GEMS facilities (2 facilities).
- DEQ should facilitate EMS mentoring by GEMS facilities.
- DEQ should form a working group of EMS project managers (both from facilities in and not in the Green Permits Program) to design approaches for promoting EMSs and Green Permits.

There were three suggestions for reducing barriers to entry for the program.

- The most general suggestion (supported by several participants and DEQ staff) is to simplify the application process.
- Three respondents suggested revising the criteria for the lowest (Participant) tier, using it to get facilities to start on the EMS process and set basic targets, rather than requiring that a facility already have an EMS in place before it can join. One respondent noted that these facilities might create more risk, but could also increase the opportunity for substantial environmental gains.
- One facility felt that the up-front cost of $5,000, while negligible for larger organizations, might be a significant barrier for smaller facilities that could have much to gain environmentally from participation in the program. Perhaps fees could be reduced based either on the number of employees, facility size, or some other factor.

Four respondents felt that DEQ should try to expand available incentives. Their suggestions included both adding to the currently listed incentives and improving the prospects for realizing regulatory flexibility.

Ideas for new incentives, or better delivery of existing incentives, include:

- reductions in levels of reporting and/or monitoring under specific conditions,
- multi-agency coordination of reporting,

- multi-agency coordination of permitting,
- working with EPA to design a more expedited review process for regulatory flexibility requests requiring federal approval.

Two facilities recommended increasing DEQ resources for the Green Permits Program.

Both felt the program needed and deserved additional resources, but neither was sanguine about that happening in the current budget situation.

One respondent proposed an alternative model under which facilities would have a 10-year, forfeitable performance bond.

Rather than having different levels of GEMS permits with specific increments of flexibility, facilities that pledged substantial long-term environmental results would have the option of using any means to achieve their goals. But failure to attain the goal would result both in forfeiting a substantial bond and in imposition of the standard regulatory regimen.

III. PERMIT APPLICATION REQUIREMENTS

KGAA also prepared case studies for three facilities receiving GEMS permits and evaluated the GEMS permit application and annual reporting requirements. The case studies documented progress made by each facility in reducing environmental impacts and regulated releases through their EMS activities. The evaluation of permit application and annual reporting forms compared the GEMS program to EPA's National Performance Track Program (NPT) and included recommendations for improving the forms and guidance. Overall, the case studies and evaluations provide additional details of the GEMS application, permitting and annual reporting processes as they are currently being implemented and provide useful context that can be used in concert with the interview findings to assist in the overall evaluation of GEMS program.

Oregon Green Permit Application Requirements

In developing the Green Permits program, DEQ prepared guidance on the information to be provided in GEMS permit applications, including draft application forms for the applicants. This guidance is found in the "*Oregon Green Permits Program Guide*" (January 2000)-Chapter 2 and Attachment A. Permit application requirements are different for the different tiers of Green Permits; however, since all the facilities currently in the program are included in the second tier, titled the GEMS Achiever, these differences have not been an issue thus far in the program. While the DEQ provided detailed guidance, DEQ also allowed facilities to use their own formats to prepare permit applications as long as the information was easily understandable by the DEQ and the general public.

The application form requires general information about the applicant including facility identification, facility description and contact information, which are relatively straightforward and not a key focus of this evaluation. Instead, this review focuses on information describing the applicant's EMS and environmental performance in four questions:

- Question 8: Implementation Status of EMS
- Question 9: Significant Environmental Aspects
- Question 10: Performance Improvements
- Question 11: Superior Environmental Performance

During the application process, the DEQ conducts a detailed review of the facility's EMS to verify that it meets ISO standards or is comparable. This review also ensures that the facility meets other requirements for acceptance into the GEMS program. During this review DEQ must determine if the results achieved by the facility are significantly better than otherwise required by law--a key requirement of the GEMS program. DEQ developed EMS verification forms (Attachment B of the Program Guide) for the EMS review and acceptance criteria forms (Attachment E of the Program Guide) to guide their review. KGAA reviewed these forms with a focus on environmental performance

information. Our review did not assess whether the verification process meets EMS certification requirements.

National Performance Track Application Requirements

The federal Environmental Protection Agency's National Performance Track Program has many similarities to Oregon's Green Permits Program. Both programs focus on facilities that have implemented an EMS and require facilities to submit environmental performance data. In addition, four of the facilities applying for or participating in the Green Permits program are also members of EPA's NPT program. Due to these similarities it is useful to evaluate both programs and compare and contrast program requirements.

KGAA evaluated the new NPT application forms and guidance, which were used in the "second wave" of NPT applications. These new forms include revisions based on lessons EPA learned from the "first wave" of NTP applications under the original "Achievement Track" submissions. The EPA required each facility to use the forms and to provide information in a consistent format. While the basic information reported required a consistent format, facilities were provided flexibility in certain areas--for example, to be able to use different units.

Comparison of Green Permit and Performance Track Application Requirements

KGAA compared the GEMS and NPT application forms to identify similarities and differences. This review included the general formats used in each form and detailed information requested. Also, we reviewed the instructions prepared by DEQ and EPA for filling out the forms. Table 1 below summarizes the results of this comparison.

Table 1: Comparison of GEMS and NPT Application Requirements

Area	GEMS	NPT
Use of standard application forms	Forms provided, but facility can use its own application format	Facility must use the standard form
Verification of EMS ISO certification or comparability **(See detailed review below)**	Detailed review conducted to ensure EMS meets ISO, or is comparable if not ISO certified	General review of EMS is conducted for key issues (Not all sites reviewed)
EMS Impacts	Facilities can define their own impacts	Facilities must choose from a standard set of 33 environmental impacts in 10 categories
	There is no minimum number of impacts required to be selected by the facility	Facilities must report past progress for 2 impacts (1 for small facilities) and future reduction targets for 4 impacts (2 for small facilities)
	Facilities select significant impacts. No discussion of criteria used or rationale for selecting significant impacts	If not a "significant" impact, facility must discuss why it was selected for reductions

	For regulated impacts, facility should report regulatory status	Same
Performance Measurement metrics	Both quantitative and qualitative measures allowed	Only quantitative metrics used
	No specific units of measurement for reporting data must be used	Facility must choose standard metrics for each impact
	Facility can choose absolute or normalized metrics	Facility must report both absolute and normalized metrics
Past Performance	Three years prior to base year. Baseyear is the current year or other period if approved by DEQ	Past performance reported for 2 years prior to the current year
	Any units can be used	Absolute and normalized metrics are required
Future targets and objectives	Baseyear should be current year prior to application, but can be changed	Baseyear must be the current year. It is the same for all facilities in the program.
	Facility can choose any future year for reduction targets	Future targets are levels to be achieved 3 years from the baseyear
	Non-numeric targets can be used	Numeric targets must be specified

Overall, the application comparison found that the GEMS program requirements are significantly more flexible compared to EPA's NPT program. There are several instances where the GEMS program allows facilities to develop their own information and choose to report in flexible formats, but the NPT program dictates specific information to be reported. It's likely that the flexibility provided in the GEMS program could impact the quality of data submitted by the facilities and the ability to document progress of specific facilities and the GEMS program as a whole. These impacts will increase if a larger number of GEMS permits are developed in the future. Some of the important differences from Table 1 are briefly discussed below.

Set List of Impacts

NPT facilities must choose from a set list of 33 impacts grouped into 10 environmental categories. While this limits flexibility for the facilities, it provides a consistent scope for the environmental issues to be addressed in the program. GEMS facilities can choose any impacts identified through their EMS defined to fit their specific needs. If a larger number of GEMS permits are issued in the future, it may be a challenge to keep track of facility progress. It could be even more of a challenge to show the overall progress of the program if facilities select different impacts. A consistent set of impacts could make it easier to show progress for the program over the long term.

Qualitative and Quantitative metrics

GEMS facilities are allowed to discuss "qualitative" accomplishments for an impact. NPT facilities are required to report numeric progress, but are allowed to discuss the specific actions on how the reductions were accomplished.

Standard units for each impact

After selecting impacts, NPT facilities must use standard units for reporting baseline quantities associated with each impact. There are typically two or three units to choose from. The units are generally straightforward. For example, emission of greenhouse gases can be reported in tons or pounds and remediation in acres or square feet. The use of standard units would make it easier to track progress for program accomplishments. While it would be possible for DEQ to manipulate the data after it is submitted, it may be more efficient if data were reported up front by facilities in consistent units. This will be particularly true if a larger number of GEMS permits are issued in the future.

Absolute vs. Production-normalized metrics

GEMS facilities are free to choose either absolute or production-normalized metrics. NPT facilities must report both absolute and normalized metrics. Requiring both metrics provides a clearer picture of facility progress over time. As is shown later in the section on annual reporting requirements, changes in production can have a significant impact on facility releases and environmental impacts and it is important to understand these impacts to provide a complete picture of facility progress.

Selection of Significant Impacts

In the GEMS program, it is not clear how facilities identify their significant impacts. For example, facilities are not required to report their total list of impacts so you can see which impacts were not identified as significant, or not included in the EMS at all. Also, facilities are not required to discuss the selection criteria used to determine if an impact is significant or discuss their decision-making process. The NPT program also does not require all impacts to be identified, or selection criteria to be discussed. NPT facilities are required to identify if an impact is significant. If an impact is not significant, the facility must briefly discuss why the impact was selected for the program, even though it is not considered significant.

Set Baseyear

Both the GEMS and NPT programs require facilities to use a single year, the year prior to submittal of the application, as the baseyear. However, the GEMS program allows exceptions based on facility-specific issues. Selecting the baseyear is an important step for establishing performance measures to determine past and future progress.

Facility-specific Application Data in Green Permits and NPT

KGAA evaluated the actual data submitted by facilities in their Green Permit and NPT applications. This review attempted to determine if some of the differences identified above in the application forms led to noticeable differences in the actual data reported by the facilities. As noted

Use of Flexible Application Formats.

LSI	own format
Wacker	own format
Epson	own format
Kingley Air National Guard	GEMS format
PacifiCorp	GEMS format
LP	GEMS format

earlier, 4 facilities participate in both programs and it is useful to compare what the facilities submitted under each program. KGAA compiled data from these applications and the other 2 facilities that applied to the GEMS program but not NPT and the results are summarized in Appendix B. It should be noted that the GEMS permit application forms reviewed above were not available at the time that three of the early pilot facilities entered the program (LSI, LP and PacifiCorp). These first GEMS facilities experimented with different application requirements during the developmental stages of the GEMS program. The applications were not prepared in response to pre-set forms; however, prior to finalizing the actual permits, each facility did compile their information into complete applications based on the current forms. While it is difficult to draw broad conclusions from such a small sample size of six facilities, some general observations can be made.

Three of the six facilities used their own application formats

Half of the facilities took advantage of the flexibility offered by DEQ allowing facilities to use their own application formats. The flexibility led to minor and subtle differences in the data reported by facilities. While these changes are characterized as "small," even small differences can lead to uncertainty and confusion. While such flexibility may be important in the early experimental stages of a pilot program, it may not be appropriate if a larger number of GEMS permits are expected in the future.

Lack of numeric targets for future reduction commitments

It is interesting to note the lack of numeric goals reported by GEMS applicants. Of the 34 impacts identified by the Green Permit facilities (excluding Wacker Siltronic), numeric goals were discussed for only six impacts. And some of these goals were even questionable. For example, LSI stressed that an 80% reduction in water use was only a "possibility." By comparison, the same facilities reported numeric targets for these same impacts for the NPT program.

Unclear baselines for environmental impacts

In a few instances it is difficult to determine baseline quantities for measuring future reductions. For example, LSI did not report baseline quantities for any impacts in their application. Instead, LSI reported reductions achieved through past projects, but did not report the beginning baseline quantities. In subsequent annual reports, LSI provided baseline data. However, for future GEMS applicants it is critical that baselines be established at the beginning of the project so achievements can be tracked and that accountability is established.

In another case, Epson Portland Inc. (EPI), an unclear baseline made it difficult to determine the difference between past progress and future goals. It’s possible that EPI had already met their future goals at the time the application was submitted. For example, for air releases, their past progress was reported at 59%, while their future reduction target was only 30%. Both metrics appeared to be based on a 1997 baseyear. If the time

frame for past reductions and baseyear for future reductions were clearly separated and specified, this situation could be avoided.

A mix of absolute and normalized metrics are used

GEMS facilities used a combination of absolute and normalized metrics. For example, LP used a combination of absolute and normalized metrics, LSI used normalized metrics, and Epson Portland used absolute metrics. This mix of metrics makes it difficult for DEQ to provide a clear picture for progress made in the program as a whole.

Comparison of EMS Review Procedures

The most detailed step in the GEMS permit process is the verification of the EMS. DEQ staff conducts a detailed review of each EMS to ensure that it meets ISO requirements and other GEMS acceptance criteria. The GEMS application materials include guidance and checklists for conducting this review (*Program Guide*, Attachment B). The EPA also conducts a review of the EMS for a portion of the facilities in the NPT program. EPA uses a standard site review protocol to conduct this review, which is completed during a one-day site visit. KGAA did a broad comparison of the GEMS EMS review criteria to the NPT site review protocol to get a general sense of the differences and similarities of these reviews. For each of the 17 ISO clauses included in the GEMS EMS review, we categorized the NPT review as similar, less detailed, or much less detailed compared to the GEMS review. Table 2 below summarizes this broad review. While this comparison is not precise, it does provide a snapshot of the similarities and differences between the two programs. A detailed comparison of the specific criteria is for each ISO clause is found is in Appendix A.

The EMS review is intended to be less detailed for facilities with an ISO-certified EMS. For ISO-certified facilities DEQ's review focuses on the regulatory requirements for acceptance into the program. DEQ prepared a separate worksheet (*Program Guide,* Attachment E) in the GEMS Program Guide. In practice, EMS reviews in the GEMS program to date have focused on the more detailed review because only one facility (Epson) had an ISO-certified EMS at the time they applied for their GEMS permit.

Table 2: Summary of GEMS/NPT EMS Review

ISO Clause In GEMS EMS Review	GEMS Critical Element	NPT Similarity
4.2 Environmental policy	Yes	Similar
4.3.1 Environmental aspects	Yes	Similar- NPT requires facilities to discuss criteria for selecting significant aspects
4.5.4 Environmental management system audit	Yes	Similar
4.6 Management review	Yes	Less Detailed
4.3.2 Legal and other requirements	Yes	Less Detailed
4.3.3 Objectives and targets	Yes	Less Detailed

ISO Clause In GEMS EMS Review	GEMS Critical Element	NPT Similarity
4.4.3 Communication	Yes	Less Detailed
4.3.4 Environmental management programs	Yes	Much Less Detailed
4.4.2 Training, awareness and competence		Much Less Detailed
4.4.4 EMS documentation		Much Less Detailed
4.4.5 Document control		Much Less Detailed
4.4.6 Operational control		Much Less Detailed
4.4.7 Emergency preparedness & Response		Much Less Detailed
4.5.2 Nonconformance and corrective and preventive action		Much Less Detailed
4.5.1 Monitoring and measurement		Not Addressed in NPT
4.4.1 Structure and responsibility		Not Addressed in NPT
4.5.3 Records		Not Addressed in NPT

This comparison found that the GEMS EMS review is significantly more detailed compared to the EPA review. This was expected given the different scopes of the programs. The GEMS program review is often conducted as the EMS is being developed by the facility and the review helps shape the effort. The NPT review is retrospective and is conducted "after the fact" for only a portion of the facilities participating in the NPT program. The GEMS program is also more directly linked to the regulatory and permitting processes and attempts to provide a greater degree of flexibility and regulatory incentives. The NPT program currently focuses more on positive public relations benefits, with plans to provide greater flexibility in the future. Due to these differences, you would expect the GEMS review to be more detailed. While the scopes of the programs are different, it is still useful to compare the different EMS review procedures to look for opportunities to increase the efficiency and effectiveness of the GEMS review process.

EPA's NPT review is similar in scope for three ISO clauses including the Environmental Policy, Environmental Aspects, and EMS Audit. The review is less detailed for four clauses including the legal requirements, objectives/targets, communication, and management review. The EPA review is much less detailed for seven clauses including EMS programs, training, documentation, document control, emergency preparedness, and nonconformance/corrective action. All but one of these clauses (environmental management programs) is not a critical element for the GEMS review. The NPT review does not cover three ISO clauses, including Record, Monitoring/Measurement and Structure/Responsibility.

