



Environmental, Safety and Health Annual Report

Environmental, Safety and Health Annual Report

**Sustainable development, Establish
a well-being working environment**



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1.All the statistics demonstrated are generalized from seven wafer fabs (Fab 2, 3, 5, 6, 7, 8 and 12)

2.All the data demonstrated are incomparable with that of other industries.

3.TSMC reserves the copyright on this report.

1 A Letter from the President



Customer Partnership has been deemed as one of TSMC's core values, while Sustainable Management is another emphasis which TSMC has been consistently strived for. Among its widespread customers in the world, Europe is the one which places heavy emphasis on sustainable management and has advocated to extend manufacturer's responsibility. Under the concept, manufacturers not only have to manufacture but also recycle products in order to decelerate the pace of exploiting natural resources. The increasing demands of environmental protection in Europe, U.S.A., Japan and other Asian countries are consistent with TSMC's sustainable management policy.

TSMC was ISO14001 and OHSAS18001 certified in 1996 and 2000 respectively. Its environmental, safety and health (ESH) policy is to "prevent pollution, efficiently use all resources, sustain management and establish a well-being working environment". Through integrated operation system, TSMC has persistently reduced environmental impacts and potential operation risks.

In order to enhance ESH performance of its suppliers and contractors, TSMC has not only assisted them to establish a comprehensive ESH management system, but has also organized annual contractor communication meeting since 2001. During the meeting, suppliers and contractors were invited to share their ESH-related experiences. In 2004, TSMC invited its primary raw material suppliers to participate in the "Green Supply Chain Project" which was sponsored by the Industrial Development Bureau and consulted by Industrial Technology Research Institute. By applying this green supply chain along the up-to-downstream, TSMC as well as its suppliers and customers are benefited from a win-win situation.

In February 2004, the Kyoto Protocol came into effectiveness. Being one of the members, TSMC, undoubtedly, has to take full social responsibility to protect the environment. In fact, TSMC committed to reducing Perfluorinated Compounds (PFCs) emission in 2001 and has painstakingly improve the ESH performance of its suppliers and contractors. Accordingly, with concerted efforts and effective operation, it is strongly believed that TSMC will sustain its management.

A handwritten signature in black ink that reads "Rick Tsai". The signature is written in a cursive, flowing style.

Rick Tsai
President and COO
May 2005

2 Company Profile



Corporate Headquarters and Fab 12

TSMC's establishment of a dedicated integrated circuit (IC) foundry on February 21, 1987 at Hsinchu Science Park, Taiwan, was the first of its kind in the world. Today, TSMC is the world's largest dedicated semiconductor foundry, providing the industry's leading process technology and the foundry industry's largest portfolio of process-proven libraries, IP, design tools and reference flows.

As the global leader in the dedicated foundry sector of the semiconductor industry, TSMC currently operates two 12-inch wafer fabs, five 8-inch wafer fabs and one 6-inch fab. The Company also has substantial capacity commitments at two wholly owned subsidiaries, WaferTech in the U.S. and TSMC (Shanghai) Company, Ltd. in China, and at a joint-venture fab, SSMC, in Singapore. The total installed annual capacity of TSMC and its affiliates amounted to 4.8 million 8-inch equivalent wafers in 2004.

TSMC's common shares are listed on the Taiwan Stock Exchange. The depositary receipts of its common shares are listed on the New York Stock Exchange (NYSE) under the symbol TSM.

TSMC takes its role as a responsible corporate citizen seriously. The Company is committed to community service and maintaining strong stakeholder relationships.

Sound corporate governance is rooted in a strong Board of Directors comprised of experienced business leaders and distinguished scholars. The Board reinforces the Company's financial integrity and management soundness. There are three independent Board members among a total of nine directors. They are Sir Peter L. Bonfield, Professor Lester C. Thurow, and Mr. Stan Shih. In addition, Professor Michael E. Porter is an independent supervisor. Under TSMC's Board of Directors, the Audit Committee was established in 2002. It oversees the integrity of TSMC's financial and audit systems. The Compensation Committee was established in June 2003. It reviews and makes recommendations on issues related to employee and executive compensation.



Fab 2



Fab 6



Fab 3



Fab 7



Fab 5



Fab 8

3 Environmental, Safety and Health Policy

TSMC focuses on core business – IC foundry. All materials and tools used in the manufacturing process, including silicon wafers, chemicals, gases, electricity, water, etc., should be well managed in daily operations. TSMC's activities should not only meet relevant environmental, safety and health (ESH) legal requirements, but should also be benchmarked against recognized international practices. TSMC's goals are to prevent pollution and efficiently use all resources, prevent incidents, improve employees' safety and health, protect property and establish a well-being working environment. To achieve these goals, TSMC is committed to continually improving the following.

- (1) All managers should take responsibility to maintain the highest-level quality of the environment and ensure a safe and healthy workplace.
- (2) Comply with ESH legal requirements and make continuous efforts to implement international state-of-the-art practices.
- (3) Promote ESH concepts and awareness company-wide by providing sufficient training and resources and actively seek cooperation and communication with employees.
- (4) Introduce new international ESH concepts and technologies to enhance and support all levels of management.
- (5) Conduct ESH assessments for new tools and materials used in research and development to reduce ESH risks.
- (6) Communicate ESH issues with suppliers and contractors to encourage them to improve their ESH performance.

