2000 GREEN PERMIT ANNUAL REPORT
LSI LOGIC CORPORATION
GRESHAM, OREGON

EXECUTIVE SUMMARY

This report summarizes LSI Logic Corporation's Gresham campus environmental activities and achievements in 2000. LSI Logic continued to improve our environmental performance and achieve results that are beyond compliance. Our commitment is exemplified by our accomplishments and awards, including:

- In 2000, the Environmental Management System (EMS) was awarded ISO 14001 registration
- LSI Logic received the first Green Permit in the State of Oregon, and we were granted Charter Membership in EPA's National Environmental Performance Track program in December 2000.
- At LSI Logic, every department is responsible for improvements in environmental performance. Each employee, from entry-level maintenance to upper-level executives, is evaluated on their contribution to this goal. This system provides a strong incentive for all employees to continually strive for environmental innovation.
- We conducted a pilot test of a wastewater reclaim system, that demonstrated we will be able to recover and reuse 80% of the process wastewater. This system will be constructed in 2002 and will ultimately result in a 600,000 gallon per day reduction in water consumption and wastewater discharge.

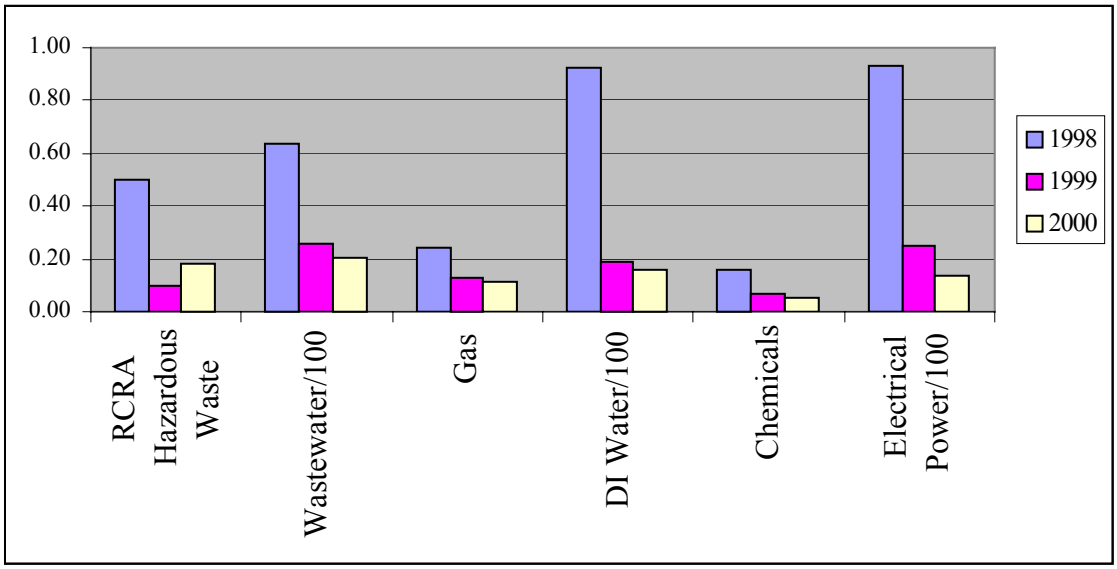
In 2000, thirteen environmental improvement projects were implemented at the LSI Logic Gresham campus. Several other energy conservation projects, as well as a water conservation and solid waste reduction project, were evaluated in 2000 and were deemed feasible for implementation in 2001 or beyond.

The following data represents the 2000 resource reductions and pollution prevention as a result of our environmental improvement activities:

• Gallons of Chemical Reduction	37,375
• Gallons of Spent Chemicals Recycled	72,000
• Gallons of Water Saved	375,000
• Pounds of Air Pollution Prevented	125,000
• Kw of Energy Saved	4,5750
• Pounds of Solid Waste Reduced	448,000
• Pounds of Solid Waste Recycled	10,800
• Miles avoided	100,000

Since the first full year of manufacturing at LSI Logic was 1998, this year is used as the baseline for measuring environmental impacts at the facility. The bar chart shows pollution generation

and natural resource use between 1998 and 2000. The comparison uses pollution and usage numbers that are normalized for production, as production levels within the electronics industry fluctuate greatly from year to year.