IV. ANNUAL PERFORMANCE REPORTING REQUIREMENTS

Oregon Green Annual Performance Reporting Requirements

In its GEMS Program Guide (*Program Guide*, Attachment C), DEQ provided applicants guidance on environmental reporting and performance measurement. This guidance identifies and discusses national and international programs for developing environmental performance metrics and annual environmental reports. The information and programs discussed by DEQ include such programs as the Global Reporting Initiative (GRI), the United Nations Environment Program (UNEP), the Coalition for Environmentally Responsible Economies (CERES), and the University of North Carolina EMS/ISO 14001 Pilot Project Data Protocols.

The information cited in the guidance represents a thorough literature review for environmental reporting and performance measures. GEMS facilities would clearly benefit from using these resources in developing their annual reports. However, no draft forms, minimum requirements or proposed options for GEMS annual reports are provided as examples for the facilities to follow should the facility choose to use them. This represents a missed opportunity for laying out a few simple ground rules to ensure that GEMS facilities report consistent and comparable data. As the more detailed review below shows, inconsistent data reported by GEMS facilities makes it difficult to show environmental accomplishments of the GEMS program.

NPT Annual Performance Reporting Requirements

EPA uses a standard annual report form and has prepared detailed, step-by-step guidance for completing the form. These forms and instructions lay out what is to be reported by the facility, how the calculations are to be made, and how the data in the annual report relates to the original data submitted by the facility in their application for the performance track program. Table 3 below outlines section B and C of the NPT form covering EMS and performance commitments.

Table 3: Summary of Key Question Areas in NPT Annual Report

	Area	Question
EMS	EMS Assessment	Was an EMS assessment done by an independent third party?
		Was an internal or corporate assessment conducted?
		Was a compliance audit conducted?
		Other Audits?
		Briefly summarize corrective actions and other improvements.
		Has the facility corrected all instances of potential non compliance or nonconformance?
		When was the last senior management review completed?

	Certification	Is your EMS currently ISO certified?
	Area	**Question**
	Aspects	When did your facility last conduct a systematic review of aspects?
	Progress towards Targets	Provide a narrative description of progress toward objectives and targets. Summary can be limited to significant aspects and those where progress was made during the year.
Performance Commitments progress (for each commitment)	Numeric	Calendar Year
		Actual quantity per year
		Measurement units
		Normalizing factor
		Basis for normalizing factor
		Normalized Quantity
	Narrative progress	Briefly describe how achievement were made, or delays.
	Other programs	List other programs to which data are reported.

To help facilities complete annual report forms and to ensure that consistent and comparable data are reported, EPA's guidance specifies a few important requirements that each facility must follow in developing and reporting their data.

Direct links between metrics in the annual report and application

There is a direct link between the aspects reported in the original permit application and those covered in the annual report. The facility is required to report progress on a consistent set of aspects from year to year.

No changes to prior information

Facilities are not allowed to change information in their application or prior year annual reports. This includes the aspects selected as future targets, baseline quantities for each aspects and future performance commitments. To change or substitute a commitment, a facility must call EPA for special instructions. EPA plans to provide a service by "precompleting" data in the annual reports and sending the preprinted forms to the facilities to complete the remaining information.

Consistent calculation for impacts from changes in production

The NPT instructions specify one method for calculating impacts from production. While normalizing for production can seem like an easy thing to do, small changes in the methods used can lead to inconsistent results. A consistent approach will help to generate more meaningful information on facility accomplishments. A two-step approach is used to calculate a normalized quantity. In step one, a normalizing factor is calculated starting with the current year production and dividing by the baseyear

production. The example used focuses on energy use at an automobile manufacturer. The production index is:

$$\frac{\text{Number of units produced in current year 2004}}{\text{Number of units produced in baseyear 2001}}$$

$$\frac{\text{1.2 million cars}}{\text{1.0 million cars}} = \text{1.2 normalizing factor}$$

Step 2 calculates a normalized quantity by dividing the absolute quantity of the aspect by the normalizing factor. The example used is:

$$\frac{\text{Absolute quantity in current year 2004}}{\text{Normalizing Factor}}$$

$$\frac{\text{22.0 trillion BTU}}{\text{1.2}} = \text{18.3 trillion BTU}$$

Summary of Annual Report Data Reported by GEMS Facilities

KGAA reviewed the data developed by the three facilities that have received GEMS permits and submitted annual reports to the DEQ. This review found that facilities report progress each year two different ways. The first method lists EMS targets from the previous year along with a discussion of progress made toward achieving the target during the current year. This includes both narrative targets, such as holding four community meetings, and quantitative targets, such as achieving a certain percent reduction. KGAA compiled data from each facility and the results are summarized in Appendix C.

The second method used to report progress is to develop performance metrics and track progress from year to year. We also compiled data on performance metrics for each facility and these data are summarized in Appendix D. Baselines and future commitments from the original GEMS applications are also included for comparison.

A review of the data in Appendices C and D show the types of inconsistencies that occur if some simple ground rules are not followed.

Facilities do not use a consistent format to link current year accomplishments to prior year targets

It was difficult to make a direct link between the accomplishments and prior year commitments. In most cases, we had to use data from annual reports the prior year or go back to the original application to get the commitments for the current year. It would be useful to have the commitment and discussion of progress included in the same document.

Facilities change impacts and performance metrics from year to year

In some cases it may be appropriate to identify a new impact that was not previously addressed--for example, if the annual EMS analysis identifies a new significant impact, or if a new objective or target is developed. These activities are part of the "continuous improvement" to be encouraged. However, some changes reported by GEMS facilities appear to be more related to inconsistent reporting from year to year. For example, the LP facility changed the aspects and performance measures significantly from year to year. Two aspects (solid waste and total criteria air pollutant releases) were used in their permit application. An absolute metric of tons/year was used for each metric. However, in their first annual report, data for five different separate aspects were reported using production-normalized metrics. The second annual report included only solid waste as an absolute metric. We were able to fill the gap of total criteria air pollutants using regulatory data. The LSI facility started reporting a new set of normalized metrics in their first annual report that was not included in their original application. The EPI facility added three additional aspects in its first annual report. While such additions can provide more complete information on the facility, it raises questions and uncertainty on the scope of the original EMS. For example, why were these aspects not considered significant in the EMS and why were no objectives or targets developed for these aspects?

V. RECOMMENDATIONS

DEQ's goal in developing the Green Permits program has been to promote voluntary, market-driven, beyond-compliance environmental performance. The program design integrates commitments to superior environmental performance with robust environmental management systems, stakeholder involvement, enhanced relationships between DEQ and Green Permit facilities, regulatory flexibility and public recognition. The Green Permits program does not yet have a long track record or large universe of participants. The experiences and observations of those we interviewed, however, suggest both progress toward the program's goals and opportunities for strengthening its future performance.

During the interviews, KGAA found broad stakeholder support for continuing development and expansion of the Green Permits program, including for extending or eliminating the current legislative deadline (December 2003) for issuing additional Green Permits. Based on the interviews and KGAA's analysis of the performance of facilities in the program, there are some changes that, if the program is to continue, could strengthen its future performance and increase the likelihood that it will fulfill its long-term goal. KGAA's recommendations focus on modifications or adjustments to aspects of the program's design and operation that could boost program participation and add to program effectiveness and efficiency. Our recommendations are grouped under four broad categories including broadening participation, expanding regulatory flexibility, promoting transparency, and program resource issues. Under each area, we provide recommendations and sub-recommendations.

Broadening Participation in the Green Permits Program

If the Green Permits program is to succeed as a vehicle for changing the focus of many Oregon facilities from environmental compliance to beyond-compliance environmental performance, it will need to expand participation. Right now, there are only a few participants, which is in part due to how new the program is. But many of those we interviewed said that the program is not well known or understood beyond a very small circle – either among the public or within the agency. In addition, they identified potential impediments to participation. Based on their insights and suggestions and the experience of other EMS-based incentive programs (frequently in part modeled on Oregon's), we recommend several measures to expand program participation.

Expand outreach to boost awareness of the program among the general public, companies, local government and other public organizations.

The Green Permits program should not become a well-kept secret. To be effective, it needs a larger audience. A major goal of the program is to communicate the opportunity for facilities to follow a different paradigm – one based more on environmental performance than regulatory compliance. Adoption of this paradigm holds promise of benefits for the public, the environment and the state's business and governmental

organizations. The program promotes EMSs as one way for facilities to manage environmental impacts of their operations more effectively, but it doesn't adopt EMSs as a sufficient solution. Rather, it ties the rewards and benefits of the program to "environmental results that are significantly better than otherwise required by law."

DEQ needs to do more to broadcast the role of the Green Permits program in promoting these changes. And that requires expanded outreach and communication about the program to businesses, government agencies and the public. This is an effort DEQ can both lead and coordinate.

DEQ should undertake the following steps to increase public awareness and understanding of the Green Permits program.

- DEQ should highlight the Green Permits program, using the awards of GEMS permits as opportunities to describe the program and its goals, and doing follow-up stories on GEMS facilities and program accomplishments. The agency should consider additional steps to expand public recognition of the program and its participants, such as public radio spots or public service ads on public transit vehicles.
- DEQ should provide information about the Green Permits program at all internal agency training programs and at public meetings organized or sponsored by the agency.
- DEQ should include a link to the Green Permits program on the top page of its website.
- DEQ should issue annual reports on the program's environmental results.

None of these measures would require significant resources. The combined effect, however, would be to significantly increase awareness of the program both inside and outside the agency.

DEQ should develop and implement a joint outreach strategy with GEMS participants to communicate with business and government agencies about the Green Permits program.

Current GEMS participants suggested working with DEQ to develop a joint outreach strategy for the Green Permits program to major industry associations and other forums (e.g., meetings of Associated Oregon Industries, the Northwest Environmental Conference, Semiconductor Health & Safety Association, etc.). The strategy could be developed either under the auspices of the Green Permits Advisory Committee or independently. Such peer-to-peer contacts, supported by program information and/or speakers from the agency, would allow targeted outreach to prospective participants. As local government facilities begin to participate in the program, a similar approach would facilitate outreach to public entities throughout the state. This approach will enable DEQ to leverage its own limited resources for outreach on the Green Permits program.

DEQ should work with EPA's Regional Office in Seattle to develop a joint outreach plan for the Green Permits program and the National Performance Track.

Working with EPA provides an additional opportunity for DEQ to leverage limited outreach resources. EPA's Performance Track program has stated its interest in developing substantial cooperative efforts with a few states, and views Oregon's Green Permits program as a national leader. Because of differences between the programs, not all facilities will join both. But the substantial overlap between the two programs makes a joint outreach effort advantageous to both agencies.

Remove barriers to participation in the Green Permits program for entry-level facilities.

There have not yet been any applicants for a GEMS Participant permit. All of the applications so far have been for the middle (Achiever) tier, with some of those facilities hoping to apply later for the highest (Leader) tier. DEQ designed the Green Permits program so that facilities could enter at any of the three levels. The rules for the GEMS Participant tier, however, make clear that it is a stepping stone to higher levels of performance. The term of the Participant-level permit is shorter that that for the other tiers (three years instead of ten), and it can be renewed only once. In addition, the incentives are less substantial.

The Participant tier should serve as a magnet for a growing number of facilities to initiate EMSs and shift their goals from compliance to superior environmental performance. So far it hasn't. And yet, attracting facilities to take the step of becoming GEMS Participants may provide the greatest opportunity for encouraging substantial change in how large numbers of facilities throughout Oregon approach environmental issues. If the first step is not too high, the Participant tier could attract facilities that are meeting basic environmental regulatory requirements, but little more, and guide them through a process that leads to continuous beyond-compliance improvement in their environmental performance. Some relatively minor rule changes could facilitate this process.

DEQ should modify the EMS requirement for GEMS Participant permits, so that the Participants tier can serve as an on-ramp for both EMSs and the Green Permits program.

This is the most important change. The primary issue here is one of timing. The Green Permit regulations currently require that applicants for Tier I have "implemented" a basic environmental management system [OAR 340-014-0115]. DEQ should modify the regulations to require facilities to initiate steps toward development of an EMS as part of the permit application process (e.g., developing a policy statement, identifying environmental impacts and establishing environmental objectives and targets), and to complete development of a basic EMS during the first year or 18 months of the permit. No change would be made in the requirement that a facility must have "developed an environmental program that will achieve environmental results that are significantly

better than otherwise required by law, demonstrated by projected reductions in targeted environmental impacts."

This modification could enable many facilities to take the initial step of joining the Green Permits program and making plans for improved environmental performance without having gone through the entire EMS development process. By both providing increased support for educating facilities about EMSs and retaining the current cap of six years for a GEMS Participant permit, DEQ would also create an incentive for these facilities to continue to complete the EMS development process and improve their environmental performance.

The experience of another EMS-based incentive program, Virginia DEQ's Environmental Excellence Program, provides a useful example of such an "on-ramp" incentive. VADEQ has established a two-tier EMS/environmental performance incentive program (although it does not involve issuance of permits). The VADEQ program does not require facilities to have already implemented an EMS before they can join the lower tier. VADEQ's program is also recent. As in Oregon, the higher tier in Virginia has so far attracted a relatively small number of facilities (8 in June 2002). But the lower tier has over 80 participants. Many of these facilities may never advance to the second tier of the VADEQ program. Others, however, may be taking the first step toward improved environmental management and higher performance. VADEQ offers little beyond recognition, and a mentoring program for EMS development, for facilities in the lower tier.

DEQ should support a reduction in the up-front deposit required of GEMS Participant applicants.

The Green Permits legislation requires a $5,000 initial deposit from each Green Permits applicant to cover DEQ's costs for reviewing and managing the permit [ORS 468.521]. The actual costs for DEQ to review and manage a GEMS Participant permit, however, are likely to be substantially lower than those for the other tiers. DEQ staff, for example, identified the EMS verification step as the most time-consuming in the permit review process. If the regulations for GEMS Participant permits are revised to no longer require a completed EMS, the review process could involve substantially less time. In addition, GEMS Participant facilities are not eligible for regulatory flexibility incentives – which eliminates the only other permit-management activity with the potential to require significant time from agency staff. Finally, a significant proportion of the applicants for the GEMS Participant permits could be smaller businesses, and many of these might not have sufficiently complex operations to require substantial review.

The $5,000 initial fee could be a significant barrier to applications for GEMS Participant permits, particularly given the limited benefits for facilities in that tier. The fee could especially deter smaller businesses from applying for the program.

DEQ should evaluate the potential cost savings from the reduced management requirements for GEMS Participant permits, and recommend a significant reduction in

the initial deposit for such permits to the legislature. A reduction in the initial deposit, of course, would not prevent DEQ from collecting additional fees if there were any cases where actual costs exceeded the initial deposit.

DEQ should streamline the EMS verification step for the Achiever and Leader tiers.

Verifying the completeness of each EMS is a detailed and time-consuming step in the GEMS permit process. It may be possible to reduce the detail included in this review. The following options are included for consideration:

Require facilities to completely fill out verification forms.

The verification forms were developed with the assistance of the GEMS pilot facilities. These facilities did not have the verification forms available. Now that they are developed, DEQ should make full use of the forms and require any new GEMS applicants to completely fill out the forms in their initial application before it is considered to be administratively complete. This could reduce the time spent by DEQ staff.

Revise verification guidance to be more "user friendly" to facilities that are not familiar with EMS.

The format and language of the verification forms is written for staff that is familiar with EMS procedures. If DEQ wants to include facilities that are developing EMSs for the first time in the program, it may be useful to revise the guidance to target an audience that is not trained in EMSs. This option may only be applicable if DEQ plans to focus the GEMS program on the "lower tier" facilities.

Identify "priority" elements for the EMS review.

DEQ could reduce the scope of the EMS review to include a shorter list of EMS requirements instead of conducting a full certification review. For example, EPA has reduced the scope of their EMS review in the NPT program. While DEQ would likely not be able to scale back their review to the same degree, it may be possible to establish some priorities to target the review. For example, DEQ could focus their review on the "beyond ISO" issues required by the GEMS rules for a certified EMS. (There may be a discrepancy in the current process between the guidance and actual practice, in that the guidance does not require a complete EMS review where the facility's EMS has received ISO 14001 certification, but the findings from the interviews suggested that the EMS review for all facilities has been fairly comprehensive. Such a discrepancy, however, could be due to the fact that many of the current GEMS permit-holders and applicants have been part of the pilot process.)

