2002 GREEN PERMIT ANNUAL REPORT
LSI LOGIC CORPORATION
GRESHAM, OREGON

EXECUTIVE SUMMARY

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. LSI Logic continued to improve our environmental performance and achieve results that are beyond compliance. Our accomplishments and awards, including the following highlights, exemplify our commitment:

- In 2002, the Environmental Management System (EMS) was recommended for continued ISO 14001 registration. LSI Logic worked in cooperation with the Oregon Department of Environmental Quality (DEQ) and the Environmental Protection Agency (EPA) to review Resource Conservation and Recovery Act (RCRA) Subpart BB and CC regulations as they apply to semiconductor fabs.

- At LSI Logic, every employee is responsible for compliance to environmental health and safety programs and for improvements in environmental performance. Each department has a target to complete on Environmental Improvement Project evaluation annually. In 2002, fifteen environmental improvement projects were implemented at the LSI Logic Gresham campus

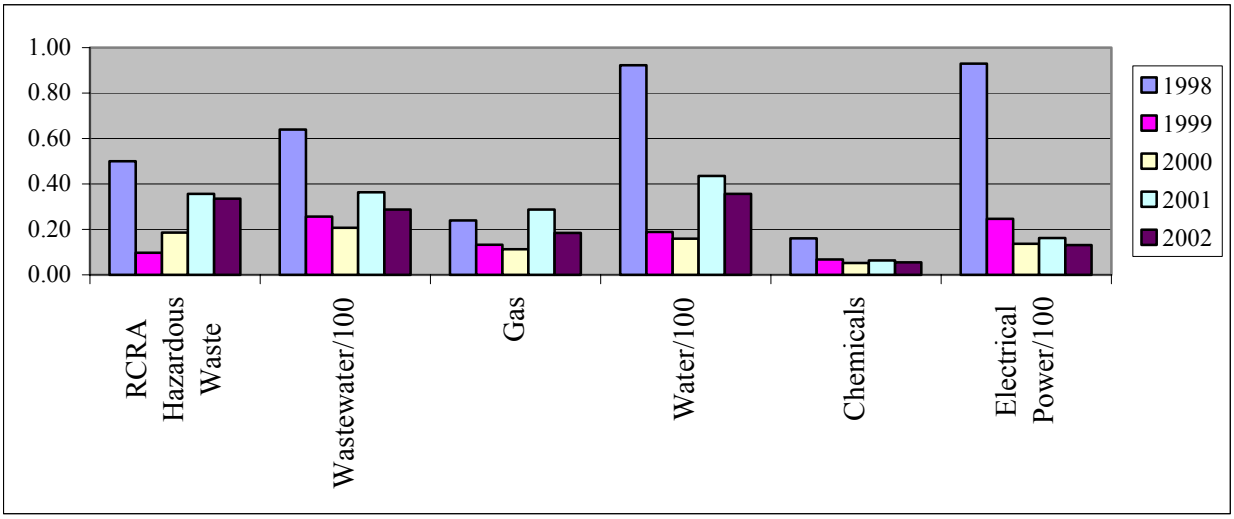
- On November 2002 the DEQ conducted a hazardous waste technical assistance visit at our site. Through the Green Permit process, items were identified for hazardous waste improvement and implemented through our EMS. This was a clear demonstration of how the Green Permit program was successfully utilized to strengthen our site's environmental programs.

The following data represents the 2002 resource reductions and pollution prevention as a result of our environmental improvement activities:

• Gallons of Chemical Reduction	232
• Pounds of Gas Reduction	28,240
• Gallons of Spent Chemicals Recycled	56,440
• Pounds of Hazardous Waste Reduced	28,830
• Gallons of Water Saved	9,467,400
• KW-hrs of Energy Saved	304,315
• Cu. Ft. of Natural Gas Reduction	2,236,529
• Pounds of Air Pollution Prevented	13,369
• Pounds of Solid Waste Reduced	34,453
• Trip Miles Avoided	161,000

The bar chart shows pollution generation and natural resource use between 1998 and 2002. 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.

Increased utilization of resources, continuous process improvements, waste minimization initiatives and simultaneous reductions in consumption has resulted in a favorable decrease in 2002 environmental impacts. 2002 key environmental metrics remained below 1998 baseline figures.



The 2002 Annual Hazardous Waste Generator Report and the 2002 Air Contaminant Discharge Permit Annual Report are included as attachments to the 2002 Green Permit Report.