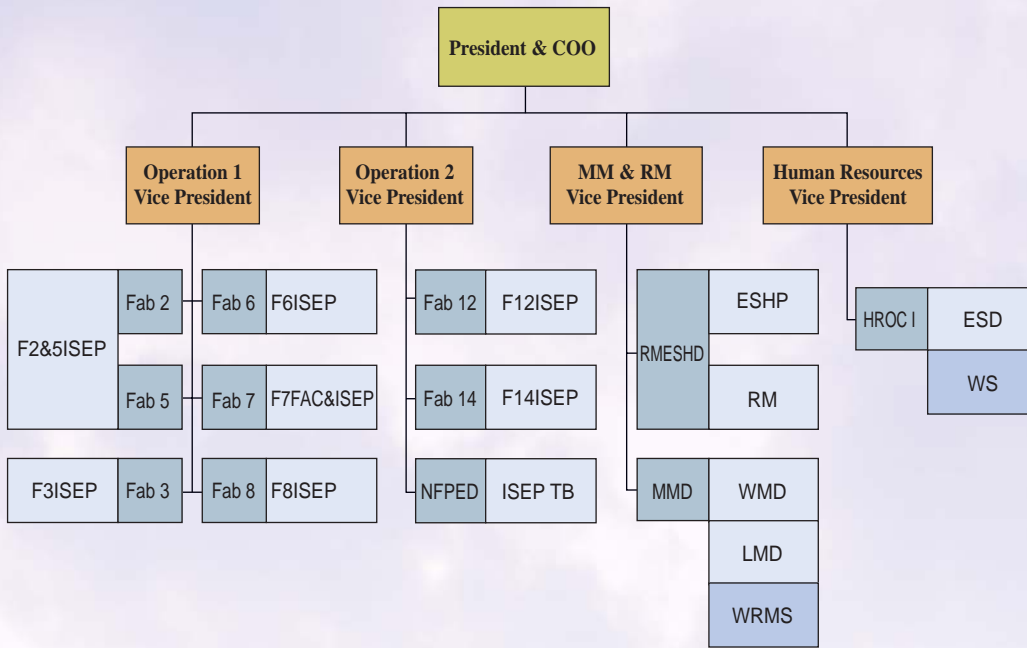
4 ESH Organization

Management plays an important role in the maintenance of ESH performance. Hence, TSMC established a corporate ESH Risk Management Department (RM) and an ESH Industrial Safety and Environmental Protection Department (ISEP) in 1995. However, in 2001, the responsibility of ISEP was transferred to the director of each fab to enhance operation efficiency. And the Risk Management Department, in May 2003, was promoted as Risk Management & Corporate ESH Division (RMESH), which is in charge of Risk Management and Environment, Safety & Hygiene Strategic Planning.

The RMESH sets the company ESH policy, general guidelines, and annual plans, as well as audits and communicates with external parties. It looks for potential risks using systematic audit programs and introduces the best available technologies and practices to prevent or solve ESH-related problems. Onsite ISEP not only stipulates ESH procedures and operational instructions, but also performs daily inspections to ensure that the procedures have been followed. With regard to new fabs, the New Fab Planning & Engineering Division (NFPED) falls under the operation organization. All the planning, construction and operation steps must follow the regulations and up-to-date international standards in order to build state-of-the-art semiconductor fabs that meet world ESH standards.

In addition, in 1998, TSMC established the Technical Board that enhances communication, information sharing and cooperation between fabs. The Technical Board also coordinates resources in the operation areas to generate Best Known Methods (BKMs) and implement standardization accordingly via cross-fab cooperation. The ISEP Technical Board is in charge of the coordination of ESH related operations.

4 ESH Organization



- ESD: Employee Service Department
- ESHP: Environment, Safety & Hygiene Strategic Planning
- HROC I: Human Resources Operations Center I
- ISEP: Industrial Safety and Environmental Protection
- ISEP TB: Industrial Safety and Environmental Protection Technical Board
- LMD: Logistics Management Department
- MMD: Material Management Division
- NFPED: New Fab Planning and Engineering Division
- RM: Risk Management
- RMESH: Risk Management & Corporate ESH Division
- WMD: Warehouse Management Department
- WRMS: Waste Resources Management Section
- WS: Wellness Section

5 ESH Milestones

Year	Milestone
1987	TSMC was founded.
1990	ISEP was founded.
1995	Corporate ESH Risk Management Department (RM) and on-site ESH Industrial Safety and Environmental Protection (ISEP) were established.
1996	Fab 2 was ISO14001 certified.
1997	Fab1, 3 and 4 were ISO14001 certified.
1998	Operational Technical Board was established. BKMs were generated and standardization implemented to facilitate the sharing of ESH experience under the Facility Technical Board.
1998	TSMC became a member of International SEMATECH. With access to advanced ESH technology and participation in ESH projects, TSMC continued to make improvement.
2000	Fab 5 was ISO14001 certified.
2000	Fab 7 was ISO14001 certified.
2000	Fab 1, 2, 3, 4 and 5 were OHSAS18001 certified.
2001	Fab 6 and 8 were ISO14001 certified.
2001	Fab 6, 7 and 8 were OHSAS18001 certified.
2002	Fab 12 was ISO14001 and OHSAS18001 certified.
2003	Risk Management Department (RM) was promoted as Risk Management & Corporate ESH Division (RMESH), which is in charge of Risk Management and Environment, Safety & Hygiene strategic Planning.
2003	SARS Crisis Management Team was established for better control and set general guidelines for future infectious diseases.
2003	ISEP Technical Board was established, which integrated the ESH-related operations.
2004	ESH policy was amended.
2004	ISO14001 (the most up-to-date version) and OHSAS18001 were renewed.

6 Performance Index

6.1 Dow Jones Sustainability Index

“Socially Responsible Investment” is not only the derivative product of sustainable economic development, but also the most vibrant field of the international investment industry today. During the investment process, attributes of social justice, environmental sustainability and financial performance have become the critical factors contributing to its investment performance and social benefits.

To satisfy market demand, the “Socially Responsible Investment Index” was introduced by several internationally renowned investment institutes. It not only serves as a comparative tool for investors, but also an effective indicator of marketability and overall investment performance. In 1999, Dow Jones and Sustainable Asset Management (SAM) introduced the Dow Jones Sustainability Group Index (DJSI). Based on the constituents of the Dow Jones Industrial Index (approximately 3000 companies), the prior 1/10 sustainable-managed companies are selected to be the constituents of DJSI with a consideration of the weighting of economic, social and environmental factors.

TSMC has been privileged to be the constituent of DJSI since 2001 for 4 consecutive years, and was the only enterprise to have been accredited with this honor in Taiwan in 2003 and 2004.





Fab 6 has the honor to receive the "National Safety & Hygiene Excellent Unit Awards" for two consecutive years.



Fab 8 has the honor to receive the "Annual Environmental Protection Award for Enterprise".

6.2 Awards

TSMC has made significant contributions to ESH improvement. These efforts have led to recognition from the government on various occasions.

Year	Awards
2004	"Water Conservation Outstanding Performance Award" from the Water Resources Agency
2004	"Annual Environmental Protection Award for Enterprise" from the Environmental Protection Administration (EPA)
2004	"Safety & Hygiene Excellent Unit Award" from the Tainan Science Park Administration (SPA)
2004	"National Safety & Hygiene Excellent Unit Award" from the Council of Labor Affairs (CLA)
2003	"Energy Conservation Award" from the Ministry of Economic Affairs (MOEA)
2003	"Annual Environmental Protection Award for Enterprise" from the EPA
2003	"National Award for Outstanding Achievements in Industrial Waste Disposal and Resources Reduction and Recycling" from the EPA
2003	"Water Conservation Outstanding Performance Award" from the Water Resources Agency
2003	"National Safety & Hygiene Excellent Unit Award" from the CLA
2003	"Safety & Hygiene Excellent Unit Award" from the Hsinchu SPA
2003	New system of "Safety, Hygiene and Volunteer Protection Program Unit Honor" from the CLA
2002	"Annual Environmental Protection Award for Enterprise" from the EPA
2002	"National Award for Outstanding Achievements in Operation and Maintenance for Pollution Control Facilities" from the Industrial Development Bureau (IDB), MOEA
2002	"Energy Conservation Award" from the MOEA
2002	"Water Conservation Outstanding Performance Award" from the Water Resources Agency
2002	"Safety & Hygiene Excellent Unit Award" from the Hsinchu SPA
2002	New system of "Safety, Hygiene and Volunteer Protection Program Unit Honor" from the CLA
2001	"National Award for Outstanding Achievements in Operation and Maintenance for Pollution Control Facilities" from the IDB, MOEA
2001	"Energy Conservation Award" from the MOEA
2001	"Safety & Hygiene Excellent Unit Award" from the Hsinchu SPA
2001	"Volunteer Protection Program 3 Years Honor" from the CLA
2000	"Industrial Excellence Award" from the MOEA
2000	"National Award for Outstanding Achievements in Operation and Maintenance for Pollution Control Facilities" from the IDB, MOEA
2000	"National Safety & Hygiene Excellent Unit Award" from the CLA
2000	"Safety & Hygiene Excellent Unit 5-Star Award" from the Hsinchu SPA

6.3 Environmental Performance

6.3.1 Wastewater Treatment

All TSMC fabs not only monitor wastewater quality on-line but also analyze wastewater at least three times a year. All the analysis results have met the wastewater standards by the Science Park Administration (SPA).

