

RC Report 2019



Nippon Shokubai Group Mission

TechnoAmenity

Providing affluence and comfort to people and society,
with our unique technology.

Management Commitment

We conduct all of our corporate activities based upon a deep respect for humanity.

We aim at coexisting with society, and working in harmony with the environment.

We pursue technologies that will create the future.

We act on the global stage.

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On publishing the RC Report

Nippon Shokubai's reports on Responsible Care (RC) initiatives began with the issuance in fiscal 2002 of the Environmental Report, which introduced our RC initiatives. The Environmental Report was renamed the "Environmental and Social Report" and later the "CSR Report," to expand the contents to include initiatives by Group companies and information on our involvement in society and corporate social responsibility.

Starting from fiscal 2019, in line with the publication of the **TechnoAmenity** Report to cover management strategies and financial data, we have decided to issue a separate RC Report, a new publication to provide detailed information on our RC initiatives.

The Nippon Shokubai Group positions its RC initiatives as a key in the principle of sustainable development, and is implementing initiatives in the six priority areas of environmental protection, process safety and disaster prevention, occupational safety and health, chemical safety, quality and communication with society.

Corporate Credo

Safety takes priority over production.

Nippon Shokubai Code of Conduct

In the belief that it is our social responsibility to conduct business based upon the principles of compliance and self-responsibility for the sake of proper social development, we have set forth the following basic corporate behavior guidelines as the “Nippon Shokubai Code of Conduct.”

- ① Guided by our Group Mission of **TechnoAmenity**, we will conduct all of our actions as a good corporate citizen.
- ② We will comply with relevant laws both inside and outside of Japan, and act in accordance with in-house regulations.
- ③ We will create and nurture a sound, vibrant workplace, where each individual can hone their professional competence and find fulfillment in their career.
- ④ We will develop and market products and services that are both safe and useful, based upon an accurate understanding of social demands.
- ⑤ We will commit ourselves to eliminating labor hazards and accidents, and constantly strive to protect the global environment.
- ⑥ We will conduct business based on fair and open competition.
- ⑦ We will take a firm stance when dealing with unlawful or antisocial groups.
- ⑧ We will ensure frequent communications with our shareholders and members of society in general, and guarantee the appropriate disclosure of corporate information.
- ⑨ With respect for the culture and customs of every nation/region we serve, we will contribute to their development and wellbeing through community-based business undertakings.
- ⑩ We will ensure the solid and sustainable development of the company through business undertakings based soundly upon the above action guidelines.

Based on our Corporate Credo “Safety takes priority over production” and RC Policy, we will make continuous efforts to steadily implement the ongoing RC initiatives and to enhance the activities in view of the needs of society, with the aim of earning greater confidence from the public as a responsible chemicals company. We will also conduct business activities related to the development of environment-friendly technologies and products that will contribute to mitigating climate change and reducing waste in all stages including the utilization stage, which will consequently contribute to an improved society and people’s lives.

I hope this Report will help deepen your understanding of the RC initiatives of the Nippon Shokubai Group. We appreciate your support and candid opinions.

Executive Officer, Director of RC Division

Gun Saito



Responsible Care Activities

RC Initiatives

We actively promote our RC initiatives in the priority areas of environmental protection, process safety and disaster prevention, occupational safety and health, chemical safety, quality and communication with society.

RC Initiatives

All companies in the chemical industry responsible for handling chemical substances voluntarily agree to protect the environment and human health and safety in all processes ranging from the development of chemical substances to their manufacture, distribution, use, end consumption, disposal and recycling. By disclosing the results of these activities to the public, the companies hold dialogue and communicate with society. These efforts are known as Responsible Care (RC). The RC Global Charter was developed in 2006 and revised in 2014 by the International Council of Chemical Associations (ICCA), which promotes Responsible Care worldwide.

Nippon Shokubai has participated in the Japan Responsible Care Council (JRCC; currently known as the Japan Chemical Industry Association Responsible Care Committee) since it was established in 1995, and has been advancing various initiatives.

We are determined to continue contributing to society while fulfilling our corporate social responsibility through our group-wide commitment to Responsible Care.