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1.0 PERFORMANCE ACHEIVEMENTS

In 2002, LSI Logic continued to improve our environmental performance and achieve results that are beyond compliance. Our accomplishments and status of our Environmental Management System, and media programs are described below.

1.1 Environmental Management System

LSI Logic received ISO 14001 registration in June 2000. A registration continuous assessment audit was conducted in October 2002 by Underwriter's Laboratory. We received a recommendation for continued registration with no major non-conformances.

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

The Gresham campus established a goal to ***Improve Environmental Performance.*** Each department has a target for completing one Environmental Improvement Project evaluation annually. Environmental Project Evaluation Forms are used to track projects and to evaluate environmental impacts, cost effectiveness, technical feasibility and effects on product quality, health & 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

Fifteen environmental improvement projects were completed in 2002. A summary of these projects is provided in this report.

1.2 Toxic And Hazardous Materials Minimization Program

LSI Logic continued to focus efforts on minimizing chemical consumption and hazardous waste generation. The spent chemical recycling and process changes projects implemented in 2002 are described below.

1.2.1 Spent Chemical Recycling

In the previous SIP reports, we described how the Gresham fab was designed to facilitate chemical recycling and reuse. LSI Logic utilizes separate piping and tank collection systems for our spent isopropyl alcohol (IPA), sulfuric acid and phosphoric acid to reduce the amount of chemical waste generated. Currently, local companies in the Greater Portland area reuse these spent products. In March of 2002, the concentration of spent phosphoric acid fell below acceptable levels for reuse. Although it was very difficult to find an outlet for the lower concentration phosphoric acid on the reuse market, LSI Logic recently located an interested party in the Portland area. Our first shipment in 2003 was sent out as a spent product for reuse.

In 2002, we recycled approximately 56, 440 gallons of spent chemicals. Recycling resulted in resource conservation, reduction of hazardous waste generation, and cost savings from deferred treatment and disposal expenses.

1.2.2 Process Changes

Conversion from Wet to Dry Processing

In January 2002, the G12 technology was converted to a dry process for etch cleaning. Dry processing uses ozone to replace hydrofluoric acid and sulfuric acid, and eliminates the de-ionized, DI, water required for rinsing. Implementation of this process change resulted in the estimated reduction of Hydrofluoric Acid consumption of 186 gallons. The water savings are described below.

Removal of inefficient tools in Thin Films – Elimination and reduction of chemicals

Insufficient tool availability on several Thin Films tools spurred the formation of a team to optimize uptime. The team was able to increase tool availability by 20%, which allowed for the removal of several less efficient tools. The removal of these tools resulted in an estimated annual chemical reduction of 176 liters of a flammable liquid (TDEAT), 10,072 pounds of C2F6 gas, and 18,168 pounds of anhydrous ammonia gas.

Copper Waste Treatment Project – Reduction of Hazardous Waste Generation

In May 2002, the concentrated copper waste treatment system was placed online with the goal of eliminating the need to transport and dispose of copper sulfate waste solution off site. The system eliminates the concentrated copper sulfate waste stream by recovering copper metal from the waste solution, and collecting it for recycling. In 2002, the system eliminated the need to ship 1,680 gallons of copper sulfate waste. Hazardous waste reduction is estimated at approximately 3,000 gallons annually.

Fluoride Treatment System Expansion Project - Reduction of Fluoride in wastewater

In December 2002, a new fluoride treatment system was placed online with the goal of reducing fluoride levels in plant wastewater discharge. The new system has reduced fluoride levels in the

plant wastewater discharge from an average of 12.5 milligrams per liter (mg/l) to 9.8 mg/l. This equates to a 22% reduction in fluoride waste. The estimated annual reduction in fluoride introduced into the waste stream is approximately 3,240 pounds. This new system not only helps to ensure regulatory compliance, but also significantly minimizes annual fluoride waste generation.

Mercury Vapor Lamp Shipment Reduction

In July 2002, a change in packing procedures for spent mercury lamps was implemented. The procedure now requires the lamps to be removed from the manufacturer's packaging before being packed into drums for disposal. Although this procedure will not reduce the amount of mercury lamps generated for disposal, it will reduce the frequency and number of shipments, and eliminate the disposal of packaging materials as waste. It is estimated that a 75% reduction in Mercury vapor lamp waste, approximately 300 pounds per year, will be attained.