2004 TSMC Wastewater Quality Analysis Results

Items	Fab	Fab 2			Fab 3			SPA Standards
	Date	Apr	Aug	Dec	Mar	Sep	Dec	
pH		6.6	6.3	6.5	6.3	6.8	6.6	5-10
Temperature (°C)		23.7	26.1	23.5	23.8	26.8	25.8	35
Suspended Solid (mg/L)		42.6	62.0	38.2	3.0	85.4	2.8	300
Chemical Oxygen Demand (mg/L)		18.7	72.6	15.6	70.9	16.4	114	500
Biochemical Oxygen Demand (mg/L)		60.3	127.0	46.9	33.7	49.4	62.2	300
Fluoride (mg/L)		4.6	4.0	5.3	1.0	7.1	12.4	15

Items	Fab	Fab 5			Fab 6			SPA Standards
	Date	Apr	Aug	Dec	Apr	Jul	Nov	
pH		6.6	6.4	6.4	7.0	6.5	6.2	5-10
Temperature (°C)		23.9	26.9	24.1	27.7	29.9	27.4	35
Suspended Solid (mg/L)		137	140.0	78.0	102.0	75.1	53.1	300
Chemical Oxygen Demand (mg/L)		44.5	77.4	25.8	198.0	185.0	147.4	500
Biochemical Oxygen Demand (mg/L)		28.6	28.5	17.6	29.4	29.3	28.8	300
Fluoride (mg/L)		3.9	4.3	6.0	10.1	7.6	3.9	15

2004 TSMC Wastewater Quality Analysis Results

Items	Fab	Fab 7 (7A1)			Fab 7 (7A2)			SPA Standards
	Date	May	Jul	Nov	May	Jul	Nov	
pH		7.3	7.4	6.5	8.0	7.9	6.8	5-10
Temperature (°C)		30.1	28.5	27.3	28.0	28.1	24.8	35
Suspended Solid (mg/L)		3.8	10.0	5.2	<2.5	<2.5	7.8	300
Chemical Oxygen Demand (mg/L)		25.6	44.0	49.7	30.3	48.6	13.0	500
Biochemical Oxygen Demand (mg/L)		15.2	32.5	ND	17.1	ND	ND	300
Fluoride (mg/L)		2.4	5.4	5.4	2.0	1.2	1.4	15

Items	Fab	Fab 8			Fab 12			SPA Standards
	Date	May	Aug	Nov	May	Aug	Nov	
pH		7.0	7.0	6.4	6.8	6.7	6.4	5-10
Temperature (°C)		27.0	27.7	25.2	25.5	29.0	24.8	35
Suspended Solid (mg/L)		54.2	15.2	21.2	61	120.0	49.0	300
Chemical Oxygen Demand (mg/L)		43.4	64.9	71.6	128	176.0	179.0	500
Biochemical Oxygen Demand (mg/L)		32.5	28.6	25.8	61.6	94.3	89.5	300
Fluoride (mg/L)		ND	7.1	10.4	12.5	6.5	10.1	15

Note: The qualities of all the effluent meet the standards of SPA.



6.3.2 Water Resource Recycling

Water is a precious resource on earth. TSMC continuously improved the water recycling rate and promoted the concept of water saving. Due to the increase of water recycling and decrease of water usage by process tools, the process water recycling rate showed great improvement from 66.2% in 2000 to 76.9% in 2004. The saving increased about 1.2 times.

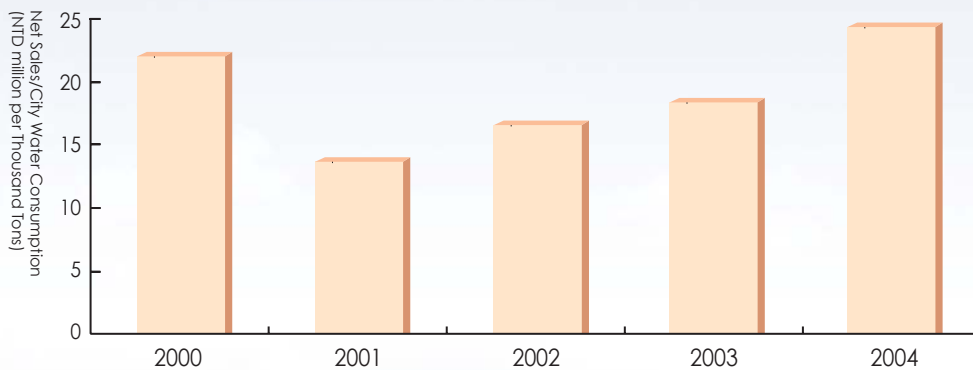
TSMC Water Conservation Performance of 2000-2004

Item	2000	2001	2002	2003	2004
Average process water recycling rate (%) ¹	66.2%	69.5%	73.3%	75.2%	76.9%
Water saved (million tons)	531	711	852	986	1162
Water saved, measured by standard swimming pools ²	2,124	2,844	3,410	3,943	4,648
Water saved, measured by the full capacity of Paoshan reservoir ³	0.99	1.33	1.59	1.84	2.17

- Note: 1. Average process water recycling rate is defined by the Science Park Administration.
 2. A standard 50 x 25 x 2m swimming pool, contains up to 2,500 tons of water.
 3. Paoshan Reservoir is the major reservoir that supplies water to Hsinchu Science Park. The full capacity of Paoshan Reservoir is 5.35 million tons.

With regard to the net sales/city water consumption, TSMC has implemented a series of water conservation programs and practices since 2002. TSMC invited the prestigious international semiconductor research organization, International SEMATECH, to conduct water optimization project, focusing on the Chemical Mechanical Polishing (CMP) tools to improve the water recovery rate and decrease water usage. With the increase of both the wafer out and annual net sales, the net sales/city water consumption increased consistently.

Net Sales from City Water Consumption





Acid gases pollution control facility – Wet Scrubber



VOCs pollution control facility – Zeolite Concentration Rotor

6.3.3 Air Pollution Control

Regarding air pollution control, TSMC has not only installed new air pollution control facilities in each fab to meet the air pollutants emission standards stipulated by the EPA, but also expanded the Volatile Organic Compounds (VOCs) backup pollution control facilities and backup fuel supply systems to reduce the risk of facility breakdown and ease the air pollution problem.