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1.0 PERFORMANCE ACHEIVEMENTS

LSI Logic received our Green Permit on December 7, 2000. In accordance with the requirements of the Green Permit, LSI Logic continued to improve our environmental performance and achieve results that are beyond compliance. The report summarizes the environmental improvement activities, environmental compliance, and stakeholder activities.

Also in 2000, EPA awarded LSI Logic a charter membership in the National Environmental Performance Track Program. LSI Logic's Gresham facility was one of less than 200 sites that were recognized as charter members of the Performance Track Program. The National Environmental Performance Track was designed to recognize and encourage top environmental performers. These are companies that go beyond compliance with regulatory requirements to attain levels of environmental performance and management that benefit communities and the environment. A copy of the certificate of recognition is attached.

1.1 Environmental Management System

LSI Logic received ISO 14001 registration in June 2000. The registration assessment audit was conducted in April by Underwriter's Laboratory. We received a recommendation for registration with no major non-conformances. Continued registration was recommended during our reassessment audit conducted in last October. A copy of the registration certificate is attached.

The objectives of the company's Environmental Management System (EMS) are to continuously ensure regulatory compliance and to minimize impacts on the environment. Significant environmental aspects of the Gresham facility activities, products and services were identified as chemical, water and energy consumption, solid waste generation and transportation.

In Gresham, company employees have a goal to ***Improve Environmental Performance.*** Each department has a target for completing one Environmental Improvement Project evaluation annually. Employees are evaluated on their contribution toward achieving this goal during performance reviews.

Environmental Project Evaluation Forms are used to track projects and to evaluate environmental impacts, cost effectiveness, technical feasibility and effects on product quality, health and safety and regulatory compliance. The project focus areas, which were determined from our significant environmental aspects, are:

- Chemical Reduction/Pollution Prevention
- Water Conservation
- Energy Conservation

- Solid Waste Reduction
- Transportation and Trip Reduction

Thirteen environmental improvement projects were completed in 2000. A summary of these projects is provided in the following sections.

1.2 Toxic and Hazardous Materials Minimization Program

LSI Logic continued to focus efforts on minimizing chemical consumption and hazardous waste generation. Environmental improvement activities conducted in 2000 resulted in a chemical reduction of 37,375 gallons. The projects implemented to achieve this reduction are described below.

1.2.1 Spent Chemical Recycling

LSI Logic designed the fabrication facility to facilitate chemical recycling and reuse. In many cases, spent semiconductor grade chemicals from our processes are still considered as industrial grade chemicals. Separate piping and tank collection systems were installed for our spent isopropyl alcohol, sulfuric acid and phosphoric acid. An industrial cleaning fluid manufacturer purchased our spent isopropyl alcohol for use in windshield washer fluid. The phosphoric acid was reused for wastewater neutralization. Sulfuric acid was reprocessed as technical grade material.

In 2000, we recycled approximately 1 million pounds, or 72,000 gallons of spent chemicals. This is more than 1.5 times the volume recycled in 1999. Recycling resulted in resource conservation, reduction of hazardous waste generation, and cost savings from deferred treatment and disposal expenses. Additionally, in 2000, we located and qualified local purchasers of our spent chemicals.

1.2.2 Process Chemistry Change

Process engineering changes often result in significant environmental improvements, including reduction in chemical consumption, hazardous waste generation, and air pollution. The following sections summarize the improvements that were implemented in 2000.

1.2.2.1 Qualified resist strip process

Sulfuric acid and ozone were consumed in the process for the resist strip step utilizing Semitool Acid Magnum tools. The performance of the Magnum tools was scrutinized due to inefficient up time and expense to operate. Through evaluation of the process, it was determined that the sulfuric acid and ozone actually did not improve surface cleanness, primarily due to the corrosive nature of the chemicals. Therefore, the resist strip process was qualified to utilize only a

deionized water rinse. This process change resulted in a chemical reduction of 3,600 gallons per year.

1.2.2.2 EKC 265 Reduction

EKC 265 is a solvent mixture used in the process for post-etch polymer stripping. Due to a supplier shortage of a chemical component in EKC 265, usage reduction and alternatives were examined. A process modification was implemented that reduced consumption, and ultimately resulted in elimination of the material altogether. The annual chemical reduction from this modification is approximately 4,000 gallons annually.

