

Site Reports

**Tokuyama Factory**

Location: 1-1, Mikage-cho, Shunan-shi, Yamaguchi 745-8648, Japan  
 Number of employees: 1,583  
 Total site area: 1.91 million m<sup>2</sup>  
 Main products: Cement, inorganic chemical products, organic chemical products, polycrystalline silicon, fumed silica, polyvinyl chloride, and other products



Hideki Adachi  
Tokuyama Factory General Manager

Still situated at the Company's first business site, the Tokuyama Factory is the Group's main manufacturing facility, and its products account for about 90% of non-consolidated sales. The factory operates with the motto, "Go to work healthy and return home happy." Aiming to achieve 6.0 million accident-free hours at the factory and 9.0 million accident-free hours at its contractors, the factory is working hard to keep everyone on site happy and safe at work. In fiscal 2018, the factory's top priorities are: (1) to identify and eliminate risks related to contact with heat and being caught in, on or between equipment; (2) to conduct active dialogue on safety in order to remove the root causes of continued risks on the production floor; (3) to reaffirm the consistency of actual conditions and work standards for contract work and eliminate sources of risk; and (4) to implement safety point-and-call at crosswalks in facilities, conduct hazard prediction training, and use case studies to raise risk awareness.

**Performance Data**

	Unit	FY2013	FY2014	FY2015	FY2016	FY2017
SOx emissions	Metric tons	750	550	680	750	780
NOx emissions	Metric tons	9,200	8,850	8,900	9,500	10,100
Soot emissions	Metric tons	174	135	138	138	168
Industrial water consumption	Million metric tons	42.2	41.7	42.1	44.1	44.5
Effluent discharged	Million metric tons	22.1	23.9	24.2	24.2	24
COD level	Metric tons	132	110	124	114	119
Total nitrogen discharged	Metric tons	70	89	92	145	173
Total phosphorous discharged	Metric tons	2.4	2.6	2.2	2.1	2.1
PRTR-designated substance emissions	Metric tons	33	25	36	29	28
Waste generated	Thousand metric tons	395	354	389	376	366
Waste sent to landfills	Metric tons	277	313	383	368	382
Energy consumption	Thousand gigajoules	43,700	44,200	45,100	47,100	49,500
CO <sub>2</sub> emissions (originating from fossil fuel)	Thousand metric tons	4,020	4,040	4,110	4,290	4,500
Complaints	Cases	1	0	1	0	0



**Emissions and Transfer of Specific PRTR-Designated Substances in Fiscal 2017**

Unit: metric tons (mg-TEQ equivalency for dioxins)

Substance name	Regulatory number	Amount of emissions				Amount transferred
		Atmospheric	Water	Soil	Subtotal	
Chloroethylene (vinyl chloride)	94	7.6	0.0	0.0	7.6	0.0
1,2-Dichloroethane	157	6.3	0.0	0.0	6.3	1.6
Chloromethane (methyl chloride)	128	3.8	0.0	0.0	3.8	0.0
Cresol	86	0.0	2.2	0.0	2.2	0.0
Toluene	300	2.0	0.0	0.0	2.0	84.5
Dichloromethane (methylene chloride)	186	1.3	0.0	0.0	1.3	0.0
Chlorodifluoromethane	104	1.2	0.0	0.0	1.2	0.0
1-Bromopropane	384	1.1	0.0	0.0	1.1	0.3
Chloroform	127	0.9	0.0	0.0	0.9	0.0
Hydrazine	333	0.0	0.0	0.0	0.0	0.0
1,2-Epoxypropane (propylene oxide)	68	0.6	0.0	0.0	0.6	2.6
Water-soluble compounds of zinc	1	0.0	0.6	0.0	0.6	0.0
1,2-Dichloropropane	178	0.4	0.0	0.0	0.4	210.1
Carbon tetrachloride	149	0.1	0.0	0.0	0.1	0.0
Benzene	400	0.0	0.0	0.0	0.0	0.3
2,2-Azobisisobutyronitrile	16	0.0	0.0	0.0	0.0	0.0
Water-soluble copper salt	272	0.0	0.0	0.0	0.0	0.0
Hydrogen fluoride and its water-soluble form	374	0.0	0.0	0.0	0.0	0.0
Boron compounds	405	0.0	0.0	0.0	0.0	0.3
Dioxins	243	2.1	20.5	0.0	22.5	0.0
<b>Total (excluding dioxins)</b>		<b>25.3</b>	<b>2.7</b>	<b>0.0</b>	<b>28.0</b>	<b>299.9</b>

Substances are listed in descending order of emissions levels; substances with no emissions are listed in order of the regulatory number

Water refers to public waters

Amount transferred indicates the sum of the quantity transferred to sewage systems and the quantity subject to intermediate treatment