Consolidation of Isopropyl Alcohol (IPA #2) and Waste General Solvents Waste Streams

In 2002, it was determined that two similar waste streams could be consolidated and shipped as one. This procedural change resulted in a 33% reduction in the number of hazardous waste shipments made. The benefits of this change have been the reduction weekly hazardous waste shipments and the reduction in associated transportation emissions.

1.3 Water Conservation, Reuse And Wastewater Discharge

Conversion from Wet to Dry Processing

Implementation of a dry clean for the G12 technologies, as described above, resulted in an approximate annual reduction of 1,254,900 gallons of water.

De-Ionized Rinse Water Reduction

Chemical Mechanical Planarization (CMP) tools use substantial quantities of de-ionized water during operation and rinsing cycles. In 2002, a water reduction project was implemented focusing on the optimization of rinsing cycles and the reduction of water consumption. The results are an estimated annual reduction in de-ionized water usage of 9,467,400 gallons. This reduction also represents a reduction in annual wastewater generated from this process.

Landscaping Water Use

When LSI Logic designed and planted the landscaping on the site in 1997, an effort was made to design for the environment. Many indigenous plants were selected that are naturally accustomed to the climate and were therefore good choices for water and waste efficient landscaping. The area planted around the buildings as grassy lawn was minimized.

To maintain the health of the lawn, a sprinkler system was installed to use the available perched aquifer water as the source. The irrigation system was initially designed to operate only based on time. Proper watering is important to maintain an attractive, healthy lawn; however since water is a limited resource, we have teamed with our landscaping company to install a more efficient irrigation system.

In 2001, LSI Logic installed a sophisticated irrigation system that uses temperature and humidity monitors to evaluate the lawn water requirements. The proper volume of water applied to a lawn depends upon the variety, climate conditions, soil absorption rate and the heat intensity. The implementation of this system made a significant contribution to water conservation and saved up to 27,800 gallons per week during watering season, or an estimated 800,000 gallons per year.

1.4 Air Quality

LSI Logic is regulated by the DEQ as a synthetic 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 concentrator/thermal oxidizer. Point of use abatement devices are also used to control hazardous gases and destroy global warming gases. Using these treatment systems, air pollution generated from our operations was decreased by over 90 %.

In March 2002, source testing was performed on the facility's air pollution control systems as required by our DEQ Air Contamination Discharge Permit (ACDP). Source testing was performed to demonstrate that the systems were operating at the efficiencies required to meet the conditions of our discharge permit. All systems were found to be in compliance with the terms of our DEQ Air Contaminate Discharge Permit.

1.5 Transportation

In 2002, LSI Logic continued to promote the Alternative Transportation Involvement Program (ATIP), which rewards employees and resident contractors that use alternative transportation during their daily travel to and from Campus.

The employees involved in the program 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 Logic Shuttle, or carpooling. Employees record their alternate transportation activities on Reward Cards and receive credits. The credits are redeemable for prizes and gift certificates at local merchants.

In 2002, over 80 employees and contractors redeemed ATIP credits for prizes. The average commute length was approximately 27 miles. The program helped to avoid over 160,700 trip miles and prevent 1,044 pounds of hydrocarbon emissions, and 9,267 pounds of carbon monoxide, and 750 pounds of nitrous oxides.

LSI Logic also 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.

In 2002, LSI Logic made arrangements with a local car dealership to provide hybrid electric vehicles (HEVs) as an option for employee car rentals. Hybrid electric vehicles (HEVs) are typically powered by two energy sources--an energy conversion unit (such as a combustion engine or fuel cell) and an energy storage device (such as batteries or ultra-capacitors). HEVs have the potential to be two to three times more fuel-efficient than conventional vehicles. A Toyota Prius HEV was a preferred rental car, which is spotted regularly in the Gresham parking lot. The Prius has been certified as a Super Ultra Low Emission vehicle (SULEV), a designation that's up to 90% cleaner for smog-forming emissions than Ultra Low Emission vehicles (ULEV).

1.6 Energy Conservation

De-energize Fluorescent lamps to conserve energy consumption on site

The fabrication and office areas have substantial lighting requirements for day-to-day operations. Fluorescent lighting needs were evaluated for potential energy reduction. LSI Logic implemented a project to de-energize approximately 550 fluorescent lamps in the Fab and office spaces to achieve a reduction in energy consumption, maintenance costs, and lamp waste. The project reduced annual electrical consumption by 192,720 kilowatt-hours and lamp disposal by approximately 70 lbs.