DEQ should promote increased training for facilities on the benefits and methods for developing and implementing EMSs.

Such EMS training should go beyond minimal EMS requirements, and demonstrate the use of EMSs to support beyond-compliance environmental performance measures, such as continuous assessments of pollution prevention opportunities and increasing efficiency in the use of natural resources. Training should be provided, at a minimum, for facilities that apply for or receive (after the threshold requirements are changed) a Participant-level GEMS permit.

In providing such training, DEQ should seek to leverage existing resources and seek external grant funding. For example, DEQ could coordinate EMS mentoring by GEMS facilities with Achiever or Leader permits – a possibility suggested by current GEMS participants during the interviews.

Expanding Opportunities for Regulatory Flexibility

DEQ's Green Permits program regulations, in addition to enumerating some specific regulatory flexibility options, add a more general option to "provide other benefits that streamline regulatory interactions or benefit the facility." [OAR 340-014-0135] As we heard repeatedly from facilities during the interviews, however, the crucial caveat is the need for approval by EPA of any changes in permit conditions governed by federal environmental regulations – which comprise a large proportion of the permit obligations for most facilities. Winning EPA agreement is not an impossible burden; EPA has agreed in principle, for example, to provide flexibility under LSI's GEMS permit for meeting specific RCRA requirements. But the process may sometimes be daunting; the LSI agreement, when final, will have taken between two and three years.

For some facilities, the question of DEQ's ability to provide the regulatory flexibility included in the package of Green Permits incentives is an important consideration in weighing the effort required to obtain a GEMS permit. While there is no easy solution, DEQ can take some steps toward expanding, or at least more clearly defining, available regulatory flexibility alternatives.

DEQ should establish priorities for developing more broadly applicable regulatory flexibility options.

Because of the challenges in implementing specific regulatory flexibility options, it is important to focus efforts on initiatives that will be valuable to GEMS facilities; have the highest probability of clearing any procedural, regulatory or legislative hurdles; and will have the broadest range of applicability. Three steps would be particularly useful in targeting future efforts:

- DEQ should review regulatory flexibility incentives available or under development in other states with EMS-based incentive programs for superior environmental performance.

- DEQ should review what would be required to develop or implement some more broadly applicable incentive concepts mentioned during the interviews – for example, inter-agency single points-of-contact or streamlined reporting that goes beyond coordinating reporting schedules.
- DEQ should seek the views of GEMS participants and other stakeholders on the value of these and other regulatory flexibility options.

DEQ does not need to start with a clean slate in exploring the value or feasibility of additional regulatory flexibility options. A few states have undertaken similar efforts, and Oregon can learn from their experience. For example, the Texas Natural Resource Conservation Commission (TNRCC) has worked with stakeholders to develop and review an extensive list of potential incentives. Some of these have been eliminated because of concerns about environmental impacts, agency resources, or federal regulatory or statutory restrictions. Others are being developed further.[3] This and similar analyses in other states would substantially reduce the effort required by DEQ. Providing such information to GEMS facilities would also establish a useful basis for discussions about specific regulatory interests or concerns.

DEQ should work with EPA's Performance Track program to identify and define regulatory flexibility alternatives and approaches that could benefit Oregon facilities.

Some broader regulatory flexibility incentives involving federal regulations will require EPA to initiate rule changes. EPA's National Performance Track (NPT) program is a principal vehicle through which EPA is seeking to identify and implement such changes for facilities with superior environmental records. For example, EPA has been developing a draft regulatory proposal, to be published in the Federal Register later this summer, to provide specific regulatory incentives involving RCRA storage and reporting under MACT standards. In developing the next round of broader changes, EPA is seeking agreements with a few state agencies with EMS incentive programs to jointly develop tailored regulatory flexibility packages. These state agencies would be able to have a major role in identifying flexibility alternatives, under the national NPT program, that would be of particular benefit to facilities in their states. Oregon DEQ already has an MOA with EPA for the Green Permits program, and has reached agreement with EPA on an alternative approach for LSI to meet one of its federal regulatory requirements. Working further with EPA under DEQ's existing MOA would provide an opportunity for long-term expansion of the flexibility available to Green Permits facilities.

[3] TNRCC has published lists of these incentives on its website, along with brief explanations of status or reasons for elimination. The lists are available at www.tnrcc.state.tx.us/exec/sbea/ems/incentives.html

Promoting Transparency and Communication of the Program's Environmental Results

Interview findings and KGAA's independent review of environmental information publicly reported in GEMS permit applications and annual reports identified potential ways to improve the public accountability for the GEMS program. These improvements should not impact the flexibility of the program, which encourages facilities to select their own targets and implement aggressive EMS programs. Instead, these improvements focus on ensuring that accomplishments made by GEMS facilities, and the program as a whole, are clearly understood by a wide range of stakeholders.

Specify minimum "required" elements that must be included in permit applications.

The DEQ should specify a set of minimum requirements for information reported in applications. These minimum requirements would focus on the quantitative performance data reported in the application, with a goal of providing consistency. This would allow DEQ to create a clearer picture on the progress made by each facility and for multiple facilities in the program. The minimum requirements should include:

- numeric goals for future reductions for each significant impact with objectives and targets
- numeric baselines for each significant impact with objectives and targets
- baselines quantified using both absolute and normalized performance measures

Require facilities to provide a complete "facility-wide" picture for their environmental impacts.

Information in the current permits provides an unclear picture on the total environmental impacts from the facilities. It would be useful to have the facilities provide a more complete picture of their total environmental impacts. This facility-wide focus would provide a clearer picture on what the proposed targets will accomplish at the facility. Some options to consider include:

Require facilities s to discuss all environmental aspects at the site, not just significant impacts or those with future targets.

This would provide the best picture of the facility, but could be perceived as requiring too much public information and create a disincentive for the program.

Require facilities to identify and discuss criteria used for selecting significant impact.

Facilities could be required to discuss their criteria for identifying significant impacts. This would not provide the facility-wide picture as completely as listing all impacts, but it would provide outside stakeholders some insight into how the impacts are selected by

the facility. It would also be less likely to raise concerns about the level of information being required under the program.

DEQ should prepare forms and develop guidance for facilities to follow in preparing annual reports.

DEQ currently does not have any forms for facilities to use for annual reporting. The annual reports developed by each facility follow completely different formats. Some reports provide general information, much like a corporate environmental report. While such information may provide useful context, it does little to show progress for specific accomplishments. A form focused on documenting progress would be useful for DEQ and the facilities. Minimum requirements included in the forms should include:

Establish a clear link between targets and progress.

Once a target is selected it should not be changed (without some explanation). The annual report should include the baseline and proposed reduction target along with the progress made during the year.

Require progress to be reported in absolute and normalized metric.

To provide a complete picture of progress, each facility should be required to report both absolute and normalized metrics. DEQ should also develop a consistent calculation method for considering impacts from production. The method used by EPA in the NPT program could be used.

DEQ should develop a method to summarize accomplishments of multiple facilities and issue an annual GEMS program progress report.

DEQ should develop a method to track and report progress of all facilities included in the GEMS program. It is likely that a wide range of facilities and metrics will be included. Even with the three current facilities, it is difficult to capture the complete progress of the facilities in a consistent, simple way. For example, a method is needed to report and compare highly variable metrics from 0.1 lb. to 1,000,000 BTU. There are methods for "scaling" and summarizing progress of multiple and different facilities that DEQ can consider. One method of scaling different metrics provides a good "relative" view of how each indicator does individually and how they compare to each other. In this method the baseline for each metric is assigned a value of 1. Progress in future years is calculated by dividing actual data by baseline. For example, if the baseline is 1,000 and the second year is 800, the baseline is 1,000/1,000 =1.00 and the second year is 800/1,000 = 0.80. Appendix E provides an example using this type of scaling for the three facilities in the GEMS program. Regardless of which method is used, DEQ should develop a method to report the progress of GEMS facilities individually and collectively.

Program Resources, Coordination and Staffing

While the up-front costs of developing the Green Permits program were substantial, the continuing costs of implementing the program are far lower. The statute requires that costs for reviewing and managing individual Green Permits be recovered from the facilities. The applicant must pay an initial deposit of $5,000, and DEQ charges its costs against that deposit. DEQ estimates that its expenses for each permit fall within that range, although this estimate relies on experiences with only three GEMS permit-holders (two of which were part of the pilot) and two applicants.

There are, however, some costs still required for program coordination and development. In addition, some of the steps recommended above, while not expensive, would not be free. But all of these costs are limited, and most could be covered by non-DEQ resources.

DEQ should continue to provide central coordination for the Green Permits program.

While individual GEMS permits are managed in the DEQ regional offices, central coordination is still needed. Such coordination is required, for example, to assure continuity and consistency, make necessary program adjustments, train DEQ regional staff responsible for individual permits, prepare the annual report on the program's environmental results (recommended above), involve the Green Permits Advisory Committee when appropriate, and negotiate with Region 10 EPA staff on regulatory flexibility for Green Permits facilities. The scope of this role is much reduced from the period of program development; it seems likely to be a half-time position or less. But it is still necessary if the program is to remain viable.

DEQ should continue to provide EMS training for staff with responsibility for managing Green Permits.

One of the unique features of the Green Permits program is the emphasis on value-added EMSs – environmental management systems designed not just to assure compliance, but also to achieve superior beyond-compliance performance. The DEQ staff who have had the responsibility for the initial Green Permits all had the benefit of EMS training. We heard from both DEQ staff and facility participants that the knowledge and understanding of EMSs by DEQ staff was a major asset in developing the permits. As new staff are assigned to future Green Permits, it is important to continue to provide such training. Ultimately, the benefit of such training will be broader than its applicability for the Green Permits program alone; it will be valuable in the interaction of DEQ staff with an increasing universe of Oregon facilities that are either implementing or interested in pursuing EMSs.

DEQ should take advantage of outside funding sources to maintain the Green Permits program and support EMS training.

EPA provides grants that could be used for some of the continuing Green Permits program needs. For example, EPA issued its implementation plan for innovation this spring, and plans to issue a grant proposal this summer to provide support to states in developing their own innovation programs. This might provide funding for such activities as the development of consolidated permitting under the Green Permits program, further defining and implementing the GEMS Leader permits, or improving tools for measuring results under the Green Permits program. EPA has also provided funding to support EMS training. Such grants might be available for the expenses associated with training DEQ staff, providing training on EMSs to Oregon facilities, and coordinating a mentoring program for Oregon facilities.

APPENDIX A: COMPARISON OF GEMS EMS VERIFICATION TO NPT ON-SITE REVIEW PROTOCOL

ISO Clause	GEMS	NPT
4.2 Environmental policy	The environmental policy should embody: ☐ Achieving and maintaining compliance with regulatory requirements ☐ Applying the pollution prevention definition and hierarchy when setting goals and targets and implementing environmental impacts 1. Source Reduction (highest priority) 2. Recycling 3. Treatment 4. Disposal ☐ Excelling in performance relative to all regulated pollutants and activities. ☐ A strong commitment to achieving superior performance relative to all site-based environmental aspects that are determined to have significant impacts, including both regulated and unregulated environmental impacts.	Does the policy include a commitment to: ❒ compliance? ❒ continuous improvement? ❒ pollution prevention? ❒ public outreach? Is the environmental policy publicized, internally? ❒ YES❒ NO And externally ❒ YES❒ NO

ISO Clause	GEMS	NPT
4.3.1 Environmental aspects	The aspect/impact analysis should include: ☐ A thorough examination of regulated and unregulated site-based environmental impacts. ☐ A determination of which site-based aspects have a significant impact on the environment, taking into consideration local, regional and global environmental conditions. ☐ A consideration of stakeholder input in identifying and determining the significance of environmental impacts. ☐ The analysis of aspects should address the operational provisions of the regulation or permit (e.g. training, maintenance, etc.). ☐ A provision for reexamining this analysis and keeping it up-to-date based on new understandings about environmental conditions or impacts.	How do you identify your environmental aspects or issues? When was your last environmental aspects/issues analysis or review? Describe the criteria you use to select which significant aspects/issues you're going to work on first. Do you consider: ❒ regulatory requirements ❒ pollution prevention opportunities ❒ community concerns

ISO Clause	GEMS	NPT
4.3.2 Legal and other requirements	☐ A procedure to identify all applicable federal, state and local legal requirements, including all permit conditions, and to keep the information updated. ☐ A record of any other requirements that the facility, or the parent company, have committed to that apply to the facility, including voluntary industry codes of practice, contracts, customer commitments, or internal requirements. ☐ A record of GEMS Permit guidelines and requirements that the facility, or the parent company, have committed to that apply to the facility. ☐ Accessibility to the terms and conditions of these legal and other requirements. ☐ A process for keeping this information up to date including periodic review, update and communication as appropriate.	How do you identify your facility's legal requirements? Is a system in place to identify legal requirements? ❒ YES❒ NO What procedures are used to ensure compliance is maintained? Are procedures in place to ensure compliance is maintained? ❒ YES ❒ NO When was your last internal compliance audit? Describe your process for addressing issues identified in the compliance audit.

ISO Clause	GEMS	NPT
4.3.3 Objectives and targets	Objectives and targets that, if achieved, will assure that the facility achieves superior environmental performance for site-based aspects that have significant impacts, including both regulated and unregulated impacts. For example: ☐ Energy conservation ☐ Water conservation ☐ Material use conservation ☐ Toxic use reduction ☐ Carbon emissions ☐ Hazardous waste reduction ☐ Solid waste reduction ☐ Reuse & recycling ☐ Employee commuting ☐ Land use ☐ Habitat conservation ☐ Landscape management ☐ _____	Have you set measurable targets based on your analysis of your environmental aspects/issues? ❒ YES ❒ NO

ISO Clause	GEMS	NPT
4.3.4 Environmental management programs	☐ Programs that are consistent with the objectives and targets and the facility's GEMS Permit. ☐ Assignment of responsibility for achieving objectives and targets at each function and level of the facility. ☐ A means for achieving the objectives and targets, including methods and resources. ☐ A designated time frame. ☐ A procedure for modifying the program based on: ☐ Audits of progress toward targets. ☐ New developments or new or modified activities, products or services. ☐ A procedure for monitoring progress toward the objectives and targets ☐ Pollution prevention initiatives as a preference to pollution control activities.	Pick one objective/target as an example and explain how it is being addressed. Include who is responsible for meeting this target, any incentives for them to meet this target, and the schedule for meeting this target.

ISO Clause	GEMS	NPT
4.4.1 Structure and responsibility	☐ Clearly defined roles, responsibilities, and authorities. ☐ Roles, responsibilities, and authorities have been communicated throughout the organization. ☐ Human, financial and technological resources essential to the implementation and control of the EMS have been provided. ☐ A management representative has been appointed who is responsible for implementation and maintenance of the EMS. ☐ A management representative has been appointed who is responsible for reporting to top management.	

ISO Clause	GEMS	NPT
4.4.2 Training, awareness and competence	☐ A determination of what job function may have a significant environmental impact. ☐ An identification and evaluation of training needs for all employees whose job functions may have a significant environmental impact, and delivery of appropriate training. ☐ An identification and evaluation of training needs for all contractors whose duties may have a significant environmental impact, and delivery of appropriate training. ☐ General awareness training for all employees and managers that addresses the environmental policy and the organizations environmental impacts. ☐ Training and awareness activities for all employees that address the types of environmental impacts appropriate to the facility's Tier. ☐ Periodic refresher training. ☐ A method of determining that employees have the appropriate education, training and experience to perform tasks for which they are responsible which can cause significant environmental impact.	What types of environmental training do you conduct (e.g., general environmental awareness, as part of orientation, compliance, or EMS-specific training)? Who receives this training and how often?