Total figures have been rounded to the first decimal place

**Kashima Factory**

Location: 26 Sunayama, Kamisu-shi, Ibaraki 314-0255, Japan  
 Number of employees: 77  
 Total site area: 101,000m<sup>2</sup>  
 Main products: **Produced by Tokuyama Corporation**  
 Bulk pharmaceuticals for stomach and duodenal ulcer treatment drugs, and diabetes drugs; optical materials (plastic lens monomer, light modulating materials, and hard coating solutions); raw materials for electronic materials; metal cleaners  
**Produced by Tokuyama Dental Corporation**  
 Dental materials (restorative materials, adhesives, relining materials, impression materials and investment materials)



Yoshiyuki Kitajima  
Kashima Factory General Manager

The Kashima Factory strives to recycle waste matter while complying with environmental laws and regulations and reducing environmental impact. As a result of this approach, the factory recorded a 74% effective utilization rate of waste in fiscal 2017, sent 9 metric tons of waste to landfills for final disposal, and achieved its "zero emissions" goal of 99%. Looking ahead, the Kashima Factory is examining the feasibility of material and thermal recycling as it works to increase its effective utilization rate for all types of waste matter.



**Performance Data**

	Unit	FY2013	FY2014	FY2015	FY2016	FY2017
Industrial water consumption	Thousand metric tons	51	48	43	36	39
Effluent discharged	Thousand metric tons	66	63	54	50	54
COD level	Metric tons	3	3	2	2	2
PRTR-designated substance emissions	Metric tons	2	2	2	2	2
Waste generated	Metric tons	919	1,020	735	775	761
Waste sent to landfills	Metric tons	7	11	20	9	9
Energy consumption	Thousand gigajoules	36	36	33	37	39
CO <sub>2</sub> emissions (originating from fossil fuel)	Metric tons	2,476	2,465	2,246	2,670	2,697
Complaints	Cases	0	0	0	0	0

**Emissions and Transfer of Specific PRTR-Designated Substances in Fiscal 2017**

Unit: metric tons

Substance name	Regulatory number	Amount of emissions				Amount transferred
		Atmospheric	Water	Soil	Subtotal	
Chloroform	127	0.7	0.0	0.0	0.7	20.4
Toluene	300	0.6	0.0	0.0	0.6	33.0
Dichloromethane	186	0.5	0.0	0.0	0.5	21.9
Acetonitrile	13	0.2	0.0	0.0	0.2	5.1
N,N-Dimethylformamide	232	0.0	0.0	0.0	0.0	5.8
N,N-Dimethylacetamide	213	0.0	0.0	0.0	0.0	2.0
2-Vinylpyridine	338	0.0	0.0	0.0	0.0	0.3
Methyl methacrylate	420	0.0	0.0	0.0	0.0	0.0
<b>Total</b>		<b>2.0</b>	<b>0.0</b>	<b>0.0</b>	<b>2.0</b>	<b>88.5</b>

All figures are the numerical sum for Tokuyama Corporation and Tokuyama Dental Corporation

Substances are listed in descending order of emissions levels; substances with no emissions are listed in order of the regulatory number

Water refers to public waters

Amount transferred indicates the sum of the quantity transferred to sewage systems and the quantity subject to intermediate treatment

Total figures have been rounded to the first decimal place

## Sun•Tox Co., Ltd.

Established: February 14, 1992  
 Shareholders: Tokuyama Corporation (80%), Rengo Co., Ltd. (20%)  
 Head office: ORIX Ueno1chome Building, 1-1-10 Ueno, Taito-ku, Tokyo, Japan  
 Business activities: Manufacture and sale of biaxial-oriented polypropylene films and cast polypropylene films



**Kazunori Shimada**  
Plant Manager



Location: 3075-18 Shimasu, Itako-shi, Ibaraki, Japan  
 Number of employees: 204  
 Total site area: 89,800m<sup>2</sup>

### ■ Kanto Plant

Sun-Tox's Kanto Plant manufactures biaxial-oriented polypropylene films and cast polypropylene films, which are used for food packaging and other applications. In fiscal 2017, the plant received the Cogeneration Grand Prize for upgrading its gas cogeneration facilities and added another line to its biaxial-oriented polypropylene film manufacturing facility. These high efficiency facilities will help the Kanto Plant to further reduce energy consumption and environmental impacts. The plant also takes part in clean-up activities inside and around the industrial complex to promote harmony with the local community. As it continues to implement three management systems, namely Japan's Occupational Safety and Health Management System (OSHMS), ISO 14001, and ISO 9001, the plant is building on its achievements with the aim to be a community-based factory.