1.2.2.3 Elimination of BOE

Buffered Oxide Etch (BOE), a compound containing hydrofluoric acid and ammonium fluoride, was used in a single tool for a single process step. To increase throughput of the tool, this step was removed from the manufacturing process, eliminating the use of BOE. The process was replaced with an inert Argon sputter etch step. This process change resulted in an overall chemical reduction of approximately 5,475 gallons of BOE annually.

1.2.2.4 Susceptor Parts Cleaning

The cleaning frequency on the Susceptor sources was reduced by 67 percent to achieve a reduction in hydrofluoric acid consumption and wastewater discharge. Ultimately this change resulted in a reduction in chemical consumption by 24,300 gallons per year. Water consumption was reduced by 125,000 gallons per year.

1.3 Water Conservation, Reuse and Wastewater Discharge

Water is a critical natural resource. Since the manufacturing of semiconductor devices is a water intensive process, water conservation continues to be a focus of our environmental improvement efforts.

1.3.1 Pilot Study for Wastewater Reclaim

The typical wastewater discharge from a semiconductor fabrication facility is approximately one million gallons per day (gpd). In order to reduce the incoming volume of water and wastewater discharge, initially LSI Logic purchased tools and implemented systems and best management practices that minimize consumption and waste generation. Our average wastewater discharge volume in 2000 was approximately 400,000 gpd. However at full Fab 01 capacity, we estimate the average discharge will be 600,000 to 800,000 gpd.

To reduce the overall water consumption and wastewater discharge, we have been researching a wastewater reclaim system that would allow us to reclaim from 80 to 85 percent of our industrial wastewater to the front of our ultra-pure water (UPW) system. To fully evaluate the potential system, we pilot tested two different wastewater reclaim technologies. The pilot testing commenced in late October to verify the technical feasibility of reclaiming process wastewater and to assess operation and maintenance requirements. Testing was completed last December after 40 days of normal operations, and 15 days of challenges to evaluate the performance limits of these technologies.

The objective of the wastewater reclaim system was to meet incoming Bull Run water quality with 80 percent efficiency. The pilot testing successfully demonstrated that we are able to treat the process wastewater (PWW) to the incoming water quality with 85 percent recovery.

The final report with analysis of the data was completed in January. Based on the preliminary results of the testing, we will proceed with the design of a wastewater reclaim system utilizing a fluidized bed bioreactor as the primary technology to reclaim our PWW. The reclaim system is scheduled to be operational by summer 2002.

1.3.2 Bathroom Faucet Automatic Shut Off

In 2000, the bathroom faucet automatic timers project was implemented. In the office building and fab, there are 32 faucets. Each faucet has an automatic shut-off after an average flow of 17.3 seconds, which is approximately 550 milliliters. Assuming that the faucets are used six times per hour, 24 hours per day, the average daily use 675 gallons per day or 250,000 gallons per year.

A timing washer, which reduces the flow rate by one-third, was installed in each faucet. This resulted in annual savings of 165,000 gallons.

1.3.3 Susceptor Parts Cleaning

As described in Section 1.2.2.4, the cleaning frequency on the Susceptor sources was reduced by 67 percent to achieve a reduction in hydrofluoric acid consumption and wastewater discharge. Water consumption was reduced by 125,000 gallons per year

1.4 Air Quality

LSI Logic is regulated by the DEQ as a minor source of air pollution. The nature of the chemicals used in the semiconductor manufacturing operations generates criteria air pollutants and hazardous air pollutants (HAPs). Wet scrubbers control chemical vapors from corrosive liquids and gases. Volatile organic compounds (VOCs) from solvent workstations are abated by a thermal oxidizer. Point of Use (POU) abatement devices are also used to control hazardous gases and eliminate global warming gases. Using these treatment systems, air pollution generated from our operations was decreased by more than 90 percent.

1.5 Energy Conservation

In 1999, LSI Logic signed a Climate Wise partnership agreement with the Environmental Protection Agency. The Climate Wise Partnership is a joint effort between the EPA and the Department of Energy to help industry to pursue energy conservation and resource reductions.

