

# Zeon Corporation – Tokuyama Plant

## Tokuyama Plant Profile

### Main Products

Butadiene monomers, synthetic rubbers, synthetic latex, polymerized toners, single-walled carbon nanotubes

Established in 1965, Tokuyama Plant is the main Zeon production plant for synthetic rubber using butadiene monomer extracted from naphtha. Approximately half of the synthetic rubbers it produces are exported from the nearby Port of Tokuyama to Europe, Asia, and other parts of the world. In 2015, Tokuyama Plant successfully mass-produced single-walled carbon nanotubes, a world first.



Aerial view of Tokuyama Plant

### Environment and Safety Policy

Tokuyama Plant has defined the following environment and safety policy based on being a petrochemical plant that handles high-pressure gas as well as hazardous and poisonous substances and is located in the Shunan Industrial Complex near residential areas and railway lines.

1. With the participation of all employees, we are committed to achieving safe and reliable operations and being a plant trusted by everyone in the local community.
2. We set targets and conduct activities in the areas of the environment, safety, and occupational health and safety. We aim to continuously improve our various management systems to improve our environment- and safety-related performance.
3. We identify all sources of danger in the workplace, and by reducing and eliminating them, aim to achieve zero occurrences of environmental and safety accidents and occupational accidents.
4. We strive to prevent environmental contamination and conserve energy to help protect the environment.
5. We comply with environment- and safety-related laws and regulations, agreements, and internally defined rules and regulations. We also strive to maintain and improve our level of environmental and safety performance.
6. We strive to maintain and improve the mental and physical health of all employees and create a vibrant and engaging workplace.

## Plant Policy by the Plant Manager

With production innovations driving plant reforms, we cooperate with the two Zeon Group companies of Zeon Yamaguchi Co., Ltd. and Zeon North Co., Ltd. to realize stable and safe plant operations and deepen our roots in the local community. With the motto of “greetings and the 3S’s (sort, straighten, and scrub) are the foundation of everything we do,” we pursue dynamic and forward-looking plant operations with the participation of all employees in production innovations. We aim to gain the trust of society by making contributions to resolving social issues and having employees engage with the local community.



Corporate Officer and Tokuyama Plant Manager  
Makoto Watanabe

## Safety Initiatives

### Policy

Safety first! Employees take responsibility for their actions to realize zero accidents and disasters.

### Specific Initiatives

- We routinely implement four types of safety activities to reduce work-related risks.
- We identify the sources of hazards to prevent safety-related accidents.

## Environmental Impact Reductions

### Policy

Achieve our targets for per-unit energy consumption and per-unit CO<sub>2</sub> emissions.

- (1) We analyze factors causing our energy consumption per unit to deteriorate and devise systems to prevent performance from backsliding.
- (2) We identify ways to conserve energy on an ongoing basis to achieve our mid- to long-term plan.

### Scope of Environmental Management System

- (1) Organizational unit: Departments of Tokuyama Plant, Zeon Corporation  
Function: Manufacture of synthetic rubbers, synthetic latex, film materials, and carbon nanotubes, and pilot research on synthetic rubbers and thermoplastic resins  
Physical boundary: Total area of Tokuyama Plant, Zeon Corporation, 2-1 Nachi-cho, Shunan-shi, Yamaguchi, Japan
- (2) Organizational activities: Work processes of manufacturing from raw materials procurement, packaging, storage, and shipping, and utility operations  
Products and services: Synthetic rubbers, synthetic latex, film materials, and carbon nanotubes, providing information to customers, response when complaints arise from customers and in the local community
- (3) Authority and capacity of managing and influencing organization: Head Office divisions (including design and development), partner companies (product logistics, disposal of industrial waste, etc.), vendors (companies supplying raw materials, etc.)

### Specific Initiatives

#### 1. Reducing emissions of hazardous chemical substances

- We have installed exhaust gas purification equipment able to stably control emissions of PRTR substances.

#### 2. Reducing industrial waste

- We have maintained a record of zero waste sent to landfills since FY 2010.
- We are reducing our industrial waste by practicing the 3R's (Reduce, Reuse, and Recycle).

#### 3. Conserving resources and energy

- We are making improvements on technological issues based on our mid- to long-term plan through the Energy Conservation Working Group and the Energy Conservation Promotion Committee.
- We are focusing intensively on daily management with the goal of achieving per-unit energy consumption of 90% or

less of the FY 1990 baseline.