President's signature on the RC Global Charter
(Revised 2014 version)

RC Policy

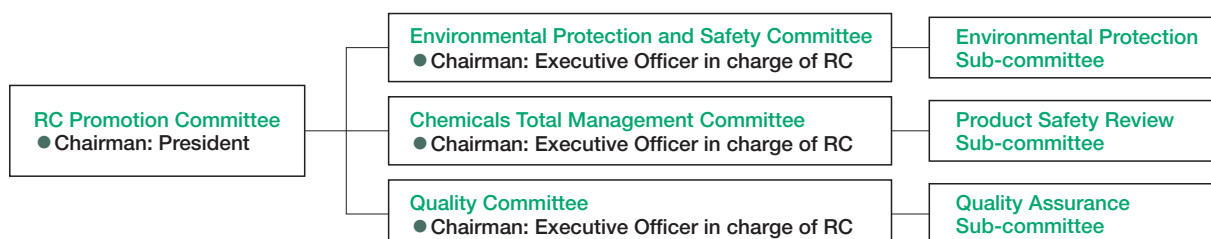
In conformity with the Nippon Shokubai Group Mission, Management Commitment, Corporate Credo, and the Nippon Shokubai Code of Conduct, we rank it as an important management measure to provide products and technologies that contribute to society and environmental protection. In addition, while paying due respect to the principle of Sustainable Development, we are determined to conduct all activities in accordance with the following policy related to environmental protection, safety, and product quality that will bring our business operations into harmony with the global environment.

We will implement this RC Policy in all our business operations by ensuring all employees have a thorough understanding and awareness of its importance. The president shall be the person with the ultimate responsibility for implementing this policy.

- 1** Aim at environmental protection and reduction of negative environmental impact throughout the entire life cycle of a product, from development to disposal.
- 2** Ensure the safety of our employees and our communities by targeting zero accidents and zero disasters with a commitment to the Corporate Credo, "Safety takes priority over production."
- 3** Confirm the safety of chemical materials, intermediates and products, and consider the health of our customers, employees of our logistics subcontractors, our employees, and others.
- 4** Stably supply products and associated services that meet customer satisfaction and inspire their trust.
- 5** Publicly announce the results of these activities and make an effort to communicate for proper understanding.

RC Promotion Organization

The president is chairman of the RC Promotion Committee, and technical committees and sub-committees are established to promote company-wide RC activities.



10th Medium-term RC Basic Plan (Fiscal 2017–2020) and Results

The 10th Medium-term RC Basic Plan was formulated in order to gain greater public trust by creating the concept of the “Reborn Nippon Shokubai.” It reflects a continuation of initiatives adopted for the 9th such plan as well as actual outcomes of problems encountered; moreover, various aspects of our RC initiatives have been modified in response to requests from both inside and outside the company. We will continue to focus on the importance of fostering a safety culture.

In addition, in order to further promote our RC initiatives, we will continue to adopt improvements by setting numerical targets (as key performance indicators, or KPI) wherever possible and will evaluate them on a regular basis.

Evaluation 😊 Achieved 😐 Almost achieved 😞 Not achieved



Environmental Protection



Objectives for Fiscal 2017–2020

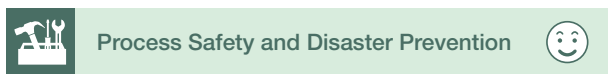
- To reduce energy consumption by an amount equivalent to 8,000 kL of crude oil (over 4 years)
- To reduce energy intensity by 5% from fiscal 2015 levels (1% reduction annually to 103.2 L/t)
- To reduce CO₂ intensity by 5% from fiscal 2015 levels (energy source, 1% reduction annually to 0.208 t-CO₂/t)
- To reduce fuel consumption intensity for road transport by 5% from fiscal 2015 levels (1% reduction annually to 33.4 L/1,000 t-km)
- To promote modal shift
- To maintain zero emissions¹ (Quantity of final off-site landfill) ≤ (Total amount of waste generated × 0.1%)
- To reduce emissions of substances subject to the PRTR Law by 25% from fiscal 2015 levels (81 t/y)

Results for Fiscal 2018

- Energy consumption reduced by 2,300 kL of crude oil equivalent
- Energy intensity: 4.6% reduction • CO₂ intensity: 9.1% reduction
- Fuel consumption intensity for road transport: 2.7% reduction
- Modal shift promotion continues • Zero emissions maintained
- Emissions of substances subject to the PRTR Law: 11.0% reduction

Priority Initiatives

- 1) Promoted energy conservation initiatives and advanced technical reviews to reduce waste and the release of PRTR-controlled chemical substances.
- 2) Continued examining the utilization of renewable energy.
- 3) Evaluated contributions to CO₂ emissions reduction related of our products through c-LCA.²
- 4) Conducted inspections of equipment that uses fluorocarbons as planned.