ISO Clause	GEMS	NPT
4.4.3 Communication	**Internal Communication:** ☐ A procedure for internal communications between various functions and levels of the organization related to the EMS and environmental aspects. ☐ An assignment of responsibility for reviewing, updating and overseeing implementation of the internal communication procedure. ☐ Examples of communications that have occurred between functions and levels of the organization. **External Communication:** ☐ A procedure for providing two-way dialogue regarding environmental performance that proactively encourages public inquiries and comments. ☐ Mechanisms to discuss environmental policy, annual performance report, environmental aspects and significant impacts, and establishing objectives and targets with stakeholders. ☐ A mechanism for receiving, documenting, considering and responding to communications received from stakeholders. ☐ Examples of external communications that have been received, documented, considered and responded to.	Describe an example of the mechanism used to respond to community concerns. **A**re mechanisms in place to respond to community concerns? ❒ YES ❒ NO Describe an example of the mechanism used to inform the community of important issues related to the facility's environmental performance. Are mechanisms in place to inform the community? ❒ YES ❒ NO Describe an example of how information on the facility's environmental performance (e.g., the annual environmental performance report) is communicated to the general public (inside and outside the local community). Are mechanisms in place to communicate environmental performance publicly? ❒ YES ❒ NO

ISO Clause	GEMS	NPT
4.4.4 EMS documentation	☐ Written or electronic information that covers all clauses of the standard: ☐ Describing the requirements of the management system and their interaction ☐ Cross-referencing related documents	
4.4.5 Document control	☐ A document control procedure, such that documents: ☐ Can be located ☐ Are periodically reviewed, revised and approved ☐ Have current versions available at essential locations, with no obsolete versions. ☐ EMS documents that are managed according to the procedures and are legible, identified, and dated. ☐ Obsolete version are retained for reference and are suitably identified. ☐ An assignment of responsibility for the creation and modification of documents.	Based on your review of EMS documents, are document control procedures in place? ❒ YES❒ NO
4.4.6 Operational control	☐ An identification of those operations and activities that are associated with its identified significant environmental aspects. ☐ Documented procedures that stipulate operating criteria and controls for identified operations in consideration of the need to prevent deviations from the environmental policy, objectives and targets.	Is this [SAMPLE TARGET FROM ENVIRONMENTAL PROGRAM SECTION] (or any) objective being addressed through documented Operational Controls? ❒ YES❒ NO _ *Review a sample Operational Control/SOP*

ISO Clause	GEMS	NPT
	☐ Procedures related to significant environmental aspects of goods and services it uses	
4.4.7 Emergency preparedness & Response	☐ A defined set of responsibilities, a management structure and a plan for emergency response to accidents and emergencies. ☐ Procedures to identify potential accidents and emergency situations. ☐ Procedures to respond to accidents and emergency situations. ☐ Procedures that address prevention and mitigation of environmental impacts associated with accidents and emergencies. ☐ A training program that includes specific provisions for skills in emergency preparedness for appropriate individuals. ☐ Procedures for periodic review and revision of emergency preparedness. ☐ If any accidents or emergencies have occurred, a review of procedures following the occurrence. ☐ Periodic drills or exercises to test the implementation of the procedures.	Does the facility have emergency preparedness procedures in place? ❒ YES ❒ NO

ISO Clause	GEMS	NPT
4.5.1 Monitoring and measurement	☐ Documented procedures to monitor and measure on a regular basis key characteristics of operations and activities that can have a significant impact on the environment. ☐ Monitoring and measurement records that track performance, operational controls and conformance with the organization's objectives and targets. ☐ Performance measures that provide a clear and quantified measure of environmental performance in context with past performance. ☐ (OPTIONAL, BUT RECOMMENDED) Performance measures that provide a clear and quantified measure of environmental performance in context with similar facilities within the industry sector. ☐ Monitoring and measurement records that track operational controls ☐ Requirements and procedures to calibrate and maintain equipment designed to monitor and measure the key characteristics of its operations and activities that can have a significant impact on the environment. ☐ Records of this process. ☐ Documented procedures for periodically evaluating compliance with laws and regulations. ☐ Evidence of the evaluation of compliance.	

ISO Clause	GEMS	NPT
4.5.2 Nonconformance and corrective and preventive action	☐ Procedures and designation of responsibility for investigating and handling non-conformance from the EMS, including identification of the cause. ☐ Procedures for corrective and preventive action. ☐ A process to evaluate the environmental impact of a non-conformance and assess the appropriateness of the corrective and preventive actions.	Is a corrective/preventative action program in place? ❒ YES ❒ NO
4.5.3 Records	☐ Procedures to identify, maintain and dispose of environmental records. ☐ Legible and identifiable records for training, audits results and management reviews. ☐ Mechanisms for record storage and retrieval.	

ISO Clause	GEMS	NPT
4.5.4 Environmental management system audit	☐ A program and procedure for periodic EMS auditing. ☐ Audit procedures that cover: ☐ Audit scope ☐ Frequency and schedule ☐ Methodologies ☐ Responsibilities for conducting and reporting results ☐ Audits of a scope sufficient to measure conformance with the requirements of the EMS. ☐ Provision of information to management regarding results of the audit. ☐ Audit procedures that are appropriate to the environmental importance of the activity. *SURVEILLANCE AUDIT GUIDELINES* An ISO 14001 registered facility is expected to receive an external surveillance audit on generally an annual basis by their registrar. The ISO Guidelines (ISO/IEC Guide 62, 1996) read: "The certification/registration body shall carry our periodic surveillance and reassessment at sufficiently close intervals to verify that its organizations whose EMS are certified/registered continue to comply with the certification/registration requirements. Note: In most cases it is unlikely that a period greater than one year for periodic surveillance would satisfy the requirements of this clause." Surveillance audits should have an "external" element by one of the following: 1. Be performed by a qualified auditor who is independent from the company, and holds no conflict of interest relative to the company 2. Be performed by a qualified auditor who may be from within the company, but is independent of the organizational unit which is covered by the EMS 3. Be performed by an internal auditor, but such that audit reports and findings are provided to DEQ for review, who may at their option perform on-site verification. The following surveillance procedures should be present for both GEMS Achiever and GEMS Leader facilities: ☐ A program for periodic surveillance audits that meets the above guidelines. ☐ Procedures for providing information to DEQ in the annual report regarding results of the audit(s) and associated corrective actions.	Was an EMS Assessment done? ? YES *date of assessment:*_____ ❒ NO Type of Assessment (*check one*) ❒ Self-Assessment, GEMI Protocol ❒ Self-Assessment, CEMP Protocol ❒ Self-Assessment, Other: ❒ Third Party Assessment, ISO 14001 ❒ Third Party Assessment, Other: When was your last internal EMS audit? Describe your process for addressing issues identified in the EMS audit.

ISO Clause	GEMS	NPT
4.6 Management review	☐ A documented management review process that involved top management. ☐ Designated intervals for management review. ☐ Documentation of reviews that have occurred. ☐ Evidence that changes to policy, objectives and other EMS elements were addressed in light of audit results and/or changing circumstances.	When was your last management review of EMS effectiveness? Describe the management review of your EMS and your process for addressing issues identified during the management review.

APPENDIX B: COMPARISON OF PERMIT APPLICATION PERFORMANCE DATA SUBMITTED IN GREEN PERMITS AND PERFORMANCE TRACK

	GREEN PERMITS PROGRAM					NATIONAL PERFORMANCE TRACK PROGRAM						
Aspect	**Baseline**	**Units**	**Past Reduction**	**Units**	**Future Reduction**	**1998**	**2000**	**Past reduction**	**Baseline**	**Units**	**Future Reduction**	**Units**
LSI Logic												
Chemical use			12,000	gallons		1.4	0.53	62.14%	0.53	Normalized	25%	
Water Use			10,000,000	gallons	80% possible	92.2	18.92	79.48%	300,000	gpd	80%	
Total Solid Waste			4,400	lbs					21.8	tons/yr	50%	
Energy Use Reduction			4,462,000	KWH								
Spent Chemical Recycling			25,000	gallons								
GHG-PFC									11	Normalized	90%	
EPSON Portland Inc.												
Solid Waste	1,582	Tons/yr			35%	1,582	646	59.17%	646	Tons	355	
Air Emissions	9.21	Tons/yr	59%		30% (97BL)	9.21	2.267	75.39%	2.267	Tons	0.25	tons
Hazardous waste	7,363	Pounds/yr	75%		30%				4,655	lbs	0	lbs
Waste Recycled	1,984	Tons/yr										
Materials Use			36%						Not known		15%	
Wacker Siltronic Corporation												
Reduce Solid Waste						2.01	1.78	11.44%	1.78	lbs/product	1.4	lbs/product
Recover Silicon Carbide						0	120			tons	250	tons
Habitat Impacts									riverbank		Wetland project	
VOCs from polishing									4,550	lbs	3,640	lbs

	GREEN PERMITS PROGRAM					NATIONAL PERFORMANCE TRACK PROGRAM						
Aspect	**Baseline**	**Units**	**Past Reduction**	**Units**	**Future Reduction**	**1998**	**2000**	**Past reduction**	**Baseline**	**Units**	**Future Reduction**	**Units**
Oregon Air National Guard Kingsley Field												
Air releases	49.6	ton	-43.68%		Conserve Energy							
Air releases	0.01	ton/flying hr	50.00%		Conserve Energy							
Hazardous materials	1,173	lbs	Unknown		Monitor consumption, automated ordering process				1,173	lbs	20%	
Hazardous materials	0.25	lbs/flying hr	Unknown		Monitor consumption, automated ordering process							
Hazardous waste	11,661	lbs	-184.28%		PP assess tri wall packaging	4,907	11,660	-137.62%	5.8	tons		
Hazardous waste	2.45	lbs/flying hr	-3.81%		PP assess tri wall packaging							
Universal Waste	2,348	lbs	-145.35%		Green lights, education, HW to universal							
Non-regulated	13,949	lbs	-198.63%		Education, toxic to non regulated							
Solid Waste Diversion	214,840	lbs	-29.00%		glass/plastic recycling, compost, eduction, reuse monitoring	96	140	-45.83%				
Solid waste disposal	220,440	lbs	Unknown		education							
Pest Management	3.1	lbs/inch rain	82.07%		IPM							
Reclaimed fuel	6,172	gallons	-204.79%		education							
Recycked POL	2,700	gallons	-200.00%		education							
Stormwater			compliance		recover deicing fluids							
Industrial Wastewater			compliance		Eliminate 4 NPDES sites							
Energy Use	4,258,060	BTU/degday	18.98%		Facility design and construction, energy conservation, education				4,258,060	BTU/deg day	10%	
Total Solid Waste									140	Tons	15%	

Louisiana-Pacific Corporation													
Total Air Emissions	64,600	lbs	Prior owner		wood to gas	NOT APPLICABLE-NOT AN NPT FACILITY						
Total Air Emissions	0.098	lbs/ton prod.	Prior owner		wood to gas							
Solid Waste	15,675	Tons	Prior owner		25%							
Solid Waste	0.02	ton/ton prod.	Prior owner		25%							
	GREEN PERMITS PROGRAM					**NATIONAL PERFORMANCE TRACK PROGRAM**						
Aspect	**Baseline**	**Units**	**Past Reduction**	**Units**	**Future Reduction**	**1998**	**2000**	**Past reduction**	**Baseline**	**Units**	**Future Reduction**	**Units**
PacifiCorp Medford Facility												
Equipment Repair Use of paints/solvents	<50 gal/yr annual rat		4,000 gal/yr		Eliminate use of all enamel based paint	NOT APPLICABLE-NOT AN NPT FACILITY						
Hazardous Waste Generation – Carbon Filter Drums	0		2,795 lbs. year		Eliminated use of chlorinated solvents in 1995.							
Reduce treated poles being sent to landfill – Recycle treated poles	135 tons/yr		0		Continue to Recycle – Goal is to determine % increase in recycling effort once baseline is determined.							
Reduce wood reels being sent to landfill – Recycle reels	17 tons/yr		0		Continue to Recycle – Decrease percentage of waste going to landfill once baseline is determined.							
Begin to Measure Other Recycled Products					By starting a baseline, and measure what is being recycled, goals could be set to increase recycling efforts by a certain percent.							
Reduce the number of spills	5 reported spills per year				Reduce the number of spills.							

APPENDIX C: SUMMARY OF EMS OBJECTIVES, TARGETS AND ACCOMPLISHMENTS

Objectives	Targets	Accomplishments
LSI Logic		
2000--13 Projects		
Chemical Reduction/pollution prevention	Installed separate piping and storage systems for IPA, sulfuric acid, and phosphoric acid. Chemicals were sold for reuse	
	Recycled spent chemicals on-site	72,000 gallons/yr
	Replaced sulfuric acid and ozone with deionized water rinse in resist strip process	3,600 gallons/yr
	Eliminated use of solvent mixture (EKC265) in the post etch polymer strip process	4,000 gallons/yr
	Replaced Buffered Oxide Etch (BOE) step, which used hydrofluoric acid and ammonium fluoride, with an inert Argon etch step	5,475 gallons/yr
	Reduced cleaning frequency on Susceptor sources	24,300 gallons/yr
Water Conservation	Pilot tested two waste water reclamation technologies	
	Installed timing washers on bathroom faucets	165,000 gallons/yr
	Reduced cleaning frequency on Susceptor sources	125,000 gallons/yr
Solid Waste Reduction	Began selling filter cake from HF and CMD WWTP to Portland cement manufacturer, instead of landfilling	446,840 pounds/yr
	Prevent scrapping 8-inch silicon wafers	3,000 wafers/yr
	Began wood waste inspection program to more closely identify wood with metal and styrofoam	40,000 pounds/yr
	Began recycling all plastic films and hard plastics	
	Donated used computers	22 computers 32 monitors 2 laptops
	Electronic time sheets instead of paper	800 pounds
Energy Conservation	Developed and submitted Climate Wise action plan	
	Installed motion sensor lights in 30 rooms	4,750 kw-hours/yr
Transportation and Trip Reduction	Initiated Alternative Transportation Involvement Plan	150 employees 125,000 trip miles 742 pounds/yr HC 6,165 pounds/yr CO 465 pounds/yr Nox
	Bicycle commute challenge	14 employees 200 trips
2001--15 Projects		
Chemical Reduction/pollution prevention	qualified local companies to purchase the spent chemicals that had been previously sent to southern California for reuse, and in the case of the sulfuric acid, to Shreveport, Louisiana for reprocessing. An alum manufacturer in the Greater Portland area qualified the spent acid to use in their process, and a local paint manufacturer is now purchasing the spent IPA. This reduces risk and emissions associated with long distance transportation.	
	recycled spent chemicals	65,000 gallons
	process qualifications were significantly reduced in 2001. Instead of using two lots of wafers for reliability data, the process was consolidated into one lot.	2,200 gallons
	converted the G11 technology to a dry process for etch cleaning, and converted the G12 technology to dry processing in 2002. Dry processing uses ozone to replace hydrofluoric acid and sulfuric acid, and eliminates the DI water required for rinsing.	2,000 gallons HF consumption
	Reduction of cleaning requirements in clean rooms	2,600 gallons IPA, 9%.
	eliminated dual mercury lamps in the DNS 200W track system.	25 pounds
Water Conservation	a dry clean for the G11 and G12 technologies, as described above	8,500,000 gallons

Objectives	Targets	Accomplishments
	Reduce process qualifications, as described above	25,400 gallons
	Following the pilot tests in 2000, initiated the design of a wastewater reclaim system that would allow us to reuse 80-85 percent of our wastewater in the front of the ultra-pure water (UPW) system. System will utilize a fluidized bed bioreactor as the primary technology to remove the contaminants of concern Anticipated completion date is December 2003	
	installed a sophisticated irrigation system that uses temperature and humidity monitors to evaluate the lawn water requirements	800,000 gallons
Solid Waste Reduction	Recycled consumable office products recycled,	207 tons of solid waste
	switched from disposable shoe covers to reusable ones	16,000 pounds
	training material was consolidated in electronic format and printed material is reused.	4,000 pounds
	eliminated paper disposable cups	9,000 pounds
	Through the Students Recycling Used Technology (STRUT) program, LSI Logic donated used PCs and components to Gresham area schools. In 2001, we donated 59 computer systems, 8 printers, 78 monitors, and two fax machines to the STRUT program	
Energy Conservation	provided employees and contractors over 5,000 compact fluorescent light (CFL) bulb coupons for personal use	
	elimination of the air showers in the fab, a result of the protocol reduction	64,000 w-hr/yr
	To optimize the energy consumption of the fab, in 2001 LSI Logic powered down two ballroom supply fans	48,000 kW-hr/yr
Transportation and Trip Reduction	expanded its employee shuttle service between the site and the Gresham Transit Center and also to Portland International Airport.	
	continued supporting the Alternative Transportation Involvement Program (ATIP), which rewards LSI employees and resident contractors that use alternative transportation during their daily travel to and from Campus.	230,000 trip miles 1,363 pounds HC 11,314 pounds CO 854 pounds NOx

Objectives	Targets	Accomplishments
Louisiana-Pacific Corporation		
2000		
Reduce particulate emissions from boiler fuel silos		Installed smaller grates over silo vents
Remove contaminated soil		Removed 1,600 tons
Reduce particulate emissions from cyclones	50%	Installed baghouse filters. Achieved 80% reduction
Improve community relations		Formed a 14 Member Community Advisory Committee
Reduce landfill items.		Recycling of Wood-wrap and metal shavings
2001		
Improve community relations	Four CAC Meetings	Held four meetings. Achieved target
Contribute to the community and the local environment	Two activities	Exceeded target
Reduce waste to landfills on a production basis	10% reduction	Reduced waste 5,219 tons. Exceeded reduction.
Reduce annual water consumption on a production basis	10% reduction	Installed gasket on non-contact cooling water pump from press to fire suppression pond. Was continuous 24 hrs/day. No meter installed, so it is unclear if target was met.
Reduce fugitive emissions from truck bins	No sawdust on the ground	Replaced truck bin with new system containing a baghouse.