Last year, LSI Logic Gresham submitted its Climate Wise Action Plan, summarizing past energy conservation and pollution prevention projects. The plan also describes potential future projects in our four significant aspect groups: energy conservation, pollution prevention, water conservation, and chemical reduction. Potential projects include: lowering the condenser water system temperature, not reheating make-up air when dehumidifying, and keeping one boiler on cold standby.

The consumption and savings estimates for each project were determined using historical data, engineering calculations, industrial research estimates, and prior project experiences. Emissions were estimated using the Climate Wise tracking software, version 1.1. If the projects identified in the Climate Wise action plan are implemented, LSI Logic Gresham could realize an energy conservation of up to 10,000,000 kilowatt-hour per year. Implementation of the projects will be dependent upon further technical evaluation and cost effectiveness.

1.5.1 Infrared Light Installation

When the facility was constructed in 1997, motion sensor lights were installed in many of the conference rooms in the office building. Lights are turned off automatically when the rooms are not in use. Since the facility operates on a 24 hours per day 7 days per week, there are always employees working at the site. However, a majority of employees who work in the office building and utilize the conference rooms are only on site Monday-Friday from 8 am to 5 pm. Subsequently, there is a significant portion of time that areas are not occupied and lights remained on.

As an environmental improvement project in 1999, an employee evaluated areas that are not continuously occupied and are not important for fire or life safety requirements to estimate potential energy and cost savings from installing motion sensor lights. The project findings demonstrated there are several rooms and areas that could save energy by not being continuously lit. The evaluation included 30 rooms in the fab and office building. Based on the successful evaluation, the project was implemented in 2000. The estimated energy savings from this project is 4750 kilowatt-hours per year.

1.6 Solid Waste Reduction and Recycling

LSI Logic embraces the concept of "reduce, reuse and recycle." In 2000, we recycled over 840,000 pounds of solid waste, including paper, plastic, glass, aluminum cans, wood, cardboard, precious and scrap metal. The following sections describe projects that were implemented in 2000 to improve our solid waste recycling rate.

1.6.1 Filter Cake Recycling

Solid filter cake is a by-product of our HF and CMP wastewater treatment systems. Previously this non-hazardous filter cake was sent to Columbia Ridge Landfill for disposal. In 2000, we audited and approved use of a facility that will use the filter cake as a component in Portland cement. We started sending our filter cake to the facility in March 2000 and diverted 446,840 pounds of waste from the landfill.

1.6.2 Reduction in Wafer Qualification

Eight-inch silicon wafers are the base materials for our semiconductors. In an effort to reduce cycle and time and wafer qualification, a team led by the Planning Department was able to prevent the scrapping of an average of 59 wafers per week. This project resulted in an annual solid waste reduction of 3,000 wafers annually.

1.6.3 Wood Recycling

Manufacturing tools and equipment are often delivered in wooden crates and pallets. Although we have a separate recycling roll-off specifically for wood, if any of the wood contains styrofoam or large metal pieces, the recycling vendor rejects the entire contents of the roll-off. Last year, we initiated a wood inspection program. The wood pallets and crates are examined for styrofoam and metal prior to placement in the roll-off. This scrutiny will increase our wood recycling rate by an estimated additional 40,000 pounds per year.

1.6.4 Shoe Cover Recycling

To maintain cleanliness in the site office building and non-manufacturing areas, all employees, contractors and visitors are required to wear shoe covers or white building shoes. Although all employees are provided with building shoes, we were consuming approximately 500,000 pairs of disposable shoe covers annually.

Previously, our shoe covers were donated to local mattress companies for their delivery personnel to wear when delivering beds. In 1999, four different companies reused over 17,500 pairs.

In 2000, we evaluated reusable shoe covers and have purchased these covers to use in lieu of the disposable ones. We estimate that the reusable shoe covers will reduce our solid waste by 16,000 pounds annually. The use of reusable shoe covers commenced in March 2001.

1.6.5 Plastic Recycling

LSI Logic started recycling clear plastic film in 1997. To increase the plastic recycling volumes, all plastic films and hard plastics were added to the recycling program last year. Additional bins have been placed throughout the facility to collect all plastics for recycling.