Process Safety and Disaster Prevention



Objectives for Fiscal 2017–2020

- To achieve zero accidents of Class A³ and Class B⁴ (zero severe process safety accidents)

Results for Fiscal 2018

- Class A process safety accidents: 0 • Class B process safety accidents: 0

Priority Initiatives

- 1) Implemented systematic risk assessments and other initiatives to prevent accidents and malfunctions.
- 2) Systematically implemented measures against deterioration and for earthquake response, for example.
- 3) Continuously improved our process safety management system.
- 4) Systematically implemented and sought to enhance external education and workplace education and training.
- 5) Sought to strengthen a safety first mindset through efforts that included Safe Operation Month activities and safe behavior checks.



Occupational Safety and Health



Objectives for Fiscal 2017–2020

- Zero injuries with loss of workdays⁵ • Zero injuries without loss of workdays⁶ (including contractors)

Results for Fiscal 2018

- Three injuries with loss of workdays • 14 injuries without loss of workdays

Priority Initiatives

- 1) Advanced basic safety activities and undertook other efforts to prevent injuries.
- 2) Implemented systematic safety measures by, for example, steadily undertaking the organization-wide introduction of industrial injury examples.
- 3) Checked the status of every safety activity and sought to continuously improve them.
- 4) Systematically implemented workplace safety education and sought to enhance workplace education and training.
- 5) Sought to strengthen a safety first mindset through efforts that included safe behavior checks.
- 6) Supported the safety initiatives of our contractors through safety education and patrols, for example.

Definitions

¹ Zero emissions: Reducing the quantity of waste subject to final disposal at off-site landfills to less than 0.1% of the total amount of waste generated (In the calculation of total waste, the amount of sludge subject to activated sludge treatment is calculated before dehydration.)

² c-LCA (carbon-Life-Cycle Analysis): A method of assessing greenhouse gas emissions throughout the life cycle of a finished product incorporating chemical products and a comparison product containing no such chemical products when used by consumers and in other industries. The evaluation method calculates a chemical product's net contribution to GHG emissions reduction by determining the increased emissions when no such chemical product is used.

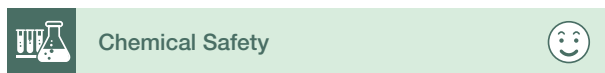
³ Level 9 or higher according to the Nippon Shokubai method on the Japan Petrochemical Industry Association chart

⁴ Level 3 to 8 according to the Nippon Shokubai method on the Japan Petrochemical Industry Association chart

⁵ Injury with loss of workdays: Injury requiring at least one lost workday for medical treatment

⁶ Injury without loss of workdays: Injury requiring no loss of workdays for medical treatment

⁷ Refers to Group companies inside and outside Japan, unless otherwise specified



Chemical Safety



Objectives for Fiscal 2017–2020

- To achieve zero problems related to chemical safety (legal or social problems)

Results for Fiscal 2018

- Zero problems related to chemical safety

Priority Initiatives

- 1) Gathered information about the hazardous properties and the legal requirements for chemical substances. In addition to making this information known within the company, also appropriately provided information to customers, including through SDS.
- 2) Implemented functional improvements to our chemical substance management system and ensured information granularity based on our plans.
- 3) Properly provided various reports and submitted information within specified time periods in accordance with the legal obligations of Japanese and foreign laws and regulations as well as other requests from authorities.