•We share information with other plants through the Energy Conservation Promotion Committee.

#### 4. Reducing impacts on air quality

•We are operating new high-efficiency boilers to steadily reduce our NO<sub>x</sub>, SO<sub>x</sub>, and CO<sub>2</sub> emissions.

#### 5. Reducing impacts on water quality

•We are reducing our COD and total nitrogen emissions through modifications to wastewater treatment facilities and improvements to treatment methods.

#### 6. Environmental Data

\*“0” indicates less than 0.5 tons, and “0.0” indicates less than 0.005 tons

Tokuyama Plant		FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
Hazardous substances	Butadiene consumption (tons)	181,275	206,710	170,327	195,538	152,247
	Butadiene emissions (tons)	1.2	0.8	1.1	0.7	1.6
	Acrylonitrile consumption (tons)	13,600	17,464	14,379	16,983	13,476
	Acrylonitrile emissions (tons)	0.6	0.6	0.7	0.6	0.6
Substances subject to the PRTR Act	Consumption (tons)	391,766	453,075	397,637	422,439	347,496
	Emissions (tons)	2.7	2.0	2.7	2.1	2.9
Industrial waste	Amount generated before compacting (tons)	16,939	19,201	24,063	23,163	24,738
	Amount generated after compacting (tons)	3,505	3,377	4,674	4,737	5,208
	Amount sent to landfills (tons)	0.0	0.0	0.0	0.0	0.0
Atmospheric emissions	CO <sub>2</sub> emissions (tons)	239,609	279,750	237,362	263,215	228,574
	SO <sub>x</sub> emissions (tons)	321.5	471.0	507.0	622.2	602.9
	NO <sub>x</sub> emissions (tons)	243	205	179.0	190.9	199.6
	Soot emissions (tons)	6	4	2.2	10.9	4.3
	Fluorocarbon leaks (tons of CO <sub>2</sub> )	–	–	–	3.9	273
Water resource consumption (1,000 m <sup>3</sup> ) (industrial water + groundwater + waterworks)		8,788	8,927	8,393	8,812	8,703
Wastewater	Total wastewater discharge (1,000 m <sup>3</sup> )	8,288	8,165	7,785	8,051	8,148
	COD emissions (tons)	58	49	42	57	49
	Total phosphorus discharge (tons)	0.6	0.7	0.6	0.8	0.7
	Total nitrogen discharge (tons)	27	28	27	28	25

Energy	Consumption (crude oil equivalent, kL)	90,648	103,000	92,423	104,326	93,669
	Unit consumption index (FY 1990 = 100)	102%	99%	106%	107%	108%
Production equivalent (tons)		487,782	573,961	477,797	531,865	475,500

## Relationship with Employees

### Human Resource Development Policy

At Tokuyama Plant, we develop human resources through education programs designed to draw out, develop, and mobilize the potential of employees, based on the ideal of employees “working toward ambitious goals, always thinking things through and taking action independently, and remaining open to change.”

### Specific Initiatives

- We established an education scheme that covers basic education, environmental and safety education, vocational education, quality management education, obtaining qualifications, and personal development.
- We conduct education and training with clearly defined human resource goals.
- Basic operator education
  - (1) Education at the Monozukuri Training Center at Mizushima Plant for employees in their first to third years of employment
  - (2) Professional development that transfers operational skills and technical knowledge

## Relationship with the Local Community

### Specific Initiatives

#### 1. Contributing to the community through volunteering

- Beautification activities in the area surrounding the plant
- Higashikawa Cleanup Campaign
- Tree thinning in the forest that is the industrial water source, conducted jointly with other companies that use the industrial water and forest operators



Higashikawa Cleanup Campaign

#### 2. Interactions with the local community

- Zeon Waraku Odori Dance Festival (approximately 2,000 visitors)  
We have held the festival since 1974 to deepen interaction with employees’ families and community residents.
- Participation in Responsible Care Council community dialogue events (twice/year)  
We provide reports on our Responsible Care activities, including environmental improvements and safety measures, to local authorities and community representatives.

#### 3. Plant tours

- Plant tours  
Held in conjunction with Japan Responsible Care Council community dialogue events. Leaders of five residents' associations near the plant participated in the tours (7 people total)
- Summer vacation parent and child classroom (organized by the Chamber of Commerce and Industry)

Experimental classroom (making a super ball), plant bus tour with about 50 participants  
•Plant tours for high school students