1.6.6 Computer Donation to STRUT

Through the Students Recycling Used Technology (STRUT) program, LSI Logic donated used PCs and components to Gresham area schools. In 2000, we donated 22 computer systems, two laptop computers and 32 monitors to the STRUT program. As local high school students refurbish their systems, they learn diagnostic and repair skills. Repaired systems are then donated to local schools.

1.6.7 KRONOS Implementation

In 2000, LSI Logic initiated an electronic time keeping system in lieu of paper time cards for non-exempt employees. This system will avoid use and disposal of approximately 800 pounds of paper.

1.7 Transportation

LSI Logic continued to participate in the DEQ Clean Air Action Day campaign and provided information to employees on the importance of using alternative transportation. Preferential parking is provided for car-poolers and free Tri-Met passes are offered to all employees to encourage the use of alternative transportation. Last year, LSI Logic Gresham expanded its employee shuttle service between the site and the Gresham Transit Center and also to Portland International Airport. This service enabled employees who take the bus or MAX to have easy transportation to and from the Gresham facility and the airport.

1.7.1 Alternative Transportation Incentive Program

In 2000, LSI Logic initiated the Alternative Transportation Involvement Program (ATIP), which rewards LSI employees and resident contractors for using alternative transportation during their daily travel to and from Campus.

The employees can choose to commute through any of the following forms of alternative transportation: walking, running, bicycling, riding a motorcycle, taking the bus, riding MAX and the LSI Shuttle, or carpooling. Each day the employee records their commuting activity on a Reward Cards and receives a credit. The credits are redeemable for prizes and gift certificates at area merchants such as Fred Meyer, GI Joe, Pizzacato, Newport Bay, and the Bike Gallery.

Last year, more than 150 employees and contractors redeemed ATIP credits for prizes. The average commute length is approximately 27 miles. The program helped to avoid almost 125,000 trip miles and prevent 742 pounds of hydrocarbon emissions, and 6,165 pounds of carbon monoxide, and 465 pounds of nitrous oxides.

1.7.2 Bicycle Commute Challenge

Last September, LSI Logic participated in the Bicycle Commute Challenge sponsored by the Bicycle Transit Authority. Fourteen employees participated and recorded more than 200 trips during the Challenge.

2.0 EMS DEFICIENCIES

LSI Logic utilizes an Access computer database to track compliance issues. The database, referred to as the Correction Action Defect Event Tracking (CADET), according to Microsoft is the largest Access database in the world! CADET ensures closed loop corrective action. Defects are logged immediately after the occurrence. Root cause is required to be identified, as well as contributing factors, short term corrective actions, and long term corrective actions. The actual environmental impact, regulatory actions, and any procedure modifications and training requirements are also recorded.

In 2000, we identified 54 internal defects. Seven accidental releases occurred on-site in 2000, which were contained in secondary containment and cleaned up. No injuries, regulatory violations or environmental pollution occurred from these internal releases. The incidents were all recorded as CADET events and closed out after procedures were modified and training conducted as necessary. None of the accidental releases were reportable under federal or state rules.

Other CADET events included such issues as proper procedures for chemical approval were not followed, wastewater treatment system monitoring equipment malfunctions, improper labeling of equipment and chemical containers, and training issues.

3.0 ENVIRONMENTAL COMPLIANCE SUMMARY

LSI Logic is committed to 100 percent compliance with federal, state and local environmental regulations. Last year, LSI Logic did not receive any notices of violation from a regulatory agency. In 2000, Gresham completed 126 required environmental permits, reports and documents. Internal environmental self-audits are regularly performed to detect and correct regulatory and internal environmental policy discrepancies. We conducted two internal audits of the EMS in accordance with the ISO 14001 internal audit element requirements.

The following environmental permits have been issued to the Gresham campus:

Agency	Permit Type	Number	Effective Date
DEQ	Air Contaminant Discharge	26-0027	7/17/96
City of Gresham	Industrial Wastewater Discharge	332	09/1/97
DEQ	Hazardous Waste Generator	ORQ000004382	9/27/96
DEQ	Green Permit	GP-01	12/8/00

3.1 Air Quality

The 2000 Annual Report is included as an attachment to this report. All of our air permit conditions were met and emissions were significantly below the company's Plant Site Emission Limits. No planned or unplanned excess emissions occurred in 2000.