Quality



Objectives for Fiscal 2017–2020

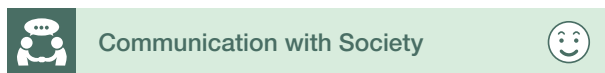
- To improve customer satisfaction • To attain more trust from customers
- To achieve zero serious quality complaints

Results for Fiscal 2018

- Customer satisfaction improvement almost achieved
- Attained more trust from customers • No serious customer complaints were filed

Priority Initiatives

- 1) Promoted efforts to prevent quality issues.
- 2) Implemented product safety assessment, product entrustment assessment and screening by the gate system for fine and specialty chemicals and new businesses.
- 3) Strengthened support for the quality assurance initiatives of Group companies.⁷
- 4) Implemented quality audits at both our plants and Group companies.
- 5) Continuously implemented quality education and quality awareness-raising activities.



Communication with Society

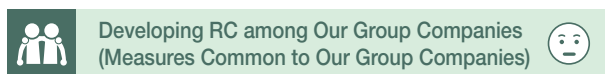


Objectives for Fiscal 2017–2020

- To maintain dialogue with stakeholders and implement information disclosure

Results for Fiscal 2018

- Published CSR Report • Released major ESG data on the company website



Developing RC among Our Group Companies (Measures Common to Our Group Companies)



Objectives for Fiscal 2017–2020

- (1) Environmental Protection:
 - To reduce energy intensity
 - To reduce final disposal at off-site landfills (Group companies in Japan)
 - To reduce the amount of waste (Group companies outside Japan)
 - To reduce emissions of substances subject to the PRTR Law
- (2) Process Safety and Disaster Prevention:
 - To achieve zero disasters and zero accidents (equivalent to Class A and Class B severe process safety accidents on the Nippon Shokubai scale)
- (3) Occupational Safety and Health: To achieve zero injuries with loss of workdays
- (4) Chemical Safety: To achieve zero problems related to chemical safety (legal or social problems)
- (5) Quality: To receive zero serious quality complaints
- (6) Communication with Society:
 - To maintain a dialogue with stakeholders and implement reasonable information disclosure

Results for Fiscal 2018

- Nine out of 12 Group companies reduced their energy intensity year-on-year
- Waste subject to final disposal at off-site landfills was reduced by 14% compared with the level of the previous fiscal year
- Amount of waste generated increased by 17% compared with the level of the previous fiscal year
- Emissions of substances subject to the PRTR Law were reduced by 37% compared with the level of the previous fiscal year
- Zero facility disasters • One facility accident • Six injuries with loss of workdays
- Zero problems related to chemical safety • No serious customer complaints were filed
- Published an Environmental Report and participated in community events

Priority Initiatives

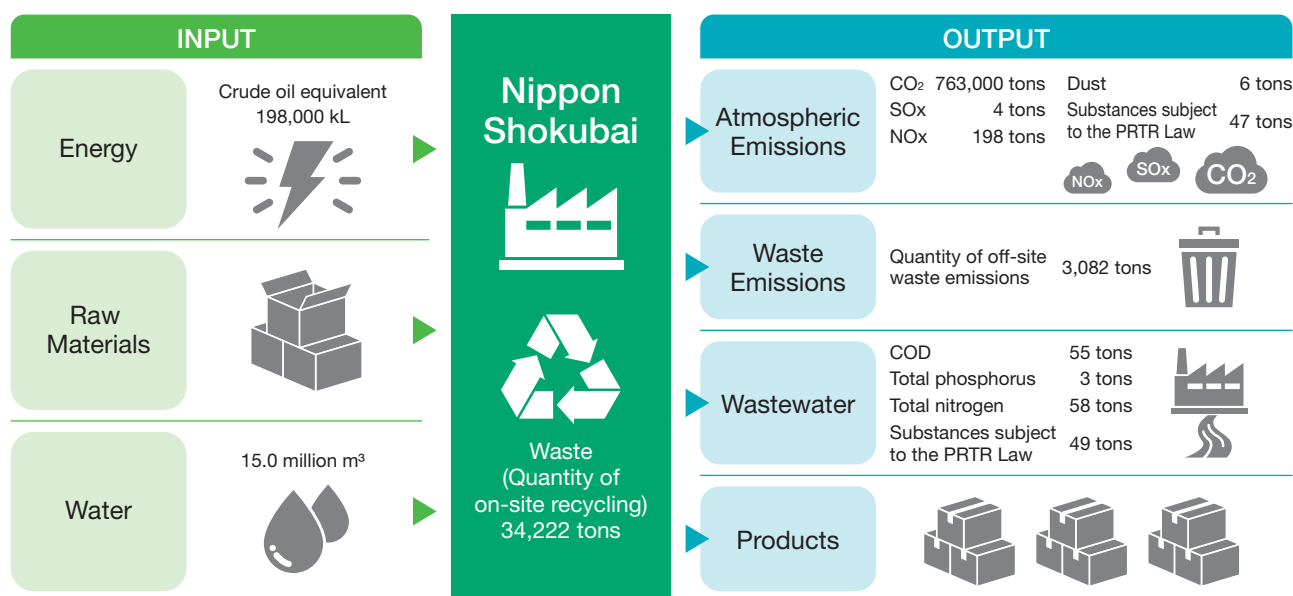
- Conducted RC discussions and audits, and sought to improve the RC level of the entire Group.