All TSMC fabs monitor the real-time concentration of VOCs and conduct an annual emission measurement as required by environmental laws. The emissions measured have been far below the legal standards.

2004 TSMC Exhaust Analysis Results

Fab	Fab 2										Fab 5					
Stack No.	P001	P002	P003	P004	P005	P006	P007	P008	P009	P011	P101	P102	P103	P104	P201	P202
H ₂ SO ₄ (kg/hr)	ND	ND	ND	ND	*	*	ND	*	*	*	*	ND	ND	*	*	ND
Fluoride (kg/hr)	ND	ND	ND	ND	*	*	ND	*	*	*	*	ND	ND	*	*	ND
HCl (kg/hr)	ND	ND	ND	ND	*	*	0.41	*	*	*	*	ND	ND	*	*	ND
Cl ₂ (ppm)	0.168	ND	ND	ND	*	*	ND	*	*	*	*	0.14	0.176	*	*	ND
NH ₃ (g/s)	*	*	*	*	ND	0.008	*	0.012	*	*	*	*	*	0.004	*	*
HNO ₃ (kg/hr)	ND	ND	ND	ND	*	*	ND	*	*	*	*	ND	ND	*	*	ND
H ₃ PO ₄ (kg/hr)	ND	ND	ND	ND	*	*	ND	*	*	*	*	ND	ND	*	*	ND
VOCs DRE (%)	*	*	*	*	*	*	*	*	97%	96%	96%	*	*	*	95%	*

Fab	Fab 6											Fab 7						
Stack No.	P101	P105	P107	P108	P109	P110	P115	P116	P117	P119	P120	P104	P108	P110	P303	P305	P308	P314
H ₂ SO ₄ (kg/hr)	ND	ND	*	*	*	*	ND	*	*	*	*	ND	*	*	ND	*	*	*
Fluoride (kg/hr)	ND	ND	*	*	*	*	ND	*	*	*	*	ND	*	*	ND	*	*	*
HCl (kg/hr)	ND	ND	*	*	*	*	ND	*	*	*	*	ND	*	*	ND	*	*	*
Cl ₂ (ppm)	ND	0.189	*	*	*	*	*	*	*	*	0.008	ND	*	*	ND	*	*	*
NH ₃ (g/s)	ND	0.067	*	*	*	*	*	*	*	*	*	*	ND	*	*	ND	*	ND
HNO ₃ (kg/hr)	ND	*	*	*	*	*	ND	*	*	*	*	ND	*	*	ND	*	*	*
H ₃ PO ₄ (kg/hr)	ND	*	*	*	*	*	ND	*	*	*	*	ND	*	*	ND	*	*	*
VOCs DRE (%) or emission (kg/hr)	*	*	96%	92%	94%	98%	*	94%	93%	92%	*	*	*	0.330	*	*	0.069	*

2004 TSMC Exhaust Analysis Results(continued)

Fab	Fab 3																			
Stack No.	P101	P102	P103	P105	P106	P107	P108	P109	P110	P111	P112	P113	P114	P115	P116	P207	P208	P209	P212	P213
H ₂ SO ₄ (kg/hr)	ND	ND	*	ND	ND	ND	ND	ND	ND	ND	*	*	*	*	ND	ND	ND	ND	*	*
Fluoride (kg/hr)	0.070	0.030	*	ND	ND	0.080	ND	ND	ND	ND	*	*	*	*	0.002	0.04	0.070	ND	*	*
HCl (kg/hr)	ND	ND	*	*	*	*	*	ND	ND	*	*	*	*	*	ND	0.33	0.010	*	*	*
Cl ₂ (ppm)	*	*	*	0.153	0.158	0.163	0.154	*	*	0.160	*	*	*	*	ND	0.165	0.162	*	*	*
NH ₃ (g/s)	ND	0.011	0.006	*	*	0.020	*	0.002	0.007	*	*	*	*	*	0.066	0.013	*	*	*	*
HNO ₃ (kg/hr)	*	*	*	ND	0.01	ND	ND	*	*	ND	*	*	*	*	ND	ND	ND	ND	*	*
H ₃ PO ₄ (kg/hr)	*	*	*	ND	ND	ND	ND	ND	*	ND	*	*	*	*	ND	ND	ND	ND	*	*
VOCs emission (kg/hr)	*	*	*	*	*	*	*	*	*	*	0.280	0.010	0.011	0.020	*	0.130	*	*	0.050	0.002

Fab	Fab 8				Fab 12				
Stack No.	P106	P109	P112	P121	P006	P008	P009	P012	P211
H ₂ SO ₄ (kg/hr)	ND	*	*	*	ND	ND	*	ND	*
Fluoride (kg/hr)	ND	*	*	*	ND	ND	*	ND	*
HCl (kg/hr)	ND	*	*	*	ND	ND	*	ND	*
Cl ₂ (ppm)	0.160	*	*	*	ND	0.142	*	ND	*
NH ₃ (g/s)	*	0.006	*	*	*	*	0.006	*	*
HNO ₃ (kg/hr)	0.002	*	*	*	0.0004	0.0003	*	0.0002	*
H ₃ PO ₄ (kg/hr)	ND	*	*	*	0.0010	0.0007	*	0.0005	*
VOCs DRE (%)	*	*	96%	97%	*	*	*	*	93%

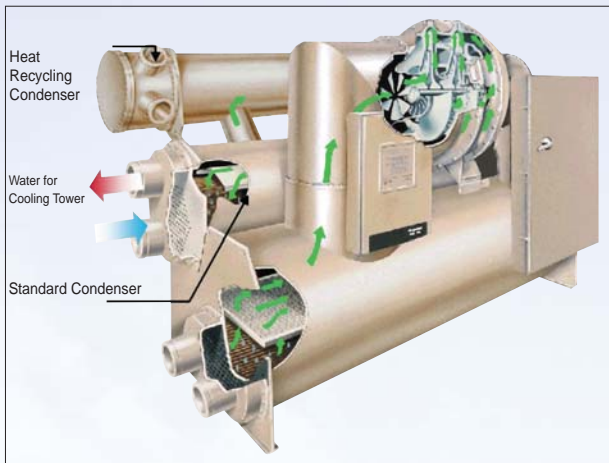
- Note: 1. All the treatment of H₂SO₄, Fluoride, HCl, HNO₃ and H₃PO₄ meets the control factors of wet scrubber of "Air Pollution Control and Emission Standards for Semiconductor Manufacturing Industry".
2. All the treatment of VOC meets the DRE (Destruction Removal Efficiency) (>90%) or factory emission (<0.6kg/hr) of "Air Pollution Control and Emission Standards for Semiconductor Manufacturing Industry".
3. All the treatment of NH₃ and Cl₂ meets the "Air Pollutants Emission Standards for Stationary Pollution Sources".
4. *: Analysis not required.
5. ND : Not Detected.