#### Performance Data

	Unit	FY2013	FY2014	FY2015	FY2016	FY2017
Waste generated	Metric tons	15	20	15	23	38
Waste sent to landfills	Metric tons	4	10	5	10	17
Energy consumption	Thousand gigajoules	360	351	356	356	533
CO <sub>2</sub> emissions	Thousand metric tons	20	20	21	21	26
SOx emissions	Metric tons	0.2	0.3	0.3	0.1	—
NOx emissions	Metric tons	0.7	0.6	0.7	0.4	0.3
Soot emissions	Metric tons	0.06	0.05	0.04	0.02	0.07

### ■ Tokuyama Plant

Sun-Tox's Tokuyama Plant manufactures biaxial-oriented polypropylene films, which are mainly used for food and beverage packaging, amounting to about 23,000 metric tons annually. As part of its environmental initiatives, the plant is actively working to reduce per-unit energy consumption and increase recycling rates. With respect to safety, it acquired OSHMS certification in 2013 for all of its departments including R&D departments. Under the slogan, "Strictly following safety procedures, making manufacturing enjoyable, and never compromising quality," the plant aims to keep its facilities operating safely so it can be depended upon by the community, customers and employees.

#### Performance Data

	Unit	FY2013	FY2014	FY2015	FY2016	FY2017
Waste generated	Metric tons	66	76	74	84	68
Waste sent to landfills	Metric tons	2	1	1	1	1
Energy consumption	Thousand gigajoules	463	458	471	463	422
CO <sub>2</sub> emissions	Thousand metric tons	27	27	27	28	25
PRTR-designated substance emissions	Metric tons	0.0	0.0	0.0	0.0	0.0
Complaints	Cases	0	0	0	0	0



**Nobuhiko Nakayama**  
Plant Manager



Location: 7-7, Harumi-cho, Shunan-shi, Yamaguchi, Japan  
 Number of employees: 142  
 Total site area: 24,100m<sup>2</sup>

## Sun Arrow Kasei Co., Ltd.

Established: February 1, 1999  
 Shareholder: Tokuyama Corporation (100%)  
 Head office: 1-2 Harumi-cho, Shunan-shi, Yamaguchi, Japan  
 Business activities: Manufacture and sale of polyvinyl chloride compounds



**Yasuto Yasuzawa**  
Plant Manager



Location: 1-2 Harumi-cho, Shunan-shi, Yamaguchi, Japan  
 Number of employees: 29  
 Total site area: 3,280m<sup>2</sup>

### ■ Tokuyama Plant

Sun Arrow Kasei's Tokuyama Plant manufactures and sells polyvinyl chloride compounds used for pipes, joints, and other items essential for upgrading infrastructure, as well as PVC window, which are highly effective for saving energy. Practicing ISO 14001 environmental management and having all employees take part in safety and accident prevention efforts has helped the plant to maintain an accident- and disaster-free record for all 18 years it has been operating. Since acquiring ISO 9001 certification in fiscal 2017, the plant has further improved customer satisfaction with a focus on the environment, safety and quality control, while strictly enforcing internal controls and carrying out Responsible Care activities.

#### Performance Data

	Unit	FY2013	FY2014	FY2015	FY2016	FY2017
Power consumption	Thousand kilowatt hours	2,562	2,473	2,659	2,490	2,533
Waste plastic produced	Metric tons	125	108	141	135	128
Waste plastic effectively used	Metric tons	124	105	141	135	128
Waste sent to landfills offsite for disposal	Metric tons	7	8	6	0	0
Steam usage	Metric tons	240	240	240	240	240
Industrial water consumption	Thousand metric tons	65	65	65	65	65

## Tokuyama Polypropylene Co., Ltd.

Established: April 2, 2001  
 Shareholders: Tokuyama (50%), Prime Polymer Co., Ltd. (50%)  
 Location: 1-1 Harumi-cho, Shunan-shi, Yamaguchi, Japan  
 Business activities: Manufacture and sale of polypropylene resin and flexible polypropylene resin



**Yuichi Taguchi**  
Plant Manager



Location: 1-1 Harumi-cho, Shunan-shi, Yamaguchi, Japan  
 Number of employees: 62  
 Total site area: 70,997m<sup>2</sup>

### ■ Tokuyama Plant

Tokuyama Polypropylene's Tokuyama Plant conducts risk assessments of processes, facilities, and operations, and takes measures to identify near-miss situations and points of concern, in order to enhance the plant's safety culture. The result has been a perfect accident- and disaster-free record since the time it was first established as Tokuyama's polypropylene film business 42 years ago. The plant is scheduled to obtain recertification in 2018 under the High Pressure Gas Safety Act and the Ordinance on Safety of Boilers and Pressure Vessels, and is pursuing Responsible Care activities with the goals of extending its accident- and disaster-free record, reducing its environmental impact, and eliminating customer complaints related to quality.

#### Performance Data

	Unit	FY2013	FY2014	FY2015	FY2016	FY2017
Industrial water consumption	Thousand metric tons	411	308	370	333	378
Waste generated	Metric tons	116	89	35	77	35
Waste sent to landfills	Metric tons	15	2.4*	0	1.8*	0
Unit energy consumption index (fiscal 2002=100)	%	84	76	71	73	69

\* Year with periodic maintenance