Objectives	Targets	Accomplishments
Move EMS toward ISO 14001 conformance	Two EMS audits	Not currently pursuing ISO certification
Reduce Spill potential from bulk off-loading areas	No spills	Developed SOPs. No spills occurred.
Reduce Opacity exceedances from the boiler	50% reduction	Developed SOPs for boiler startup/shutdown. No incidents reported. Achieved target.
Reduce Electricity usage on a production basis	10% reduction	Plans developed to not start equipment earlier than necessary. Stopped using 40 lights. Probably did not meet 10%
2002		
Improve community relations	Four CAC Meetings	
Contribute to the community and the local environment	Two activities	
Reduce Disposal to Landfill	5% reduction per employee hour	
Design and implement water project	Implement one project by 12/01/02	
Implement Waste Minimization Project	One project to be implemented	
Environmental Training to build employee awareness and knowledge	Four hours of employee training per employee/year	

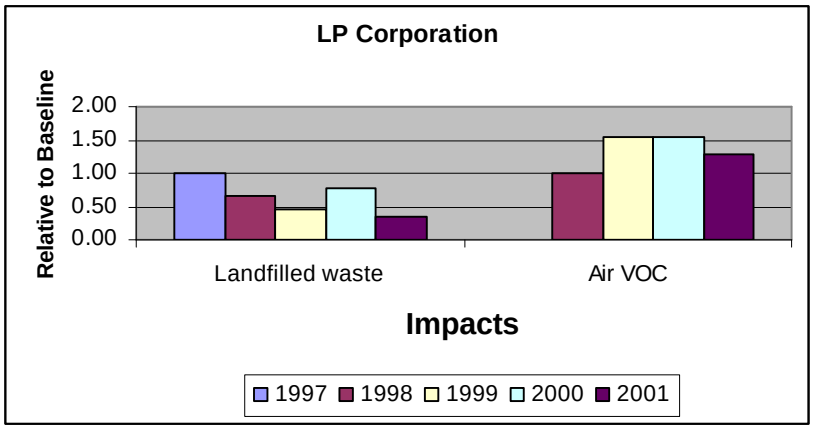
Objectives	Targets EPSON Portland Inc.	Accomplishments/Deficiencies
2001		
Compliance	100% performance to permit and regulatory requirements	DEQ stormwater permit deficiency; EPI corrective action in place Noncontact cooling water OK
	100% Reporting to schedule performance	CWS industrial wastewater permit deficiency; EPI corrective action in place
Reduce use of toxic and hazardous materials	Maintain conditionally exempt SQG status for phase III	Did not meet due to waste generated from closing printer operations
	Maintain SQG status for phase I and II	?
	Reduce generation of HW by 30%	Reduce HW by 51%
Reduce Solid Waste	35%	75% reduction
Reduce Air Impacts	Reduce VOCs by 30% (1997 baseline)	VOC's reduced 99%
	Complete Employee Commute Option Survey	Started carpooling program, but it is currently discontinued
Share Environmental Information	Sponsor environmental month	No open house held due to shut down of printer and contract manufacturing
	Promote environmental activities	EPI has 1999 and 2000 data on web site
	Support Seiko Epson affiliates in their environmental efforts	
Promote Green Purchasing	Develop a tracking system for green products	Did not complete green purchasing guidelines to accurately track products
	Survey vendors and suppliers on green products	Completed distribution of all surveys
2002		
Compliance	Maintain 100% compliance with Green Permit	
	Maintain 100% compliance with Performance track	
ISO 14001 requirements	Maintain 100% ISO 14001 certification	
Reduce Solid Waste	Maintain an average 60% diversion rate	
	Reduce total waste by 8% (Baseline 2001) and/or 80% 1997 baseline	
	Maintain 100% waste to energy	
Reduce Air Emissions	Monitor 100% of manufacturing and maintenance chemical use	

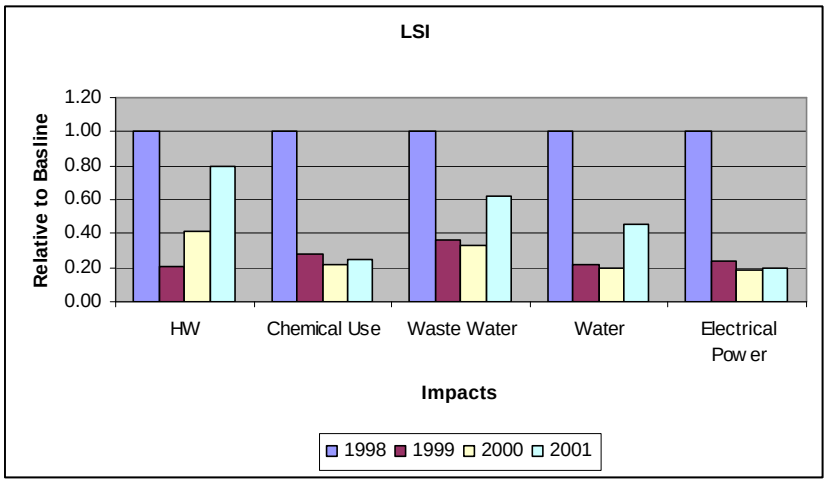
Sharing Environmental Information	Generate one annual environmental report by May each year	
	Promote Environmental Activities	
Promote Green Purchasing	20% of general purchases (office/janitorial) be environmentally green products	
	100% of production purchases be environmentally green products	
Reduce Total Energy Consumption	Reduce electrical usage by 5% (2001 baseline) and /or 25% (1997 baseline)	
	Reduce natural gas usage by 5% (2001 baseline) and /or 25% (1997 baseline)	
	Reduce total water usage by 5% (2001 baseline) and /or 25% (1997 baseline)	

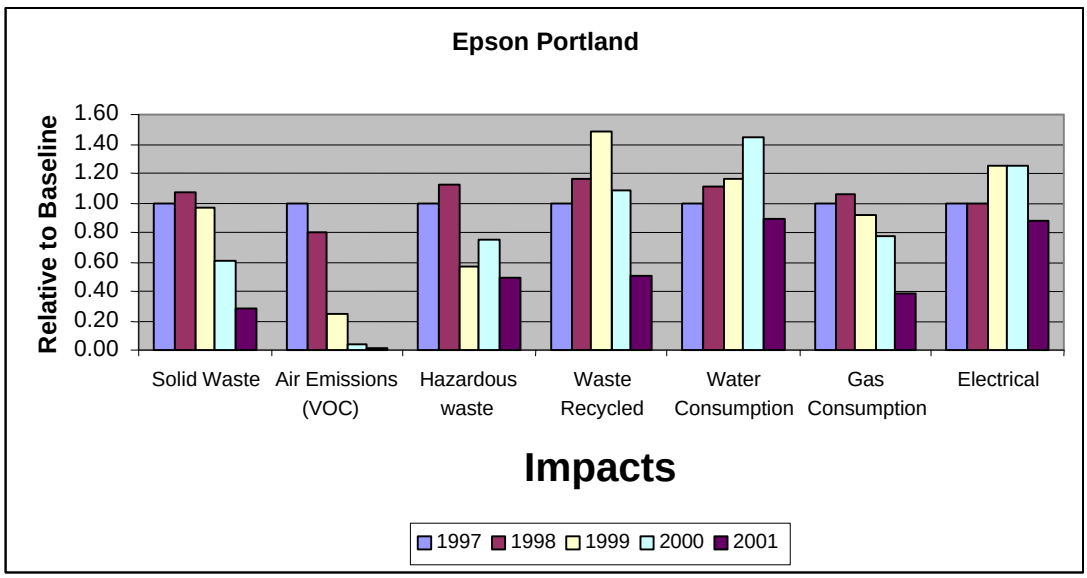
APPENDIX D: SUMMARY OF ANNUAL REPORT ENVIRONMENTAL PERFORMANCE DATA

	Units	1997	1998	1999	2000	2001	Reduction	Goal
Lousiana-Pacific Corporation								
Landfilled waste	Tons	10,500	6,800	4,800	8,150	3,750	64.29%	25.00%
Air Total Criteria	Tons		32.3	40.77	70.46	61.99	-91.92%	
Electrical consumption	KWH/ton product				225			
Raw Material Conversion	Pound/PoundProduct				2,288			
Water Use	Gallons/Ton Product				355			
Waste recycling	pound/ ton Product				345			
Landfilled waste	pound/ ton Product				69			
LSI Logic								
HW	normlalized	NA	0.50	0.10	0.19	0.36	28.00%	
Chemical Use	normlalized	NA	0.16	0.07	0.05	0.06	62.71%	
Waste Water	normlalized	NA	0.64	0.26	0.21	0.36	43.75%	
Water	normlalized	NA	0.92	0.19	0.16	0.43	53.36%	80%
Gas	normlalized	NA	0.24	0.13	0.11	0.29	-20.83%	
Electrical Power	normlalized	NA	0.93	0.25	0.14	0.16	82.80%	
EPSON Portland Inc.								
Solid Waste	Tons	3,600	3,850	3,500	2,200	1,000	72.22%	35.00%
Air Emissions (VOC)	Tons	9	7	2	0	0	99.13%	30.00%
Hazardous waste	Tons	4	4	2	3	2	51.28%	30.00%
Waste Recycled	Tons	1,984	2,300	2,950	2,150	1,000	49.60%	
Water Consumption	Gallons		10,000,000	10,500,000	13,000,000	8,000,000	11.11%	
Gas Consumption	SCF		110,000	95,000	80,000	40,000	61.54%	
Electrical	Kilowatts		12,000,000	15,000,000	15,000,000	10,500,000	12.50%	

APPENDIX E EXAMPLE OF SCALED METRICS







Oregon Green Environmental Management System Permit Case Study:

EPSON PORTLAND, INC.
Hillsboro, Oregon

Background on Oregon's Green Environmental Management System Permit Program

The Oregon Green Permits Program is a voluntary, incentive-based program that rewards facilities that go beyond compliance and achieve superior environmental performance. The 1997 Oregon Legislature authorized the Oregon Department of Environmental Quality (ODEQ) to issue Green Permits that may waive regulatory requirements and provide other benefits for facilities within this "performance track". ODEQ has signed a Memorandum of Agreement with USEPA and the Lane Regional Air Pollution Authority that describes how the program will be implemented under the principles of the "Joint EPA/State Agreement to Pursue Regulatory Innovation".

A Green Permit modifies regulatory requirements after a facility has demonstrated that it can meet certain requirements. Rules adopted in 1999 require a facility to: (1) demonstrate that it has achieved or will achieve environmental performance that is significantly better than otherwise required by law, (2) develop a public performance report at least once/year, and (3) plan and implement a program for ongoing communication with interested stakeholders to provide input into the facility's environmental program. A "tiered" approach offers different types of Green Permits, in which increasing performance receives increasing benefits.

"Green Environmental Management System Permits", or GEMS Permits, require the implementation of a formal environmental management system to achieve results. Three types of GEMS permits may be issued--ranging from the entry-level Participant permit to the highest level Leader permit--to allow a wide range of participants in the program. Benefits include public recognition; enforcement discretion that focuses on the environmental management system to continually improve performance; technical assistance as requested by the facility; and regulatory modifications or efficiencies through consolidated reporting, flexible permits, and other waivers requested by the

facility. The GEMS Leader Permit rewards demonstrated leadership in applying sustainable development principles to the environmental life cycle aspects of a facility's activities, products and services.

Facility Description

The Epson Portland Inc. (EPI) facility is part of Japan's Seiko Epson Corporation (SEC). EPI has operated at the Hillsboro site for over 15 years manufacturing various styles of color ink jet printers and print cartridges. In the past, EPI also conducted other operations at the site including circuit board assembly, plastic injection molding, printer refurbishing, optical engine refurbishing, media development, and contract electronics manufacturing. However, these operations ceased in 2001.

EPI received the third GEMS permit issued by the Oregon Department of Environmental Quality in November 2001. The permit expires in May of 2010. Epson has operated under the terms of the GEMS permit for one year.

Accomplishments for Acceptance in the Green Permits Program

Epson submitted the third Green Permit application in September of 2000. The company requested to be accepted as a GEMS Achiever (Tier II) facility. To be approved as a GEMS achiever, Epson had to show that their past environmental accomplishments and future plans for additional reductions met criteria established in Oregon's rules. Many of these criteria deal with the effectiveness of the facility's Environmental Management System (EMS).

EMS Certification/Verification

Information in Epson's application documented details of the company's EMS. Epson's EMS was ISO certified in June of 1998. Epson was the first facility with a certified EMS entering the Green Permit program. Oregon DEQ staff worked closely with Epson staff in documenting specific EMS standards and procedures using the DEQ verification process and determined that the EMS supported verification and met the requirements for a GEMS Acheiver. Highlights of the EPI EMS as described in the permit application include:

- The environmental policy includes the use of environmentally sound processes, pollution prevention, compliance with regulatory requirements, and a commitment to communicate environmental accomplishments through ongoing public outreach and annual environmental reports.
- The EMS planning procedures describe an integrated process for identifying environmental aspects, ranking and selecting aspects to determine significance, developing objectives and targets and developing environmental programs.
- Epson uses a 22-member committee representing each department to develop objectives and targets.
- The aspect and impact analysis is completed at least annually.
- Epson publishes their environmental results through an annual environmental report available on the Internet

Environmental Performance Measurement

The Green Permit applicant must also document baseline performance information for past environmental accomplishments and provide information on environmental programs for future reductions. Specific performance measures must be identified with a "baseline performance report." Table 1 below summarizes information from Epson's permit application and review report for the Green Permit addressing past environmental performance and proposed future reductions for their significant environmental impacts.

Table 1: Summary of Significant Environmental Impacts for Epson Portland

Significant Environmental Impact	Baseline (1997)	Units	Past Reduction (1999)	Units	Future Reduction
Solid Waste (landfilled)	1,582	Tons/yr	59%		35%
Air Emissions (VOC)	9.21	Tons/yr	75%		30%
Hazardous waste	7,363	Pounds/yr	37%		30%
Waste Recycled	1,984	Tons/yr	46%		

Summary of Regulatory Requirements

The Epson facility is covered by regulatory requirements for air, water and hazardous waste. Table 2 below summarizes Epson's regulatory requirements.

Table 2: Summary of Regulatory Requirements for Epson

Area	Permit/status	Permit Number
Water	Non-Contact Cooling Water Surface Water Discharge	NPDES 100-J/ 103448
	Stormwater Discharge Permit	NPDES 1200-Z/ 103448
	Unified Sewerage Agency Pretreatment Permit	133072
Hazardous Waste	Conditionally exempt small quantity generator	
Air	Employee Commute Operations Program	None assigned
Toxic Release Inventory	Form R	None assigned

The ambient environmental conditions at the Epson site do not meet all existing requirements. The Portland-Vancouver Air Quality Maintenance Area is a designated maintenance area for CO and ozone. The Tualatin River Subbasin is identified on the current 303(d) list and is water quality limited for nuisance algal growth, dissolved oxygen, bacteria and temperature.

Environmental Performance Achievements Throughout Green Permit Program

Each facility receiving a GEMS permit must document environmental performance through annual performance reports. Epson has submitted one performance report documenting their accomplishments for 2001. Information from the annual report can be combined with information from the permit application and the Green Permits review report prepared along with the permit to create a complete picture of environmental achievements over the course of the Green Permit program.