6.3.4 Energy Conservation

TSMC continuously makes concerted efforts to conserve energy to reduce the emission of global warming gas – carbon dioxide. Since 1999, TSMC has been awarded the “Energy Conservation Award” by the Ministry of Economic Affairs (MOEA) for 5 consecutive years. Net sales/power consumption increased from 121 NT\$ million/million KWH in 2003 to 145 NT\$ million/ million KWH in 2004.

For Fab 12, its major accomplishments of energy conservation are as follows:

- The installation of heat recycling chiller facilitates 35°C warm water and saves 36,595 MWH/year.
- The adoption of inverters in air condition, exhaust and process water systems saves 19,207 MWH/year.

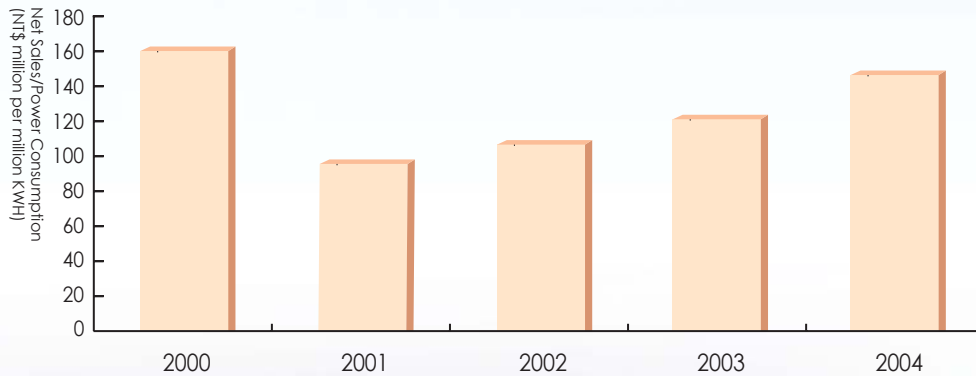


Heat Recycling Chiller



Inverters in Process Water System

Net Sales from Power Consumption





Transportation of waste sludge to the cement plant.



Close supervision to ensure proper waste disposal.

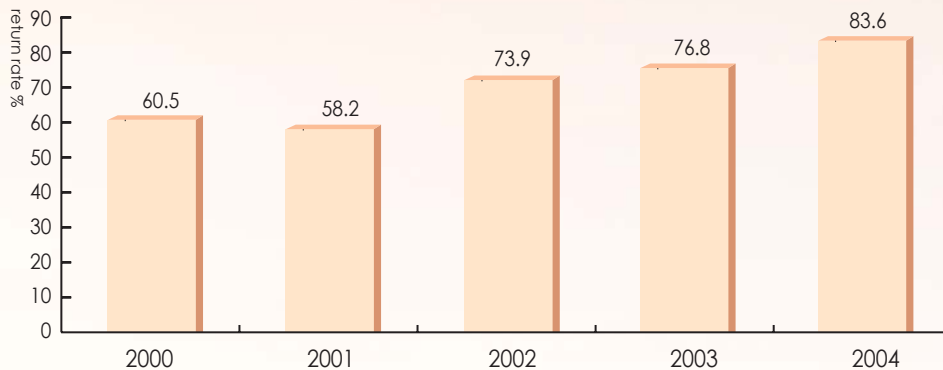
6.3.5 Waste Management and Resource Recycling

Waste minimization and pollution prevention have been TSMC's principle when it comes to waste management. Recycling is considered to be the primary measures for the treatment of waste, while non-recyclable items undergo careful treatment performed by licensed treatment companies. TSMC not only insists on consigning legal contractors but also monitoring the disposal of waste. In order to ensure the waste being legally and properly disposed, TSMC audits waste disposal contractors frequently.

TSMC's achievements of waste reduction and recycling in 2004 are as follows:

- Reduce the discharge of waste solvent by separating wastewater from the draining pipes.
- Overall waste recycling rate significantly went up to 83.6% in 2004 from 76.8% in 2003.
- The quantity of waste recycled in 2004 was 5,600 tons higher than that in 2003.
- Promote recycling of leftover, empty ink cartridge, waste hydrofluoric acid, waste sulfuric acid, waste phosphoric acid, waste copper sulfate and waste calcium fluoride sludge.

Overall Waste Recycling Rate





ISO14001 certificate



OHSAS18001 certificate

6.4 ESH Management System Certification

All TSMC fabs were ISO14001 and OHSAS18001 certified in 1996 and 2000 onwards. TSMC proposes improvement projects like pollution control, energy and resources conservation, waste reduction, safety and health management, fire and explosion prevention as well as loss prevention in order to minimize potential ESH risks. In 2004, fab 2, 3, 5, 6, 7, 8 and 12 completed the certification renewal process and were ISO14001: 2004 certified.

The certification periods of those fabs are listed as follows:

Site	ISO14001	OHSAS18001
Fab 2	1996	2000
Fab 3	1997	2000
Fab 5	2000	2000
Fab 6	2001	2001
Fab 7	1977	2001
Fab 8	2001	2001
Fab 12	2002	2002

6.5 Occupational Injury/Illness Statistics

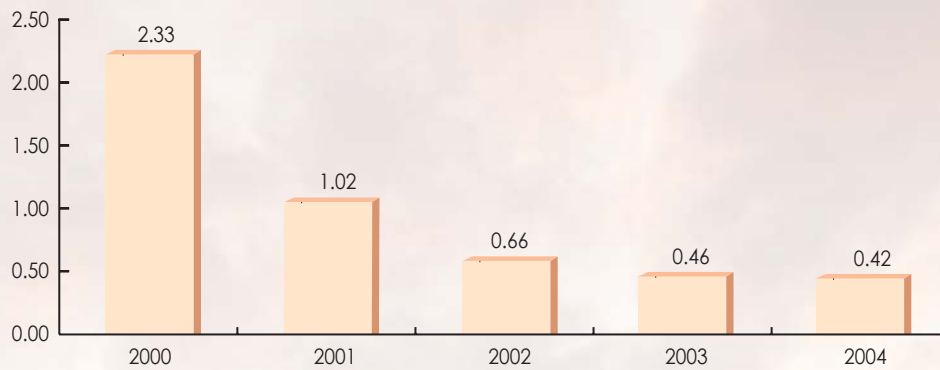
Occupational injury/illness statistics is an important performance indicator demonstrating the effectiveness of occupational safety and health programs. TSMC is continuously promoting work safety programs and implementing the programs into employees' daily operation. In 2004, TSMC reached its climax in respective of its sales and profit. Even though the numbers of employees and work hours have relatively increased, the occupational injury/illness indices showed better results in 2004 compared with those in 2003.