In July 1999, LSI Logic conducted air emission source testing to verify compliance with plant site emissions limits (PSELs) and destruction and removal efficiencies (DRE) specified in our ACDP. The following table summarizes the results of the stack testing:

Parameter	Permitted PSEL (tons per year)	Actual PSEL (tons per year)	Permitted DRE (%)	Actual DRE (%)
VOC	< 35.7	1.2	>90	97
HF	< 1.5	0.18	Not Required	Not Required

3.2 Wastewater

LSI Logic's on-site treatment systems include fluoride, ammonia and slurry treatment, and acid waste neutralization. Wastewater effluents are sampled weekly and self-monitoring reports were submitted monthly to the City of Gresham. LSI Logic received a 2000 Pretreatment Award from the City of Gresham for no violations of our wastewater discharge permit and its requirements. A copy of the certificate is included as an attachment to this report.

3.3 Hazardous Waste

In 2000, LSI Logic was a large generator of hazardous waste. Our Annual Hazardous Waste Report is included as an attachment to this report. The largest RCRA hazardous waste streams were isopropyl alcohol (IPA), which is used in the wafer cleaning process and ammonium sulfate, which is a byproduct of the ammonia treatment system.

Chemical Waste Stream	**Total Volume (tons)**
Isopropyl Alcohol	344
Ammonium Sulfate/Sulfuric Acid	325
Waste Mixed Solvents	67
Waste Photoresist/EBR	3.4
Calcium Fluoride/ Slurry Filter Cake	223.42
Corrosive Containing Solids	888
Solvent Containing Solids	259
Arsenic Debris	94
EKC 265 Wipes	315
Empty Nowpacs	0.01
GRC Canisters	13.69
Lab Packs	0.17
Waste Oil	1.98
Mercury Vapor Lamps	0.25
Spent Batteries	0.24
Total	**1058**

In 2000, Gresham generated more hazardous waste than in 1999. The increased generation of two waste streams, isopropyl alcohol (IPA) and ammonium sulfate accounted for the majority of the increase. However, production rates increased by 126% during this period and hazardous waste generation has been reduced by 63 percent from the 1998 normalized baseline.

Three new wet benches were purchased for use by manufacturing in 2000. These tools utilize a continuous flow through design, which generates a tremendous amount of IPA contaminated with deionized water waste. The waste generated by these new wet benches nearly doubles the previous generation rate. Most of the increase can be attributed to additional water.

The second increased waste stream was ammonium sulfate, which is a byproduct of our ammonia wastewater treatment system. In 2000, the original evaporator used to concentrate ammonia sulfate did not operate properly. Subsequently, until the new evaporator could be installed, we were generating a dilute waste stream to send off-site for disposal.

3.4 Stormwater

Engineering controls and best management practices have been integrated to create an effective storm water management program at LSI Logic. The company's goal is to protect water quality in Fairview Creek, and ultimately the Columbia Slough. In 2000, DEQ conducted a technical assistance site evaluation, and determined that LSI Logic met the criteria for "no exposure" to industrial activity. Subsequently, DEQ terminated our 1200-Z storm water permit and did not issue a 1200-COLS permit. In accordance with our Green Permit requirement, we continue to implement Best Management Practices (BMPs) and utilize our EMS to ensure that the storm water runoff is protected.

4.0 STAKEHOLDER INVOLVEMENT ACTIVITIES

LSI Logic held an open house for stakeholders last August. The invitation is attached to this report. LSI Logic employees and a DEQ representative attended the open house. In 2001, LSI Logic will be conducting outreach to the local neighborhood associations and posting additional information on our corporate web site. The following sections describe the other community activities that LSI Logic participated in 2000.

4.1 Salish Ponds Adoption

LSI Logic continued our partnership with SOLV, the City of Fairview, the Fairview Creek Watershed Conservation Group, and Reynolds High School for the "adoption" of Salish Ponds for restoration. Salish Ponds are a part of a 70-acre park that is home to cutthroat trout, red tailed hawks, crawdads, and other fish and wildlife. In 2000, LSI Logic volunteers planted native vegetation and removed litter and trash to enhance the wetland and streamside areas. A thank-you from SOLV is included as an attachment to this report.