Objectives, Targets and Accomplishments

Epson develops new objects and targets each year through their EMS. Table 3 below summarizes Epson's targets and accomplishments for 2001, and lists their future targets for 2002.

Table 3: Summary of EMS Objectives, Targets and Accomplishments

Objectives	Targets 2001	Accomplishments/Deficiencies
Compliance	100% performance to permit and regulatory requirements	DEQ storm water permit deficiency; EPI corrective action in place Noncontact cooling water OK
	100% Reporting to schedule performance	CWS industrial wastewater permit deficiency; EPI corrective action in place
Reduce use of toxic and hazardous materials	Maintain conditionally exempt SQG status for phase III	Did not meet due to waste generated from closing printer operations
	Maintain SQG status for phase I and II	?
	Reduce generation of HW by 30%	Reduce HW by 51%
Reduce Solid Waste	35%	75% reduction
Reduce Air Impacts	Reduce VOCs by 30% (1997 baseline)	VOC's reduced 99%
	Complete Employee Commute Option Survey	Started carpooling program, but it is currently discontinued
Share Environmental Information	Sponsor environmental month	No open house held due to shut down of printer and contract manufacturing
	Promote environmental activities	EPI has 1999 and 2000 data on web site
	Support Seiko Epson affiliates in their environmental efforts	

Promote Green Purchasing	Develop a tracking system for green products	Did not complete green purchasing guidelines to accurately track products
	Survey vendors and suppliers on green products	Completed distribution of all surveys
2002		
Compliance	Maintain 100% compliance with Green Permit	
	Maintain 100% compliance with Performance track	
ISO 14001 requirements	Maintain 100% ISO 14001 certification	
Reduce Solid Waste	Maintain an average 60% diversion rate	
	Reduce total waste by 8% (Baseline 2001) and/or 80% 1997 baseline	
	Maintain 100% waste to energy	
Reduce Air Emissions	Monitor 100% of manufacturing and maintenance chemical use	
Sharing Environmental Information	Generate one annual environmental report by May each year	
	Promote Environmental Activities	
Promote Green Purchasing	20% of general purchases (office/janitorial) be environmentally green products	
	100% of production purchases be environmentally green products	
Reduce Total Energy Consumption	Reduce electrical usage by 5% (2001 baseline) and /or 25% (1997 baseline)	
	Reduce natural gas usage by 5% (2001 baseline) and /or 25% (1997 baseline)	
	Reduce total water usage by 5% (2001 baseline) and /or 25% (1997 baseline)	

Significant Environmental Aspects

In their annual report, Epson has also established a set of 7 environmental performance metrics to track their environmental progress. These metrics are not indexed to production, but instead report the absolute quantities for each environmental impact. Table 4 below summarizes Epson's environmental performance data reported in their first annual report. Overall, these data show Epson reduced quantities for each significant impact. Reductions ranged from a high of 100%, the complete elimination of landfilled waste, to an 11% reduction in water consumption. It is not possible to determine if reductions are the result of decreased production or plant shutdowns. The reduction of VOC air releases is likely the result of a shutdown of circuit board assembly, plastic injection molding, printer refurbishing and other operations.

Table 4: Summary of Environmental Performance Metrics

Significant Environmental Impact	Units	1997 (Baseline)	1998	1999	2000	2001	Reduction	Goal
Solid Waste (Total)	Tons	3,600	3,850	3,500	2,200	1,000	72.22%	35.00%
Solid Waste (Landfilled)	Tons	1,582	1,289	646	100	0	100%	
Air Emissions (VOC)	Tons	9	7	2	0	0	99.13%	30.00%
Hazardous waste	Tons	4	4	2	3	2	51.28%	30.00%
Waste Recycled	Tons	1,984	2,300	2,950	2,150	1,000	49.60%	
Water Consumption	Gallons	9,000,000	10,000,000	10,500,000	13,000,000	8,000,000	11.11%	
Gas Consumption	SCF	104,000	110,000	95,000	80,000	40,000	61.54%	
Electrical	Kilowatts	12,000,000	12,000,000	15,000,000	15,000,000	10,500,000	12.50%	

Regulatory Environmental Data

Epson's annual GEMS report is required to include several regulatory reporting requirements including: Stormwater sample results, Non-contact cooling water sample results, hazardous waste annual report and the Oregon Toxic Use and Hazardous Waste Reduction report.

Tables 5 and 6 below summarize data for water discharges of stormwater and non-contact cooling water. No violations are reported.

Table 5: Summary of Stormwater Sample Results (Permit 1200-Z)

Parameter	August 2001	October 2001	January 2002
Number of Sites Sampled	8	4	4
pH	5.21 - 6.18	5.89 - 6.03	6.24 - 6.62
Oil and Grease	ND	ND	ND
TSS	2 - 13	ND - 3	ND - 3
Copper	ND	ND	ND
Lead	ND	ND	ND
Zinc	0.03 - 0.13	0.02 - 0.05	0.04 - 0.06
Monthly Visual Inspection	OK	OK	OK

Table 6: Summary of Non-contact Cooling Water Discharge (Permit 100-J)

Parameter	December 2001	January 2002	Februar y 2002	March 2002
Flow	0.003428	0.002455	0.00320 3	0.00354 1
Temperature	68	74	78	78
Total Chlorine	0	0	0	0
Flow X Temperature	0.233	0.181	0.249	0.276
pH	8.70	8.46	8.63	8.6

The annual report is also required to include data for the hazardous waste report. However, the environmental performance metric for total hazardous waste was the only hazardous waste data included in the report. Table 7 below presents data obtained from the ODEQ on Epson's hazardous waste generation as reported in their prior hazardous waste reports from 1998 to 2000.

Table 7: Summary of Hazardous Waste (kilogram)

Waste	1998	1999	2000
Alcohol NOS 3	2,752	2,111	1,931
Lead contaminated waste	102	392	546
Waste paint related			503
Corrosive liquid NOS			100
Waste aerosol	11		51
Waste propane			13
Waste amines	3		5
Batteries, dry,	12		
HW NOS 9 batteries	21		
Lithium batteries	2		
RW waste flammable liquid	81		
Waste batteries	93		
Waste comb. Liquid Pet. Naphtha	194		
Waste Hcl	4		
Waste Isocyanate	2		
Waste Sulfuric Acid	27		
TOTAL	**3,304**	**2,503**	**3,149**

Other Benefits of the Program

Changes to Reporting of Environmental Information

The Green Permit includes four important changes to Epson's environmental reporting requirements. The first change revised the months covered in Epson's annual reports. In past, all regulatory reports were based on the calendar year, covering January through December. However, Epson's internal data follows their fiscal year, which runs from April through March of the following year. Epson's annual reports now cover their fiscal year and match more directly with their business planning. The single point of contact at the ODEQ adjusts Epson's data from the fiscal year to the calendar year for reporting to EPA and state databases.

The second change revises the dates for three regulatory reports: the stormwater permit requirements, hazardous waste report, and the state Toxics Use and Hazardous Waste Reduction. These reports are now due at the same time when the annual GEMS performance report is submitted on May 1 each year.

The third changes revises the monthly reporting requirements for the discharge of non-contact cooling water to an annual summary report. Monthly monitoring is still required, but the results are reported once annually in the GEMS report.

The fourth change to reporting requires Epson to update their EMS performance indices quarterly and post the results on their external web site.

Single Point of Contact

Like other facilities, Epson believes the single point of contact has provided a significant benefit to the company. Epson believed this has worked extremely well, especially when difficult issues have arisen in different programs within the agency.

Document Control

Epson believes that the Green Permit and EMS improves their internal document control. There is a clearer connection between their regulatory requirements and the internal data and documentation needed to show compliance. Epson auditors find the new documentation easy to follow.

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Oregon Green Environmental Management System Permit Case Study:

LOUISIANA PACIFIC ENGINEERED WOOD PRODUCTS FACILITY
Hines, Oregon

Background on Oregon's Green Environmental Management System Permit Program

The Oregon Green Permits Program is a voluntary, incentive-based program that rewards facilities that go beyond compliance and achieve superior environmental performance. The 1997 Oregon Legislature authorized the Oregon Department of Environmental Quality (ODEQ) to issue Green Permits that may waive regulatory requirements and provide other benefits for facilities within this "performance track". ODEQ has signed a Memorandum of Agreement with USEPA and the Lane Regional Air Pollution Authority that describes how the program will be implemented under the principles of the "Joint EPA/State Agreement to Pursue Regulatory Innovation".

A Green Permit modifies regulatory requirements after a facility has demonstrated that it can meet certain requirements. Rules adopted in 1999 require a facility to: (1) demonstrate that it has achieved or will achieve environmental performance that is significantly better than otherwise required by law, (2) develop a public performance report at least once/year, and (3) plan and implement a program for ongoing communication with interested stakeholders to provide input into the facility's environmental program. A "tiered" approach offers different types of Green Permits, in which increasing performance receives increasing benefits.

"Green Environmental Management System Permits", or GEMS Permits, require the implementation of a formal environmental management system to achieve results. Three types of GEMS permits may be issued--ranging from the entry-level Participant permit to the highest level Leader permit--to allow a wide range of participants in the program. Benefits include public recognition; enforcement discretion that focuses on the environmental management system to continually improve performance; technical assistance as requested by the facility; and regulatory modifications or efficiencies through consolidated reporting, flexible permits, and other waivers requested by the

facility. The GEMS Leader Permit rewards demonstrated leadership in applying sustainable development principles to the environmental life cycle aspects of a facility's activities, products and services.

Facility Description

The Louisiana Pacific Corporation uses softwood veneer to produce laminated veneer lumber and I-joists. Louisiana Pacific (now known as LP Corporation) has owned and operated the site since March of 1997, when it acquired the site from Techton Laminates, Inc. Since that time, LP has significantly expanded operations at the site.

LP Corporation received one of the first GEMS permits issued by the Oregon Department of Environmental Quality in December 2000. The permit is effective for ten years, expiring in December of 2010. LP has submitted two annual reports, covering calendar years 2000 and 2001, documenting their environmental accomplishments operating under the conditions in the GEMS permit. LP Corporation was also one of four original pilot facilities participating in the Environmental Management Systems Incentives Program (EMSIP). Following the passage of the Green Permit legislation in 1997, DEQ used EMSIP to test some of the concepts for the program before the rules were developed to implement the program.

Accomplishments for Acceptance in the Green Permits Program

Louisiana Pacific (LP) submitted the second Green Permit application in December of 1999. The company requested to be accepted as a GEMS Achiever (Tier II) facility. To be approved as a GEMS achiever, LP had to show that their past environmental accomplishments and future plans for additional reductions met criteria established in Oregon's rules. Many of these criteria deal with the effectiveness of the facility's Environmental Management System (EMS).

EMS Certification/Verification

Information in LP's application documented details of the company's EMS. LP initiated the EMS at the corporate level, and the Hines, Oregon site was the first facility to initiate an EMS within the LP Corporation. The EMS was already underway before the company expressed interest in the Green Permits Program. However, the EMS was not ISO 14000 certified at the time the application was submitted. Oregon DEQ staff worked closely with LP staff in documenting specific EMS standards and procedures using the DEQ verification process and determined that the EMS supported verification. Highlights of the LP EMS as described in the permit application include:

- The EMS program involves every aspect of business management and production. Teams representing various segments of LP's organizational structure form a communication and support network to help LP guide the progress of the EMS at each of our facilities.

- At the plant level, the Plant Sponsor and EMS Core teams work to implement the EMS by writing Standard Operating Procedures (SOPs), organizing employee and management

training, and establishing inspection and process change programs. The goal at each facility is to integrate compliance with identified environmental objectives into the daily work of every employee to ensure that all individuals take personal responsibility for their actions.

- Each employee receives training in the EMS 26-Step Process, a standardized means of program execution. Employees are also acquainted with programs de-signed to facilitate the rapid implementation of changes in the workplace. As training continues, the next and most essential step is to generate Standard Operating Procedures (SOPs) that outline how individual job tasks will be carried out. Working with environmental professionals, the EMS core team develops SOPs by incorporating permits, regulations, LP standard practices and other job-specific criteria. The success of the program lies in matching personnel with job-specific training and safety requirements to carry out individual SOP responsibilities.

- A comprehensive self-inspection program is executed to evaluate its effectiveness. SOPs are regularly updated and the overall EMS program is continuously improved. Continuous improvement includes an ongoing process, typically through the plant EMS core team, for identifying new environmental objectives and developing SOPs to accomplish those goals.

Environmental Performance Measurement

The Green Permit applicant must also document baseline performance information for past environmental accomplishments and provide information on environmental programs for future reductions. Specific performance measures must be identified with a "baseline performance report."

Table 1 below summarizes information from LP's permit application addressing past environmental performance and proposed future reductions for their significant environmental impacts. It should be emphasized that LP acquired the site in 1997. The new LP staff did not believe that accurate records were available to directly quantify past reductions. The EMS process was used to establish accurate baseline records and put in place future data tracking methods to accurately record data so future progress can be documented.

Table 1: Summary of Significant Environmental Impacts for LP

Significant Environmental Impact	Baseline (1998)	Units	Regulatory Limit	Past Reduction	Future Reduction
Total Air Emissions	64,600	lbs	631,200 pounds	Previous Ownership	- Replace open top cyclones with high efficiency baghouses - replace burning wood waste with natural gas in on-site boilers
	0.098	lb./ton product		Previous Ownership	- Replace open top cyclones with high efficiency baghouses - wood to gas
Solid Waste	15,675	tons		Previous Ownership	25%
	0.02	ton/ton product		Previous Ownership	25%

Along with the quantitative data on baseline performance, the LP application documented the following qualitative reductions and changes to reduce wastes and emissions:

- The removal and cleanup of a "boneyard" (a location on the property where industrial waste was stored).
- The installation of an effluent neutralization system to improve the quality of the boiler blowdown.
- The maintenance of the "undeveloped" portion of property to be used for wildlife habitat.
- The boiler conversion plans that would burn LPG fuel in place of wood waste.
- The replacement of open topped cyclones with primary filters to reduce particulate matter (PM) emissions by 80% on a throughput basis.
- The review of all materials prior to purchase to ensure LP does not generate more hazardous waste.
- The replacement of air compressor systems that lower the water use.
- Collection and treatment of parking lot runoff.
- Environmental education for all employees.
- The installation of a used oil-burning heater that eliminates disposal of used oil and heats the maintenance shop.
- Implementation of a container tracking system.
- Implementation of an emission inventory tracking system.
- The tracking and review of any environmental issues.

Summary of Regulatory Requirements

The LP, Hines facility is covered by regulatory requirements for air, water and hazardous waste. Table 2 below summarizes LP's regulatory requirements.

Table 2: Summary of Regulatory Requirements for LP

Area	Status	
RCRA	Conditionally Exempt Generator	ORD987177086
Air	Synthetic Minor	13-0016
Water	Boiler blow down	500-J
	Storm water	1200-Z
Hazardous Substance	Tier II for 22 substances	
Spill	SPCC 17,000 gallons of petroleum products	
Cleanup	ODEQ Voluntary Cleanup Program	

The ambient environmental conditions at the site meet all existing requirements. The Burns-Hines airshed currently meets all National Ambient Air Quality Standards. The Malhuer Lake Basin and Silvies Sub Basin Watersheds are not impaired and are not identified on the most recent 303(d) list of water quality limited water bodies.

Environmental Performance Achievements Through the Green Permit Program

Each facility receiving a GEMS permit must document environmental performance through annual performance reports. The LP facility has submitted two performance reports documenting their accomplishments for the years 2000 and 2001. Information from the annual reports can be combined with information from the permit application

and the Green Permits review report prepared along with the permit to create a complete picture of environmental achievements over the course of the Green Permit program.

Objectives, Targets and Accomplishments

LP develops new objectives and targets each year through the EMS process. The new targets are based on the continuous evaluation of environmental impacts and the development of new priorities each year. Table 3 below summarizes information on LP's objectives, targets and accomplishments over the life of the Green Permits program.