To evaluate the effectiveness of occupational health and safety programs, TSMC chooses the following two indices defined by the Council of Labor Affairs (CLA): 1. Injury Case Rate per thousand workers (The number of loss-day injury cases per thousand workers) 2. Frequency Rate (FR, the number of disabling injury & illness cases per million man-hours), Note: Traffic accident injuries are not included.

1. Injury Case Rate per thousand workers

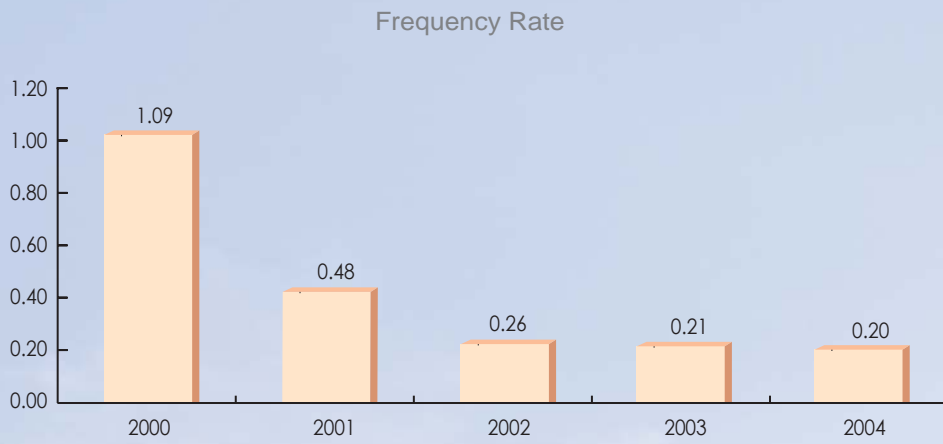
TSMC's injury case rate per thousand workers was significantly reduced from 0.46 in 2003 to 0.42 in 2004, much lower than 6.5 of the Taiwan national injury case rate reported by CLA.

Injury Case Rate per Thousand Workers



2. Frequency Rate (FR)

The FR of TSMC was reduced from 0.21 in 2003 to 0.20 in 2004, much lower than 1.91 of Taiwan national FR or 1.2 of the semiconductor industry's FR reported by the U.S. Bureau of Labor Statistics (BLS).



7 Environmental Management

7.1 Environmental Accounting

In 2002, TSMC established the environmental accounting system and integrated the environmental accounting practices with the Environmental Management System (EMS) one year later in order to evaluate the economic benefits of environmental management programs. The integrated system not only facilitates each fab to implement environmental management programs, but also evaluates their economic efficiency simultaneously. By the end of 2004, the total benefit for promoting environmental management programs is up to NT\$ 93,870,000.

TSMC Environmental Costs in 2004

(NT\$ in Thousand)

Classification	Description	Investment	Expenses
1. Direct cost for reducing environmental impacts	(1) Pollution Control Fees for air pollution control, water pollution control and others	1,055,000	1,941,665
	(2) Resources Conservation Costs for resources (e.g. water) conservation	537,000	305,000
	(3) Waste Disposal and Recycling Fees for waste treatment (recycling, incineration, or landfill)	0	89,375
2. Indirect cost for reducing environmental impacts (managerial cost)	Including: (1) Cost of training (2) Expenditure of environmental management system and certification (3) Fees of environmental measurement and monitoring (4) Fees of purchasing environmental protection products (5) Fees of environmental protection organizations	168,000	191,370
3. Expenditure of environment-related activities and environmental foundation	Including: (1) Sponsoring environmental protection activities and establishing environmental protection foundation (2) Advertising fees	0	1,973
4. Other environmental related costs	(1) Costs for de-contamination and remediation (2) Environmental damages insurance and environmental taxes (3) Costs related to environmental settlement, compensations, penalties and lawsuits	0	0
Total		1,760,000	2,529,383

TSMC Environmental Efficiency in 2004

(NT\$ in Thousand)

Item	Description	Efficiency
Recycling of industrial waste	Recycling of waste pallets, packaging materials, wafer boxes, wafers, computers and accessories, fluorescent lamps, and metals.	4,570
Reduction of industrial waste	Costs of industrial waste disposal saved by reducing their quantity.	87,000
Reduction of energy and resource consumption	Costs saved by reducing energy and water consumption	2,300
Total		93,870

7.2 Life Cycle Assessment

Since 2002, TSMC conducted the “Life Cycle Assessment Project” persistently. This study collected and calculated the data of wafer manufacturing – from raw materials suppliers to the products – including energy and raw materials consumption, pollutants generation from silicon mining, wafer production, to Integrated Circuit (wafer) manufacturing. TSMC Fab 2, 3, 5, 6, 7 and 8 have completed their eco-profile which not only satisfies international standards but also customers’ requirements.

The analyzed data showed that water is the most consumed raw material, followed by air, coal and petroleum oil. Air can be viewed as a recoverable resource and therefore poses no environmental problem. According to the initial weighting analysis, the most significant environmental impact of manufacturing a wafer is water consumption, followed by energy consumption, aquatic toxicity and global warming effect.

7.3 Green Procurement

TSMC persistently promoted “Green Procurement”. In 2004, TSMC invited 9 primary raw material suppliers to participate the “Green Supply Chain Project” which was sponsored by the Industrial Development Bureau and consulted by Industrial Technology Research Institute.

The “Green Supply Chain Project” amended TSMC green procurement procedure. TSMC created a banned substance list for wafer manufacturing, including the Restriction of Hazardous Substances (RoHS) regulated by European Union, Ozone Depleting Substances, Polychlorinated Biphenyls and carcinogens. Simultaneously, all suppliers are also strictly required not using these banned substances in their products. By applying this green supply chain along the up-to-downstream, TSMC as well as its suppliers and customers are benefited from a win-win situation.

TSMC restricted substance	
Asbestos and its compounds	Ozone Depleting Substances
Azo - Based Materials	Polybrominated Biphenyls (PBB's) and their Ethers/Oxides (PBDE's)
Cadmium and its compounds	Polychlorinated Biphenyls (PCB's)
Certain Ethylene Glycol Ethers	Polychlorinated Naphthalenes (more than 3 chlorine atoms)
Chromium (VI) and its compounds	Radioactive Substances
Lead and its compounds	Shortchain Chlorinated Paraffins
Mercury and its compounds	Tributyl Tin, Triphenyl Tin and oxides



Kick-off meeting of the "Green Supply Chain Project"



Achievements of the "Green Supply Chain Project" Seminar

7.4 Greenhouse Gases Emission Reduction

The Perfluorinated Compounds (PFCs), such as CHF_3 , C_2F_6 , SF_6 , CF_4 , C_3F_8 , C_4F_8 and NF_3 are widely used in the semiconductor manufacturing processes. Attributable to the global warming effect which PFCs result in, PFCs emission reduction has been one of the emphases of Taiwan Semiconductor Industrial Association (TSIA) and World Semiconductor Council (WSC). In order to sustain its management, TSMC actively participated in PFCs gas emission reduction.