Condenser Water Temperature Optimization

The plant's cooling system uses refrigeration machinery to produce cold water to satisfy the factory's cooling requirements. A condenser water system is used to remove heat from the plant cooling system. We evaluated and implemented a project to optimize the condenser water temperature settings, for seasonal conditions, in order to maximize energy conservation. The estimated annual reduction in electrical consumption is 185,290 kilowatt-hours.

Temperature Control Changes in Make-up Air Units

The plant's make-up air units supply large quantities of "conditioned" air to the factory clean rooms to replace air that is exhausted from the tools and to maintain a positive pressure in the clean rooms. The units were originally set up to produce warmer supply air, which created an additional cooling load for the re-circulating air handling units. A project was evaluated and implemented to adjust the make-up air unit temperature control set points in order to optimize electrical and natural gas consumption in the system. The impact of this project is an estimated annual reduction of 968,564 kilowatt-hours of electrical and 276,693 therms of natural gas consumption.

1.7 Solid Waste Reduction and Recycling

In 2002, LSI Logic recycled over 220 tons of solid waste. This figure represents the consumable office products recycled, and not the chemicals or byproducts that were also reused. LSI Logic successfully increased its 2002 solid waste recycling by 13 tons, or 6.3%, over the 2001 figures.

Recycled Copy Paper Program

In 2002, LSI Logic switched suppliers to utilize office copy paper with 30% recycled post-consumer content for the Gresham site. Over the course of the year, 410 cases of copy paper were used. The environmental savings estimated by utilizing this quantity of recycled paper over new paper are: 75 trees, 21,525 gallons of water, 12,608 kW-hrs of electricity, and 185 pounds of air pollution.

Reduction in Paper Waste – Solid Waste Reduction

The Human Resources department created a team to reduce the volume of solid waste generated due to HR document revisions. The team was able to reduce the number of document revisions made, and the subsequent copies generated. The team successful reduced the volume of office paper waste by 500 sheets annually.

Increased Recycling and Reuse of Scrap Silicon Wafers

LSI Logic uses silicon wafers for research and development, testing, tool qualification and to build application specific integrated circuits (ASIC). In 2002, we recycled 4,000 pounds of scrap silicon wafers and reclaimed 13,139 pounds of silicon wafers for re-use.

Computer Donation to StRUT

Through the Students Recycling Used Technology (StRUT) program, LSI Logic donated used PCs and components to Gresham area schools. In 2002, we donated 317 computer systems, 189 monitors, 19 laptop computers, and 14 printers to the StRUT program. StRUT is a state of Oregon program designed to give students exposure to the Information Technology field. As local high school students refurbish the systems, they learn diagnostic and repair skills. Repaired systems are then donated to local schools. This program effectively reuses equipment, which would normally be disposed.

2.0 EMS DEFICIENCIES

LSI Logic utilizes an Access computer database to track defects, which are EMS deficiencies or non-compliances. The Correction Action Defect Event Tracking (CADET) database ensures closed loop corrective action. Defects are logged immediately after the occurrence. Root cause is 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 2002, 47 environmental events were logged into the CADET system. These ranged from monitoring alarms, improper storage, equipment failures, and minor chemical leaks. All releases were either contained in secondary containment and cleaned up, or abated by the plant air pollution control equipment. No injuries or detrimental 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 to prevent reoccurrences. None of the accidental releases were reportable under federal or state rules.

Internal EMS audits are also performed annually to review the following elements:

- **Environmental Policy**
- **Planning**
- Environmental Aspects
- Legal and other requirements
- Objectives and targets
- Environmental management programs
- **Implementation and Operations**
- Structure and Responsibility
- Training, awareness and competence
- Communications
- Environmental management systems documentation
- Document Control
- Operations Control
- Emergency preparedness and response
- **Checking and Corrective Actions**
- Monitoring and measurement
- Nonconformance and corrective and preventive action
- Records
- Environmental management system audit

In 2002, we identified 19 defects through our internal EMS audits. The defects were documented, root causes were identified and corrective actions were implemented.