Table 3: Summary of EMS Objectives, Targets and Accomplishments
(New target areas in bold)

Objectives	Targets	Accomplishments
2000		
Reduce particulate emissions from boiler fuel silos		Installed smaller grates over silo vents
Remove contaminated soil		Removed 1,600 tons
Reduce particulate emissions from cyclones	50%	Installed baghouse filters. Achieved 80% reduction
Improve community relations		Formed a 14 Member Community Advisory Committee
Reduce landfill items.		Recycling of Wood-wrap and metal shavings
2001		
Improve community relations	Four CAC Meetings	Held four meetings. Achieved target
Contribute to the community and the local environment	Two activities	Exceeded target
Reduce waste to landfills on a production basis	10% reduction	Reduced waste 5,219 tons. Exceeded reduction.
Reduce annual water consumption on a production basis	10% reduction	Installed gasket on non-contact cooling water pump from press to fire suppression pond. Was continuous 24 hrs/day. No meter installed, so it is unclear if target was met.
Reduce fugitive emissions from truck bins	No sawdust on the ground	Replaced truck bin with new system containing a baghouse.
Move EMS toward ISO 14001 conformance	Two EMS audits	Not currently pursuing ISO certification
Reduce Spill potential from bulk off-loading areas	No spills	Developed SOPs. No spills occurred.

Objectives	Targets	Accomplishments
Reduce Opacity exceedances from the boiler	50% reduction	Developed SOPs for boiler startup/shutdown. No incidents reported. Achieved target.
Reduce Electricity usage on a production basis	10% reduction	Plans developed to not start equipment earlier than necessary. Stopped using 40 lights. Probably did not meet 10%
2002		
Improve community relations	Four CAC Meetings	
Contribute to the community and the local environment	Two activities	
Reduce Disposal to Landfill	5% reduction per employee hour	
Design and implement water project	Implement one project by 12/01/02	
Implement Waste Minimization Project	One project to be implemented	
Environmental Training to build employee awareness and knowledge	Four hours of employee training per employee/year	

Environmental Performance Metrics

LP uses environmental performance metrics to track their overall performance. Table 4 below summarizes performance metrics for the significant environmental impacts. It is difficult to provide a consistent picture of performance through time because the performance metrics have changed each year. One set of metrics were used in the permit application, and different metrics were used in the two annual reports. Air emissions of total criteria pollutants is the only metric with consistent reporting over time. Air emissions have almost doubled at the site from 1998 to 2001.

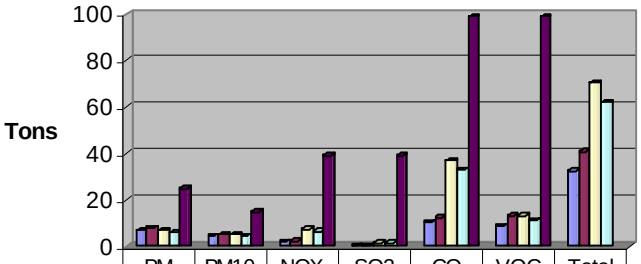
Table 4: Summary of Environmental Performance Metrics

Significant Environmental Impact	Baseline from Application (1998)	Units	First Annual Report (2000)	Units	Second Annual Report (2001)	Units
Air Emissions (Total Criteria)	64,600	pounds	140,920	pounds	123,980	pounds
Air Emissions (Total Criteria)	0.098	pound/ton product				
Solid Waste	15,675	tons				
Solid Waste	0.02	ton/ton product				
Electrical consumption			225	KWH/ton product		
Raw Material Conversion			2,288	Pound/PoundProduct		
Water Use			355	Gallons/Ton Product		
Waste recycling			345	pound/ ton Product		
Landfilled waste			69	pound/ ton Product	3,750	Tons

Regulatory Environmental Data

In addition to the performance metrics that track progress toward EMS targets, LP also provides regulatory data in the annual environmental performance reports. The Hines facility has two surface water permits and one air permit. Each annual regulatory report summarizes data documenting compliance with these permits. Figure 1 below summarizes compliance data for criteria air pollutants. LP has remained well below their permitted levels, staying below 40% of permit requirements for all pollutants. However actual emission have increased by 90% between 1998 and 2001.

Figure 1: Criteria Air Pollutants



	PM	PM10	NOX	SO2	CO	VOC	Total
1998	6.82	4.38	2.02	0.18	10.29	8.64	32.3
1999	7.78	5.06	2.35	0.21	12.14	13.23	40.77
2000	6.74	4.95	7.27	1.3	36.95	13.25	70.46
2001	5.89	4.37	6.44	1.2	32.89	11.2	61.99
PERMIT LIMIT	24.8	14.8	39	39	99	99	

Tables 5 and 6, below summarize compliance data submitted by LP for their boiler blowdown and storm water discharges to surface water. No noncompliance has been reported.

Table 5: Summary of Surface Water Data (Boiler blowdown)

PERMIT Limits	pH 6.0 - 9.0	TSS 50 mg/l	Temp 100 Degrees F	Flow 40 gpm
Time period				
Jan-00	7.79	5	78.4	24
Feb-00	8.29	ND	78.2	23
Mar-00	8.33	ND	76.5	18
Apr-00	7.75	ND	72.6	24
May-00	Down	Down	Down	Down
Jun-00	8.79	ND	71.1	28

Jul-00	8.6	9	96.4	24
Aug-00	7.85	3	83.6	13
Sep-00	7.72	ND	71.8	33
Oct-00	8.36	ND	79.4	8
Nov-00	8.06	ND	74.3	14
Dec-00	7.78	3	83.2	0
Jan-01	8.09	ND	70	20
Feb-01	7.8	10	78.5	1
Mar-01	7.74	6	78.3	28
Apr-01	8.02	ND	88.2	25
May-01	7.53	8	84.8	1
Jun-01	7.56	13	89.1	28
Jul-01	7.46	5	85.5	15
Aug-01	8.5	5	86.9	21
Sep-01	7.37	ND	95.9	20
Oct-01	7.45	ND	87.3	24
Nov-01	7.97	ND	87.3	0
Dec-01	7.5	6	81.7	24

Table 6: Summary of Storm Water Sample Results

	Copper	**Lead**	**Zinc**	**pH**	**TSS**	**Oil/Grease**	**Floating Solids**	**Oil/Grease Sheen**
Benchmarks	**0.1 mg/l**	**0.4 mg/l**	**0.6 mg/l**	**5.5 - 9.0**	**130 mg/l**	**10**	**None**	
Time period								
10/28/1999	0	0	0.000017	7.28	9	5	None	None
5/8/2000	0	0	0	7.48	0	0	None	None
2/20/2002	0	0	0.000014	7.84	6	0		

Other Benefits of the Program

Improved Communication

A key benefit of the program cited by LP and DEQ staff is improved communication. Communication has improved between agency staff and LP. Also, the stakeholder process has resulted in improved communication with local citizens within the community as well. Within the agency, LP has a single point of contact that is familiar with the details of their operations as well as their management approaches for environmental improvement. The single point of contact acts as a "clearinghouse" for the range of questions that can arise on the environmental requirements LP faces. While

it is not possible to quantify the benefit of improved communication and relationships, it is an important factor to highlight, as all those involved in the process believe communication has improved under the Green Permit program.

Recognition

Receiving a Green Permit provides the added benefit of being recognized as a top environmental performer. LP is allowed to use the Green Permit identify, providing positive public relations benefits for company generally. LP has also used the positive recognition and Green Permit identity in developing a Green Permit label for one of the products produced at the site.

Consolidated Reporting

Annual reports submitted by the company document achievements toward EMS objectives and targets and include regulatory reports covering compliance reporting for all of LP's permits. This allows LP to develop and submit their reports all at the same time. Rather than submitting reports on differing regulatory schedules, LP can consolidate their reports into one submission. While the substantive reporting requirements are not altered, the change in reporting dates improves coordination in the data development and reporting process. Also, having all data provided in a single report allows other stakeholders easy access to the complete range of environmental impacts from the facility.

Changes to Air Permitting Requirements

The Green Permit incorporates three important changes to LP's air permit requirements. First, the permit lifetime was extended from 5 years to 10 years. The increased time horizon provides added certainty for consistent operation over time. The second change provides flexibility for making certain process changes without receiving preapproval from ODEQ. LP is able to modify equipment if the change does not increase emissions above the Plant Site Emission Level (PSEL) and other conditions are met. The third change provides expedited review for plant changes that do not meet the flexibility criteria where the ODEQ must review and modify LP's permit, before any changes are made. ODEQ is committed to issue permits within 90 days. LP has not used the pre-approved changes flexibility or expedited permit review; however, LP believes these conditions give their facility an advantage when business decisions are made in the future.

Enforcement Discretion

The Green Permit incorporates increased enforcement discretion for noncompliance if it is needed. The ODEQ will encourage using the environmental management system to correct instances of potential noncompliance and will use maximum enforcement discretion for noncompliance discovered by LP or ODEQ. While it is hoped that such discretion is not needed over the life of the Green Permit, the use of discretion provides added certainty for correcting deficiencies if they are found.

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Oregon Green Environmental Management System Permit Case Study:

LSI LOGIC
Gresham, Oregon

Background on Oregon's Green Environmental Management System Permit Program

The Oregon Green Permits Program is a voluntary, incentive-based program that rewards facilities that go beyond compliance and achieve superior environmental performance. The 1997 Oregon Legislature authorized the Oregon Department of Environmental Quality (ODEQ) to issue Green Permits that may waive regulatory requirements and provide other benefits for facilities within this "performance track". ODEQ has signed a Memorandum of Agreement with USEPA and the Lane Regional Air Pollution Authority that describes how the program will be implemented under the principles of the "Joint EPA/State Agreement to Pursue Regulatory Innovation".

A Green Permit modifies regulatory requirements after a facility has demonstrated that it can meet certain requirements. Rules adopted in 1999 require a facility to: (1) demonstrate that it has achieved or will achieve environmental performance that is significantly better than otherwise required by law, (2) develop a public performance report at least once/year, and (3) plan and implement a program for ongoing communication with interested stakeholders to provide input into the facility's environmental program. A "tiered" approach offers different types of Green Permits, in which increasing performance receives increasing benefits.

"Green Environmental Management System Permits", or GEMS Permits, require the implementation of a formal environmental management system to achieve results. Three types of GEMS permits may be issued--ranging from the entry-level Participant permit to the highest level Leader permit--to allow a wide range of participants in the program. Benefits include public recognition; enforcement discretion that focuses on the environmental management system to continually improve performance; technical assistance as requested by the facility; and regulatory modifications or efficiencies through consolidated reporting, flexible permits, and other waivers requested by the

facility. The GEMS Leader Permit rewards demonstrated leadership in applying sustainable development principles to the environmental life cycle aspects of a facility's activities, products and services.

Facility Description

LSI Logic is a semiconductor manufacturing facility located Gresham, Oregon. It is a new facility constructed in 1996 and 1997with full production beginning in the fall of 1998. LSI produces custom, high performance application specific integrated circuits (ASIC's) for use in communications, consumer, and storage applications. So far, LSI has invested more than $1 billion at its Gresham manufacturing campus and employs approximately 900 operators, technicians, engineers and administrators.

LSI received one of the first GEMS permits issued by the Oregon Department of Environmental Quality in December 2000. The permit is effective for ten years, expiring in December of 2010. LSI has submitted two annual reports, covering calendar years 2000 and 2001, documenting their environmental accomplishments operating under the conditions in the GEMS permit. LSI was also one of four original pilot facilities participating in the Environmental Management Systems Incentives Program (EMSIP). Following the passage of the Green Permit legislation in 1997, DEQ used EMSIP to test some of the concepts for the program before the rules were developed to implement the program.

Accomplishments for Acceptance in the Green Permits Program

LSI submitted the first Green Environmental Management System Permit (GEMS) application to the Oregon Department of Environmental Quality in November 1999. In the application, LSI requested to receive a GEMS Achiever (Tier II) permit. To be approved as a GEMS Achiever, LSI had to show that their past environmental accomplishments and future plans for additional reductions met criteria established in Oregon's rules. Many of these criteria deal with the effectiveness the facility's Environmental Management System (EMS).

EMS Certification/Verification

LSI's application provided detailed information on the standards and procedures used in implementing LSI's EMS. At the time the application was submitted, LSI's EMS was not yet certified. LSI planned to conduct an audit within 6 to 12 months. During the application review process, LSI worked with DEQ staff following the EMS verification process established by DEQ. Through this review DEQ determined that the EMS was comparable to the ISO 14001 standard. Highlights of the EMS include:

- The environmental management system is designated as one of the company goals for the facility

- The EMS establishes a corporate-wide Performance Development System (PDS) which links individual performance directly to strategic, organization, and functional business goals.
- A Quality Improvement System (QIS) was established in 1992 and provides a formalized structure and systematic process for individuals and groups to identify and eliminate defects.
- All employees are required to complete QIS training and participate in a Cycle of Quality (COQ). Environmental Improvement can either be a focus of a COQ, or an indirect benefit of an improvement in another area.
- An Environmental Impact Evaluation Form is used to capture the environmental benefit of a COQ.
- The targets developed to meet objectives are specific environmental improvement activities that are established annually. Each year LSI also conducts evaluations of potential new environmental improvement projects that could be selected for implementation the following year(s).

Environmental Performance Measurement

The Green Permit applicant must also document baseline performance information for past environmental accomplishments and provide information on environmental programs for future reductions. Specific performance measures must be identified with a "baseline performance report"

Table 1 below summarizes information from LSI's Green Permit application and Green Permit review report, addressing past environmental performance and proposed future reductions for their significant environmental impacts. LSI documented past reductions, but did not provide baseline data for significant impacts.

Table 1: Summary of Significant Environmental Impacts

Significant Environmental Impact	Past Reduction	Units	Future Reduction
Chemical use	12,000	Gallons	
Spent Chemical Recycling	25,000	Gallons	
Water Use	10,000,000	Gallons	80% possible
Energy Use Reduction	4,462,000	KWH	
Total Solid Waste	4,400	Lbs	

LSI also documented some of the specific projects implemented to achieve these reductions. Table 2 below summarizes these projects and past reductions.

Table 2: Summary of Past Reduction Projects

Significant Environmental Impact	Project Description	Reductions
Chemical use	Chemical baths in the wet bench wafer cleaning process were diluted with water to reduce the quantity and toxicity of chemicals (ammonium hydroxide, hydrogen peroxide, and hydrochloric acid) used for cleaning,	7,000 gallons per yr
	change from a tungsten-based slurry process to a peroxide-based process	4,000-gallon per yr.
	Installed new chemical and mechanical polishing tools to reduce DI water use	1,300 gallons per week
Water Use	Installed an Ultra Pure Water (UPW) system with advanced reverse osmosis (RO) technology.	90%
	Installed a UPW reclaim loop on the wet benches and polishers in the fabrication process	100,000 gallons per day
	Installed level controls on the condenser tanks used in the ultra pure water purification process	80% 10,000,000 gal/yr
	Installed new chemical and mechanical polishing tools to reduce DI water use (Same Project as chemical use)	650,000 gallons per week
	constructed a 6-acre storm water detention pond to reduce the peak storm water runoff from the site to a level lower and a water quality pond was constructed to enhance sedimentation and facilitate biodegredation of contaminated storm water	65% of total suspended solids
Total Solid Waste	LSI purchased recycled paper and envelopes, laser printer cartridges, cafeteria “to-go” containers, file folders, and bathroom supplies.	
	Implemented a corporate-wide Systems, Applications, and Products in Data Processing (SAP) software to integrate business information management.	estimated 1,200 pounds per year
	found an on-going alternative use for approximately 70 empty plastic slurry totes and metal drums generated annually that would otherwise be disposed as a solid waste	3,200 pounds per yr
Energy Use Reduction	As a member of the "Green Lights" program energy conservation measures have been incorporated into the building design and operation. By switching to more energy efficient lighting such as motion detectors and low-energy “T-8” fluorescent bulbs	30 % per year
	Replaced evaporator , used to reduce the volume of ammonium sulfate solution generated as a by-product of LSI’s ammonia treatment with a more efficient model	75%
Spent Chemical Recycling	Separate piping and tank collection systems were installed for selected spent chemicals.	
	LSI located and audited multiple prospective purchasers of its spent chemicals. The materials sold to other users included isopropyl alcohol, phosphoric acid, and sulfuric acid.	

Summary of Regulatory Requirements

The LSI facility is covered by regulatory requirements for air, water and hazardous waste. Table 2 below summarizes LSI's regulatory requirements.