TSMC signed “Memorandum of Understanding on Perfluorinated Compounds Emissions Reduction of TSIA” in 2001. TSMC has committed to reducing PFCs emission to 10% below the average emission value of 1997 and 1999 by 2010. In order to effectively reduce PFCs emission, TSMC has adopted the following strategies:

- Measure the PFCs use rate of process tools and destruction efficiency of abatement systems to thoroughly understand the PFCs emission amount.
- Optimize the use of PFCs in the semiconductor manufacturing process.
- Seek substitute gases for PFCs.
- Conduct evaluation and make use of PFCs abatement systems.

TSMC has already installed PFCs abatement systems in newly-bulit fab. In the future, TSMC will endeavor to reduce PFCs emission by a variety of strategies.

8 People Well-being

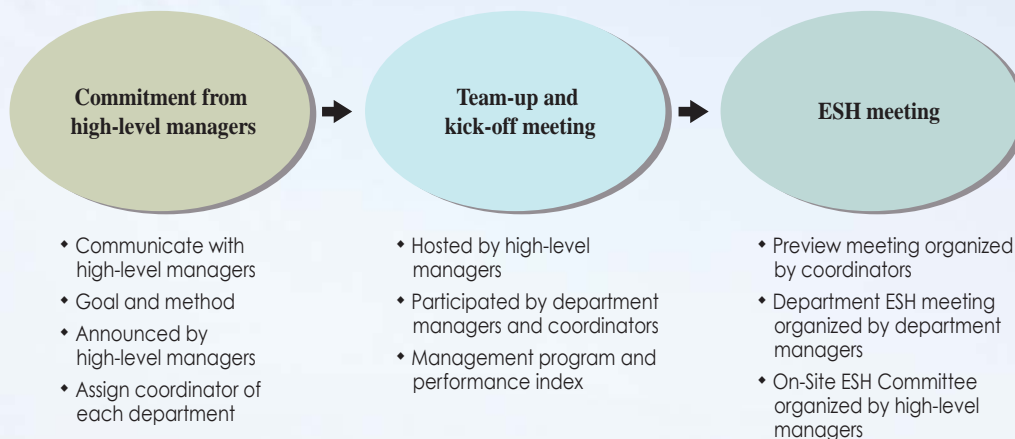
8.1 Safety Culture

TSMC commits that all managers should take responsibility to ensure a safe and healthy workplace. Since 2004, department managers have been required to hold preview meeting in order to thoroughly understand the performance of ESH programs, and the directors are also responsible for reviewing the ESH issues during regular ESH committee.

In addition, TSMC established a Major Accident Review Board (MARB) in 2004. It invites all Technical Board members to review the major accidents and implement optimized and standardized preventive measures companywide in order to minimize operational risks. At the end of 2004, TSMC actively sought mutual communication with its primary contractors. In line with the common goal of establishing a zero-disaster safety culture, TSMC also shared its experiences to assist its primary contractors to establish ESH management system and acquire ISO14001 and OHSAS18001 certifications.

TSMC endeavors in continuous improvement of the management system and establishing safety culture. In 2004, TSMC promoted a series of safety-related activities, including domestic safety and fire prevention activities, child/old safety seminars, preventive driving safety promotions, dormitory fire evacuation drills, CO poison preventive practices and job observation program, so as to arouse its employee's safety awareness and instill safety concepts into their family.

Process of organizing ESH meeting



8.2 Health Promotion

In order to offer a safe and healthy workplace, TSMC provides regular physical examinations for its employees. Based on their examination results, TSMC organizes different health care services to suit different physical needs. TSMC also designs a medical webpage, which covers physical examination reports, most up-to-date medical information and application procedures for various health care services. Besides, TSMC endeavors in providing a series of health promotion programs, including blood drive, cancer screening for women, hepatitis vaccination, abdominal ultrasound examination and fitness program, breast milk promotion, psychological consultation and pressure management program, with more than 30,000 person-time participated in 2004. Besides, to prevent influenza, more than 5,000 employees and their family took influenza vaccination.

Furthermore, TSMC offers clinical and dental care services in Fab 5 and Fab 12 and expanded the services to Fab 3 in 2004. Provision of complete clinical services include nutrition consultation, weight loss classes, self-paid acupuncture weight loss program, Helicobacter Pylori C-13 Urea Breath Test, thyroid ultrasound examination, endocrinology clinic, dermatology clinic, bone mineral densitometry examination and cancer screening, with a 29.4% growth rate compared with that in 2003. With heavy emphasis on employees' health, TSMC is determined to introduce more professional and convenient health promotion programs in the future.

Wellness

流感疫苗接種囉!

流感肆虐 小心別趕流行囉!

迎新年時，又是流感盛行的季節。為預防流感病毒之感染及為所造成之併發症或導致員工之家人感染之機會，促請您選擇特種流感疫苗注射活動。其經由疫苗接種種類，能減少對个人或家人罹患流感之機率，以改善個人的生活品質。

【疫苗接種實施辦法-接種時間】

廠別	日期	時間	地點	
竹科廠區	員工	10/12-13/1000 A區: 10/12, 13/1000 B區: 10/14, 15/1000	18:00-20:00 健康中心	
	家屬	10/16-17/1000 (週一、週二) 11/20-21/1000 (週一、週二)	9:00-16:00 5:00-12:00 (請持專業特種醫療人員入) 9:00-16:00 六、日、國定假日	
	竹北廠區	員工/家屬	10/20-21/1000 (週一、週二)	六、日、國定假日
	員工	A區: 10/20, 21 B區: 10/23, 24	17:00-21:00 六、日、國定假日	
南科廠區	員工	十區廠: 10/13, 14 A區: 10/13 B區: 10/14	17:00-21:00 十區廠健康中心	
	家屬	10/18-18/23 (週一、週二) 10/19-19/23 (週二、週三)	18:00-12:00 18:00-12:00 十區廠健康中心 (請持「最大樓進入」)	
	員工	10/18-18/23 (週一、週二) 10/19-19/23 (週二、週三)	18:00-12:00 18:00-12:00 十區廠健康中心 (請持「最大樓進入」)	

【服務對象】 全體員工
員工親屬及眷屬 (年齡2歲以上之親屬均歡迎參加且沒有傳染病者)

【報名方式】 1. 親臨 my home 服務台向服務中心領取各種健康服務資訊及預約卡
2. 親臨健康服務中心

【報名日期】 即日起至 **【員工自行費用】** 每劑200元 **【收費方式】** 每月10日前繳完即可

【注意事項】 1. 繳納了疫苗接種費，一週內請勿服用第二劑
2. 新疫苗: hexagram 疫苗，請務必告知醫生，以便評估
3. 有嚴重過敏反應者，請先告知醫護人員進行評估

任何問題請洽各廠健康中心

■ 五廠: 706-5315 ■ 三廠: 703-3550 ■ 六廠: 706-8555 ■ 七廠: 707-4491
■ 八廠: 708-2511 ■ 十二廠: 712-3120 ■ 十四廠: 714-2120

主辦單位: 員工服務部-健康促進課

Wellness

三廠診所~為您的健康把關!