In November 2002, Underwriters Laboratories Inc. (UL) conducted a three-day ISO 14001 continuous assessment audit of our site and identified two action requests. One was related to the review process of some of our internal specifications. The other was due to improper storage of two bottles of isopropyl alcohol by a contractor on our site. Both items were corrected to the satisfaction of UL. In their assessment report, UL stated that LSI Logic's EMS strength was "a well documented and implemented system which has responded to local environmental concerns and has received the first Green Permit from the State of Oregon. Additonal strengths include the control of on-site contracted services for facility support and the committment of management and the environmental staff to support the EMS."

The objectives and targets of the EMS were not revised in 2002.

3.0 ENVIRONMENTAL COMPLIANCE SUMMARY:

LSI Logic is committed to 100% compliance with federal, state and local environmental regulations. In 2002, Gresham completed 232 required environmental permits, reports and documents. Internal environmental self-audits are regularly performed to detect and correct regulatory and internal environmental policy discrepancies. No environmental clean-up activities were required.

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

Agency	Permit Type	Number	Effective Date
DEQ	Air Contaminant Discharge	26-0027	5/9/02
City of Gresham	Industrial Wastewater Discharge	332	9/12/02
DEQ	Hazardous Waste Generator	ORQ000004382	9/27/96
DEQ	Green Permit	GP-01	12/8/00

3.1 Air Quality

The 2001 Annual Report was submitted to the DEQ on with our Annual Green Permit Report on April 1, 2002. We satisfied all of the permit conditions, and were significantly below all of our Plant Site Emission Limits.

3.2 Wastewater

LSI Logic's on-site treatment systems include fluoride, ammonia, and acid waste neutralization. Wastewater effluents are sampled weekly and self-monitoring reports were submitted monthly to the City of Gresham. In 2002, LSI Logic received one notice of violation from the City of Gresham. This was due a missing an Organic Toxic Pollutants (OTP) laboratory test result in our July self-monitoring report. LSI Logic immediately tested a sample and reported the results to the City of Gresham. All constituents were below permitted levels. Corrective actions were completed to prevent a reoccurrence.

3.3 Hazardous Waste

In 2002, LSI Logic was a large quantity generator of hazardous waste. We submitted our Annual Hazardous Waste Report to the DEQ with our Annual Green Permit Report on April 1, 2002. The largest RCRA hazardous waste streams were isopropyl alcohol mixed with waste general solvents (IPA#2), which is used in the wafer cleaning process, and ammonium sulfate, which is a byproduct of the ammonia treatment system.

RCRA Hazardous Waste Stream	Total Volume (tons)
IPA#2	1032
Ammonium Sulfate/Sulfuric Acid	350
Waste Photoresist/EBR	63.4
Solvent Containing Solids	2.64
EKC 265 Wipes	1.16
Arsenic Debris	0.658
Lab Packs	0.622
Empty Nowpacs	0.034
Ammonia Determination Vials	0.056
Total	**1451**

In 2002, Gresham generated 1451 tons of RCRA hazardous waste. This figure represents a 32% increase over calendar year 2001. The increased generation of two waste streams, IPA#2 and ammonium sulfate account for most of the additional waste. Overall, our normalized hazardous waste generation has been reduced by 51% from the 1998 baseline. LSI Logic has also completely eliminated our use of arsenic by removing our implant operation. May 2002 marked the last shipment of the arsenic debris waste stream.

The second increased waste stream was ammonium sulfate, which is a byproduct of our ammonia wastewater treatment system. In 2002, work was started to optimize the ammonia ion exchange system. Initially, this resulted in an increase in ammonium sulfate waste. However, future waste generation will be significantly reduced due to the increased treatment efficiency of the system.

In November 2002, DEQ conducted a hazardous waste technical assistance visit at our site. Through the Green Permit process, six items were identified for hazardous waste management improvement in the area of spill procedures, contingency plan notifications, hazardous waste storage, open drums, drum logs and manifests. Internal procedures were modified to implement the changes. This was a clear demonstration of how the Green Permit program was successfully utilized to strengthen our site's environmental programs.

3.4 Storm Water

Engineering controls and best management practices have been integrated to create an effective storm water management program at LSI Logic. Our 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.

3.5 National Environmental Performance Track

EPA awarded LSI Logic a Charter Membership in the National Environmental Performance Track Program in the fall of 2000. The National Environmental Performance Track was designed to recognize and encourage top environmental performers—those who go beyond compliance with regulatory requirements to attain levels of environmental performance and management that benefit people, communities, and the environment. Our annual Performance Report was submitted electronically to the Performance Track On-Line database in June, 2002.