Table 3: Summary of Regulatory Requirements

Area	Permit Type	Number
Water	Storm Water Discharge 1200-Z	File No 109799
	Industrial Wastewater Discharge City of Gresham	332
Air	Air Contaminant Discharge	26-0027
Hazardous Waste	Hazardous Waste Generator (Large Quantity Generator)	ORQ000004382

The ambient environmental conditions at the site do not meet all existing requirements. The Portland Vancouver Air Quality Maintenance Area is currently designated a maintenance area for carbon monoxide and ozone. The Columbia Slough Watershed is water quality limited for Chlorophyll a (spring through fall), dissolved oxygen (annual), pH (spring through fall), phosphorus (spring through fall) and DDT, DDE, PCBs, Dieldren, lead and bacteria (spring through fall and summer).

Environmental Performance Achievements Through Green Permit

Each facility receiving a GEMS permit must document environmental performance through annual performance reports. The LSI facility has submitted two performance reports documenting their accomplishments for the years 2000 and 2001. Information from the annual reports can be combined with information from the permit application and the Green Permits review report prepared along with the permit to create a complete picture of environmental achievements over the course of the Green Permit program.

Objectives, Targets and Accomplishments

LSI established five objectives in its EMS. LSI does not develop future numeric targets to be achieved during the next year. Instead, each year LSI develops targets in the form of specific environmental improvement projects identifying reduction opportunities. Table 4 below summarizes projects and reductions.

Table 4: Summary of EMS Objectives, Targets and Accomplishments

Objectives	Targets	Accomplishments
2000--13 Projects		
Chemical Reduction/pollution prevention	Installed separate piping and storage systems for IPA, sulfuric acid, and phosphoric acid. Chemicals were sold for reuse	
	Recycled spent chemicals on-site	72,000 gallons/yr
	Replaced sulfuric acid and ozone with deionized water rinse in resist strip process	3,600 gallons/yr
	Eliminated use of solvent mixture (EKC265) in the post etch polymer strip process	4,000 gallons/yr
	Replaced Buffered Oxide Etch (BOE) step, which used hydrofluoric acid and ammonium fluoride, with an inert Argon etch step	5,475 gallons/yr
	Reduced cleaning frequency on Susceptor sources	24,300 gallons/yr
Water Conservation	Pilot tested two waste water reclamation technologies	
	Installed timing washers on bathroom faucets	165,000 gallons/yr
	Reduced cleaning frequency on Susceptor sources	125,000 gallons/yr
Solid Waste Reduction	Began selling filter cake from HF and CMD WWTP to Portland cement manufacturer, instead of landfilling	446,840 pounds/yr
	Prevent scrapping 8-inch silicon wafers	3,000 wafers/yr
	Began wood waste inspection program to more closely identify wood with metal and styrofoam	40,000 pounds/yr
	Began recycling all plastic films and hard plastics	
	Donated used computers	22 computers 32 monitors 2 laptops
	Electronic time sheets instead of paper	800 pounds
Energy Conservation	Developed and submitted Climate Wise action plan	
	Installed motion sensor lights in 30 rooms	4,750 kw-hours/yr
Transportation and Trip Reduction	Initiated Alternative Transportation Involvement Plan	150 employees 125,000 trip miles 742 pounds/yr HC 6,165 pounds/yr CO 465 pounds/yr Nox
	Bicycle commute challenge	14 employees 200 trips
2001--15 Projects		
Chemical Reduction/pollution prevention	qualified local companies to purchase the spent chemicals that had been previously sent to southern California for reuse, and in the case of the sulfuric acid, to Shreveport, Louisiana for reprocessing. An alum manufacturer in the Greater Portland area qualified the spent acid to use in their process, and a local paint manufacturer is now purchasing the spent IPA. This reduces risk and emissions associated with long distance transportation.	
	recycled spent chemicals	65,000 gallons
	process qualifications were significantly reduced in 2001. Instead of using two lots of wafers for reliability data, the process was consolidated into one lot.	2,200 gallons

Objectives	Targets	Accomplishments
	converted the G11 technology to a dry process for etch cleaning, and converted the G12 technology to dry processing in 2002. Dry processing uses ozone to replace hydrofluoric acid and sulfuric acid, and eliminates the DI water required for rinsing.	2,000 gallons HF consumption
	Reduction of cleaning requirements in clean rooms	2,600 gallons IPA, 9%.
	eliminated dual mercury lamps in the DNS 200W track system.	25 pounds
Water Conservation	a dry clean for the G11 and G12 technologies, as described above	8,500,000 gallons
	Reduce process qualifications, as described above	25,400 gallons
	Following the pilot tests in 2000, initiated the design of a wastewater reclaim system that would allow us to reuse 80-85 percent of our wastewater in the front of the ultra-pure water (UPW) system. System will utilize a fluidized bed bioreactor as the primary technology to remove the contaminants of concern Anticipated completion date is December 2003	
	installed a sophisticated irrigation system that uses temperature and humidity monitors to evaluate the lawn water requirements	800,000 gallons
Solid Waste Reduction	Recycled consumable office products recycled,	207 tons of solid waste
	switched from disposable shoe covers to reusable ones	16,000 pounds
	training material was consolidated in electronic format and printed material is reused.	4,000 pounds
	eliminated paper disposable cups	9,000 pounds
	Through the Students Recycling Used Technology (STRUT) program, LSI Logic donated used PCs and components to Gresham area schools. In 2001, we donated 59 computer systems, 8 printers, 78 monitors, and two fax machines to the STRUT program	
Energy Conservation	provided employees and contractors over 5,000 compact fluorescent light (CFL) bulb coupons for personal use	
	elimination of the air showers in the fab, a result of the protocol reduction	64,000 w-hr/yr
	To optimize the energy consumption of the fab, in 2001 LSI Logic powered down two ballroom supply fans	48,000 kW-hr/yr
Transportation and Trip Reduction	expanded its employee shuttle service between the site and the Gresham Transit Center and also to Portland International Airport.	
	continued supporting the Alternative Transportation Involvement Program (ATIP), which rewards LSI employees and resident contractors that use alternative transportation during their daily travel to and from Campus.	230,000 trip miles 1,363 pounds HC 11,314 pounds CO 854 pounds NOx

Table 5: Summary of Project Accomplishments

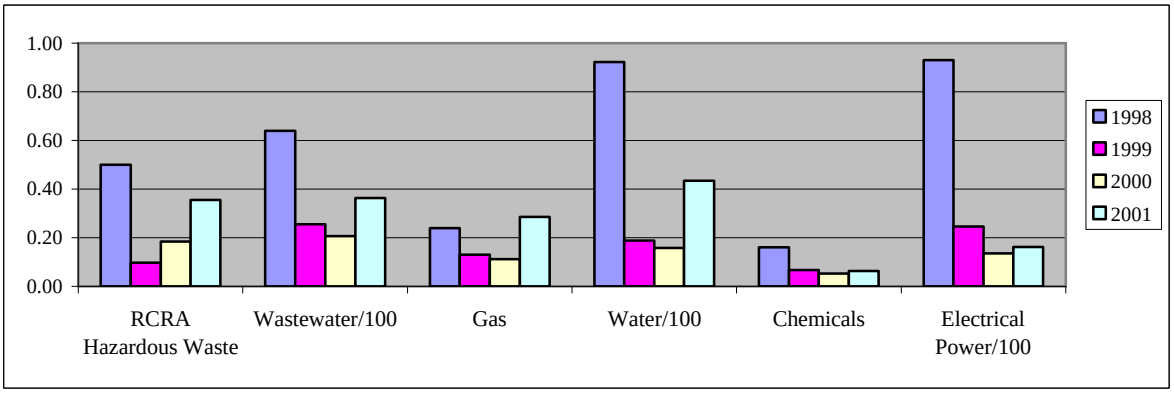
Objective		1998 Reduction	1999 Reduction	2000 Reduction	2001 Reduction
Chemical Reduction/pollution prevention	Gallons of Chemical Reduction	12,000	25,000	37,375	6,800
	Gallons of Spent Chemicals Recycled	25,000	51,300	72,000	65,000
Water Conservation	Gallons of Water Saved	10,000,000		375,000	9,300,000
Energy Conservation	Kw of Energy Saved	4,462,000	627,000	45,750	112,000
Solid Waste Reduction	Pounds of Solid Waste Reduced	4,400	5,575	448,000	29,000
	Pounds of Solid Waste Recycled		9,600	10,800	
Transportation and Trip Reduction	Miles Avoided			100,000	230,000

Environmental Performance Metrics

LSI has also developed a set of 6 environmental performance metrics to track annual progress. These metrics, which are in addition to the project-by-project reduction information, are designed to capture a more complete picture of the site's total environmental performance. These metrics are normalized to account for changes in production. Normalizing for production is important for a facility where production can fluctuate dramatically from year to year, such as for the electronics industry. The units for wastes and releases are pounds per unit of product produced. Figure 1 below summarizes LSI's environmental performance metrics from 1998 to 2001. Overall, all metrics, except natural gas, show reductions from 1998 baseline year to 2001. However, 2001 levels show increases when compared to the levels reported in 2000. LSI attributes these increases to the fact that production levels were lower in 2001 compared to 2000. While this may explain some of the discrepancy, the goal of production-normalized metrics is to account for such changes so the performance measure is not impacted by production levels from year to year. It's possible that there is not a direct relationship between the production measure used for normalization and the environmental impact quantities. LSI and ODEQ may want to do a more detailed review of the normalization factors to ensure they accurately account for changes in production.

Performance Metric	Reduction from Baseline
HW	28.00%
Chemical Use	62.71%
Waste Water	43.75%
Water	53.36%

Figure 1: Summary of LSI's Environmental Performance Metrics



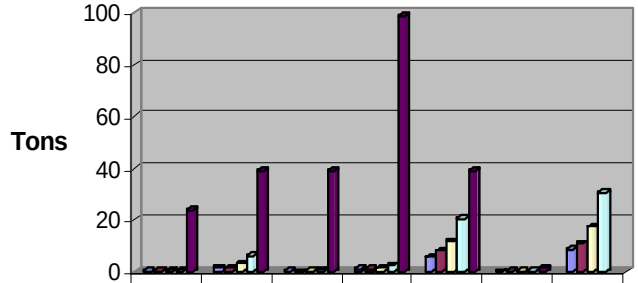
Regulatory Environmental Data

In addition to the performance metrics, LSI also provides combined regulatory data in their annual environmental performance reports. Data in these regulatory reports are not normalized to account for changes in production and provide a useful comparison to the normalized environmental performance metrics. LSI reports regulatory data for criteria air pollutants and hazardous waste.

Figure 2 below summarizes LSI's data for criteria air pollutants. These data show that LSI has remained well below their permit limits. However, emissions have steadily increased and LSI is now within 60% of their permitted limits for VOC. The upward trend is likely due to significant increases in production compared to baseline levels.

It is interesting to note that regulated air emissions are not considered a significant environmental impact in LSI's EMS and there is no corresponding environmental performance metric tracking the progress of regulated air releases. It would be useful to have a performance measure normalized to production to determine the trends in emission of criteria air pollutants. For example, the absolute VOC emissions almost doubled between 2000 and 2001, a period that LSI indicated production decreased. It would be useful to know if a normalized metric was also increasing. Another doubling of VOC emissions would increase LSI's emissions above their current VOC cap and it may be critical to gain a better understanding of the cause of VOC increases if LSI expands operations at this location.

Figure 2: Criteria Air Pollutants



	PM	NOX	SO2	CO	VOC	HF	Total
1998	0.3	1.66	0.13	1.16	5.49	0.04	8.78
1999	0.29	1.31	0.04	0.97	8.23	0.13	10.97
2000	0.42	2.98	0.29	1.51	11.82	0.3	17.32
2001	0.49	6.31	0.83	2.38	20.48	0.27	30.76
Permit Limits	24	39	39	99	39	1.5	

Table 6 below summarizes hazardous waste generation data for LSI. Like the criteria air pollutant data, hazardous waste is not indexed to production and the data represent the absolute quantity of waste generated each year. LSI has eliminated several waste streams that formerly generated different acids (hydrochloric, hydrofluoric, and phosphoric acids). Overall, hazardous waste generation has increased. Increases are mainly from isopropyl alcohol waste generated in new wet benches. LSI reported that these new tools use a continuous flow through design and generate large quantities of isopropyl alcohol contaminated deionized water. While the waste stream is 95% water, it contains enough alcohol to create a flash point of less than 140 degrees F. Like the criteria air pollutant data, increases are likely due to increased production. Increases from these sources have outpaced decreases at those sources LSI has been able to eliminate.

Hazardous waste generation is a significant impact in the EMS and LSI tracks hazardous waste trends using production-normalized performance metrics. It is useful to compare the absolute regulatory data to these normalized performance metric. This comparison shows that both the normalized and absolute measures have increased between 2000 and 2001, a period with decreased production. Such increases indicate that LSI may want to take a closer look at the factors used for normalizing. It appears there may not be a direct relationship between these factors and waste generation.

Table 6: Summary of Hazardous Waste Data (kilogram/yr)

Waste	1998	1999	2000	2001	%Change
Isopropyl Alcohol	37,357	72,616	282,785	771,144	1964.3%
Ammonium sulfate /sulfuric acid	50,496	61,720	291,592	299,485	493.1%
Spent photoresist/EBR	4,428	8,707	22,494	47,549	973.8%
Solvent contaminated debris	1,927	1,971	3,105	3,891	101.9%
Arsenic contaminated debris	272	413	593	1,443	430.4%
Ekc 265 wipes	786	408	612	1,351	71.9%
Various lab packs	1,205	1,192	99	325	-73.0%
Ammonia concentration vials	34	11		51	49.4%
Amine based paint		227			-100.00%
Hydrochloric acid	18,078	10,546	10,171		-100.00%
Hydrofluoric acid	15,958	17,741	16,085		-100.00%
Hydrogen peroxide	74,808	88,640	97,830		-100.00%
Nitric acid	2,848	2,600	2,277		-100.00%
Paint related material		227			-100.00%
Phosphoric acid	18,855	33,008			-100.00%
Spent trimclear,			10		-100.00%
Sulfuric acid	75,392	93,082			-100.00%
TOTAL	**302,444**	**392,882**	**727,643**	**1,125,239**	**272.0%**

Other Benefits of the Program

Positive Relationship with DEQ

LSI believes that the intangible benefit of developing a positive relationship with DEQ is a benefit of the Green Permits program. Working in more cooperative relationship with DEQ Green Permit staff acting as an advocate for LSI provides real benefits to the company.

Regulatory Efficiencies

The Green Permit Program includes several conditions that are benefits in themselves including a Single Point of Contact, expedited permitting and consolidated reporting. But LSI feels that the biggest benefit collectively from these conditions is improved efficiency. LSI believes that these provisions save time and money over the long run in conducting the tasks needed to ensure compliance with all their regulatory requirements.

LSI believes that the current consolidated reporting in the Green Permit represents a step in the right direction. But in the long run a more substantive consolidation of reporting-- perhaps leading to a single combined report meeting all requirements-- would provide additional benefits.

Enforcement Discretion
The Green Permit incorporates increased enforcement discretion for noncompliance if it is needed. The ODEQ will encourage using the environmental management system to correct instances of potential noncompliance and will use maximum enforcement discretion for noncompliance discovered by LSI or ODEQ. While LSI has not needed this flexibility and it is hoped that such discretion is not needed over the life of the Green Permit, the use of discretion provides added certainty for correcting deficiencies if they are found.

Regulatory Flexibility
LSI pursued regulatory flexibility for a specific hazardous waste requirement through the Green Permits program. The federal RCRA rules establish air emission standards for solvent waste tanks and associated equipment, including monitoring, inspection, and recordkeeping activities for large quantity generators. LSI requested an exemption from these requirements because they believed that their solvent waste collection system is designed and operated in such a manner that air emissions are reduced to a level that is significantly better than required by law. Ultimately, EPA decided to prepare a site-specific rule, which is currently being developed, to address LSI's issue. While this rule may provide the flexibility needed, LSI believed that such flexibility could have been provided without the need for a site-specific rule.

Developing the EMS
LSI's decision to develop an EMS and pursue ISO certification was initially driven by customer requests. However, going through the Green Permits program as an initial pilot facility in the EMSIP program and the verification through the Green Permits to show ISO equivalency helped with ultimate development of an ISO-certified EMS.

Contacts for Additional Information

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