門診親切 視病猶親 健檢詳盡 健康隨行

服務項目 健康檢查、肝腎功能檢查、血脂檢查、腹部超音波檢查、
輸門診安排呼吸氣管洗滌、尿沉澱及異體檢查及成人體檢、
疫苗注射: A、B型肝炎疫苗、破傷風疫苗等疫苗注射。

地點 三廠一樓健康中心內

門診時間

星期別	時段	科別	醫師姓名
星期二	13:30-16:30	家庭醫學科	涂貴琪 醫師
星期三	13:30-16:30	肝膽腸胃科	曾冠瑛 醫師

肝膽腸胃科 醫師曾冠瑛 13:30-16:30 (每週三週十位諮詢)

門診預約方式

- my home 服務健康中心預約健康查詢/線上預約及查詢/各廠門診掛號
- 親臨掛號或電話諮詢專線/掛號電話: 703-8106 / 三廠健康中心: 703-3555

應屆超會裝檢查預約方式

my home 服務健康中心預約健康查詢/線上預約及查詢/健康促進活動預約/三廠掛號服務台預約

醫師簡介

涂貴琪 家庭醫學科
對疾病診斷總是平心靜氣，男女老少，任何疾病或症狀來詢均可嘗試，特別對於動植物長期慢性病的臨床診斷，從謹慎性、過問性、長期性與精細性的健康照顧。
學歷: ●台北醫學大學 ●任職東亞醫院任主治醫師

曾冠瑛 婦科 肝膽腸胃科
擁有最新超音波及檢查儀器，可詳盡為民眾作體檢服務，並提供民眾肝炎專業諮詢及治療。
學歷: ●中央研究院醫學系醫師
●任職東亞醫院任醫師 ●任職三廠健康中心主任、健康課主任

~健康中心關心您~

8.3 ESH Activities

TSMC not only promotes a variety of ESH activities but also participates in related ESH activities held by Science Park Administration (SPA) and other environmental protection organizations. These activities help instill the concepts of environmental protection and work safety into all employees, and implement the concepts in their life. In 2004, the activities TSMC took part in are as follows:

- Participated in the ESH Month Activity Held by Science Park Administration
With more than 3,000 neighborhoods participated in the jogging activity, TSMC successfully raises ESH awareness.
- Sponsored World Earth Day
Instilled the concept of environmental protection through interactions between parents and their children in the natural environment.
- Organized office greening competition
The office greening competitions organized in Feb 2 and 5 includes environmental greening and hygiene, garbage sorting and recycling, energy and paper conservation, etc. and encouraged growing plants indoor and outdoor to establish a healthy working environment.



Office greening competition



Indoor planting



Japanese-styled scenery



World Earth Day – Activity 1



World Earth Day – Activity 2



Jogging activity during ESH month

9 Reduction of Operational Risks

9.1 Emergency Response

Emergency response requires comprehensive planning and continuous modification and practice. TSMC's emergency response procedures include the initial immediate response (or "Emergency Response Period"), emergency management steps and disaster recovery plans. TSMC has a disaster response organization set up at the company headquarters, which formulates "Disaster Recovery Guidelines". Each fab also formulates its own disaster recovery plan that specifies detailed response procedures for possible disasters.

Aside from organizing quarterly emergency response drills for Engineering and Facility departments, TSMC also requires each fab to organize large-scale emergency response drills and evacuation drills annually. In 2004, emergency response drills included electrical system firefighting, toxic gas leakage, earthquake recovery, emergency medical team and evacuation practice were organized. Moreover, TSMC designed emergency response drills specially for on-site service contractors in order to build up the supporting mechanism and minimize the risk of possible disasters.



Incident commanding system team-up



Firefighting by emergency response team



Evacuation and excursion practice



Fire engines support



Awarded to ESH well-performed contractors



2004 contractor communication meeting



Drama themed "Confined Space Work"

9.2 Contractor Management

TSMC committed to communicating with its contractors and suppliers, and encouraging them to improve their ESH performance. In the 2004 annual contractor communication meeting, TSMC not only showed great concern on ESH issues, but also praised its contractors for their excellent performance. In 2004, TSMC especially highlighted the concepts of "Confined Space Work" via drama

In 2004, TSMC affiliated with a total of 1,881 contracting companies, in which about 1,970,000 workers and 14,300,000 work hours were recorded. Statistically, there were 368 violations including not wearing proper personal protective equipment (PPE), misplacement of construction waste, no proper fence at high elevation openings, unauthorized application of work permits, drinking alcohol and chewing betel nuts and chemical containers with no hazard labels. Besides, 10 accidents caused by contractors were recorded, including 4 fire alarms, 5 injuries, and 1 gas leakage. According to the analysis results, those accidents can be attributable to failure to define construction area, insufficient preparations and reviews, personnel mis-operation and usage of unqualified equipments.

Consequently, emphases of 2005 contractor management policy fall onto establishing an integrated ESH management system and enhancing ESH performance simultaneously in order to minimize possible accidents in the future.

10 Corporate Social Responsibility

TSMC Education and Culture Foundation

TSMC is dedicated to becoming the leading corporate citizen and has been an active sponsor of educational and cultural activities in Taiwan. In order to better consolidate and organize our contributions and fulfill our commitment to social responsibility, TSMC established the TSMC Education and Culture Foundation (TSMC Foundation) in 1998. Dr. F. C. Tseng, Deputy CEO of TSMC, has served as Chairman of the Foundation since 2002. Last year, in addition to existing long term projects, the Foundation started several new initiatives, including the “ TSMC Scholarship ”, “ TSMC Youth Novel Writing and Book Review Award ” and “ TSMC Volunteer Program ”.

Contributions to the TSMC Site Community

We strive to enrich the site communities and make them better places to live. TSMC is thus committed to promoting various educational, artistic and charitable initiatives at two of our largest operating sites, “ Hsinchu ” and “ Tainan ”. In 2004, we once again sponsored the “ TSMC Hsinchu Art Festival ”. This year’s themes included “ Classical Drama ”, “ Children’s Esthetic Programs ” and a series of “ Stories of Creativity ” lectures. The Festival brought high-quality artistic events to the local community and created opportunities for local audience to enjoy the beauty of arts. In the summer of 2004, the Foundation also assisted “ Tao-Shan ” primary school in Hsinchu County to successfully cope with devastating typhoon damage. The school was relocated and provided with operational support that enabled it to continue serving student in spite of the storm. In Tainan, we continued to sponsor the “ National Cheng Kung University Culture and Art Festival ” and to support the publication of the picture book “ The Beauty of Tainan ”.

Equal Opportunity Employment

TSMC believes in equal opportunity employment and values the diversity its staff contributes. Recruitment is conducted via open selection and is based on candidate merit to meet the needs of each position, regardless of race, gender, age, religion, nationality or affiliation.

Contact Window

If you have any comments or questions, please contact

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