4.2 Adopt a Highway

The B-shift Green Team adopted a 2.69-mile stretch of Highway 26. In 2000, they conducted three cleanups along this stretch of highway, collecting everything from fast food wrappers to discarded clothing. The Adopt-a-Highway program, sponsored by the Oregon Department of Transportation, provides an opportunity for the Green Team to help the community and to protect the environment.

4.3 Green Team

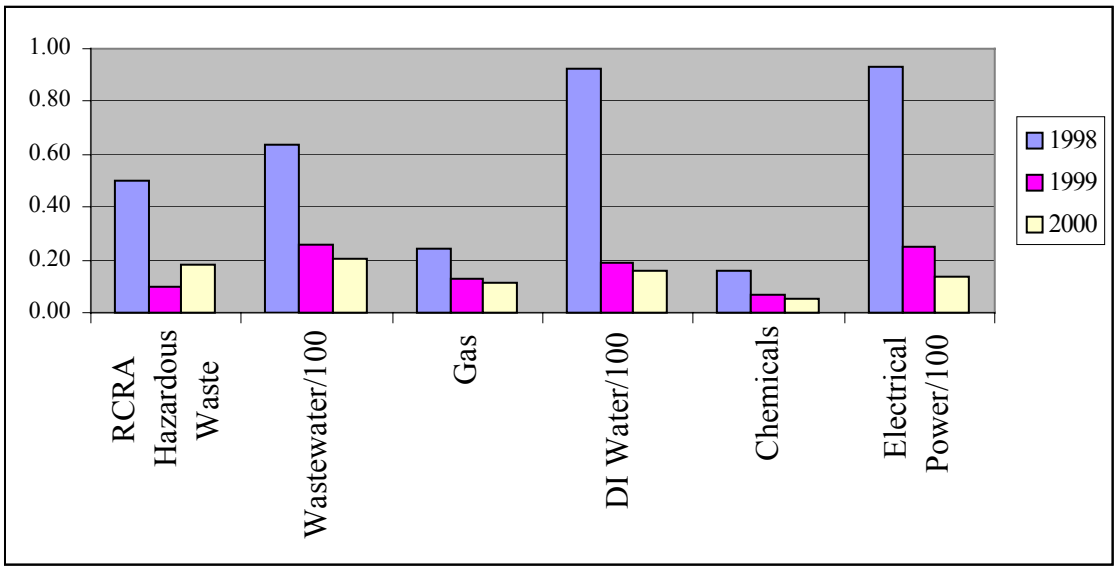
Currently the Green Team has more than 50 members that participate on all shifts. In 2000, the Green Team evaluated waste minimization opportunities such as recycling shoe covers, precious metals, IPA wipes, old building shoes, and plastic shipping boxes.

4.4 Environmental Health and Safety Fair

Last September, LSI Logic held it's second annual Environmental Health and Safety Fair. Our intent was to provide a variety of environmental, health and safety information, services, and products to our employees in a fun-filled atmosphere. More than 500 people attended the event during the two days. Approximately, 25 organizations and vendors, including DEQ, METRO, SOLV, and the Bicycle Transit Authority, participated in the event. To encourage employees to visit with the exhibitors, we created a scavenger hunt, and offered a new mountain bike as a prize.

5.0 PERFORMANCE SUMMARY

In 1998, LSI Logic established metrics to monitor the environmental impacts of our operations. A normalized production unit based on the volume of wafer starts and process complexity was developed to compensate for the site's changing manufacturing rates. Through continuous source reduction, recycling, process optimization and product yield improvements, LSI Logic has reduced the environmental impacts of its semiconductor wafer production activities by 53 to 85 % since 1998.



The following data represents the 2000 resource reductions and pollution prevention as a result of our environmental improvement activities:

- Gallons of Chemical Reduction 37,375
- Gallons of Spent Chemicals Recycled 72,000
- Potential Gallons of Water Saved 300,000 (230,000,000*)
- Pounds of Air Pollution Prevented 125,000
- Kw of Energy Saved 10,000,000*
- Pounds of Solid Waste Recycled 840,000
- Miles avoided 100,000

* Values represent potential conservation savings of projects evaluated in 2000.

The objectives and targets of the EMS were not revised in 2000.