4.0 STAKEHOLDER INVOVEMENT

Green Team

Currently our Green Team has more than 20 voluntary employees who actively participate in reviewing pollution prevention, waste reduction, recycling, energy and water conservation in the work environment and the community. In 2002, the Green Team evaluated waste minimization opportunities such as recycling cell phones, prescription glasses, athletic shoes, used wipes, pop cans, scrap parts and other miscellaneous materials.

Adopt-a-Highway

Our voluntary LSI Logic employee Green Team adopted a 2.69-mile stretch of Highway 26. In 2002, they conducted four 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.

Athletic Shoe Recycling Drive

In 2002, the Green Team sponsored a new athletic shoe drive to collect shoes destined for obscurity in a closet or landfill. The good reusable shoes were be donated to families in need, and the worn-out shoes were donated to Nike's Reuse-A-Shoe program to be ground up and made into something else. The rubber, foam, and fabric reclaimed from these shoes can be used to create soccer, football, and baseball fields, weight room flooring, synthetic basketball courts, tennis courts and playground surfacing tiles, and even padding under hardwood basketball floors. The shoe drive collected 154 pairs of athletic shoes and avoided over 300 lbs of waste.

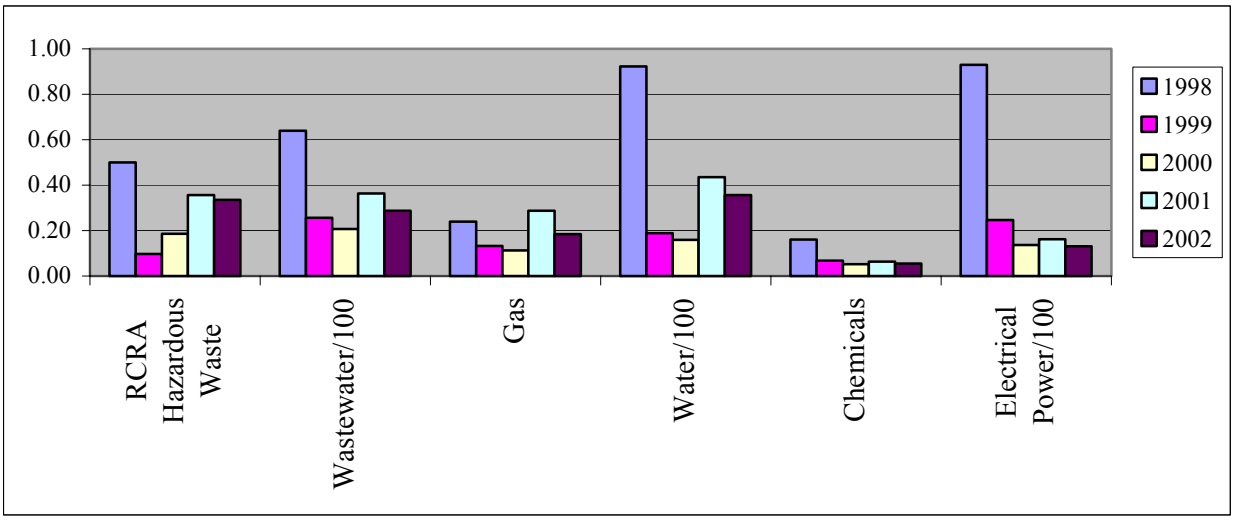
Salish Ponds Adoption

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 2002, LSI Logic volunteers helped to plant native species and remove litter and trash to enhance the wetland and streamside areas.

5.0 ENVIRONMENTAL 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 strives to minimize the environmental impacts of our semiconductor wafer production.

In 2002, fab capacity was more effectively utilized than in 2001 due to wafer loading. Increased utilization of resources, continuous process improvements, waste minimization initiatives and simultaneous reductions in consumption has resulted in a favorable decrease in 2002 environmental impacts. 2002 key environmental metrics remained below 1998 baseline figures.



2002 Environmental Impact Reductions

The following data represents new resource reductions and pollution prevention achievements as a result of our environmental improvement activities in 2002:

- Gallons of Chemical Reduction 232
- Pounds of Gas Reduction 28,240
- Gallons of Spent Chemicals Recycled 56,440
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