Environmental Protection Initiatives

We promote initiatives to reduce the environmental impact of our business operations, including tackling climate change and reducing waste through our product supply chains.

Environmental Impacts of Our Business Operations

We are engaged in various efforts to not only provide better products and services, but also to reduce the environmental impacts of our business operations, including in our supply chains. We make efforts to conserve energy and tackle climate change of course. We are also managing the water used in our manufacturing sites in order to use water resources effectively, conducting advanced recycling and thoroughly treating water before it is released into the natural environment. Moreover, we also commission odor monitoring as well as conduct odor patrols and regular noise measurements so that neighboring residents can live in peace.



Note: This fiscal 2018 data is for only Nippon Shokubai (including our head offices, research centers and other sites).

Employee's Voice

We achieved our energy consumption reduction target by reviewing the cooling processes.

We are the only company in the world that produces ethyleneimine by vapor-phase dehydration reaction. As demand for ethyleneimine polymers is increasing for use as heavy metal removers and other water treatment agents and as an inkjet pigment dispersant, we have decided to increase production.

In reviewing each process for the production increase, we found that the efficiency of the cooling process could be improved by introducing the cooling using cold water in stock at the plant in addition to the conventional cooling using only refrigerating machines. This enabled us to reduce electricity consumption, and we achieved an energy consumption reduction with a crude oil equivalent of 92 kL/year. This eliminated the need to replace refrigeration machines, which was necessary in the former process, contributing to a reduction in construction costs.

The construction work for the production increase will continue for a while. I will do my best as a member of the project team to ensure safety in production.



Kenji Arai

Production No. 1 Section
Kawasaki Plant

Initiatives for Tackling Climate Change

Promoting CO₂ emissions reductions

■ Reducing energy/CO₂ emission intensity

As the world stepped into a new phase in tackling global warming after the Paris Agreement was adopted in 2015, the Japanese government established a Plan for Global Warming Countermeasures. Based on this plan the Commitment to a Low Carbon Society was established by the Japan Business Federation (Keidanren), positioned as the base of action by businesses.

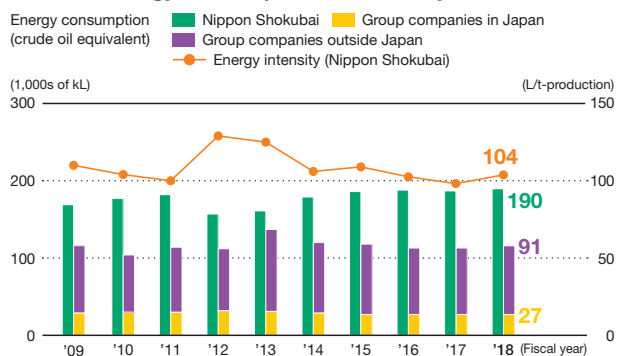
At Nippon Shokubai, in line with the targets set in the commitment to a low carbon society by the Japan Chemical Industry Association, the RC Promotion Committee, chaired by the President, has formulated the Medium-term RC Basic Plan. Based on this Plan,

each plant, under the initiative of the energy management committee, implements activities to help mitigate climate change, including reducing energy consumption and CO₂ emission intensity.

In fiscal 2018, the results of our efforts to conserve energy aimed at our fiscal 2020 targets were 104 l/t for energy intensity, 0.407 t/t for CO₂ emission intensity, and 0.199 t/t for energy source CO₂ emission intensity.

Our Osaka and Tokyo Offices use green electricity (biomass generation) under the Green Electricity Certificate System.

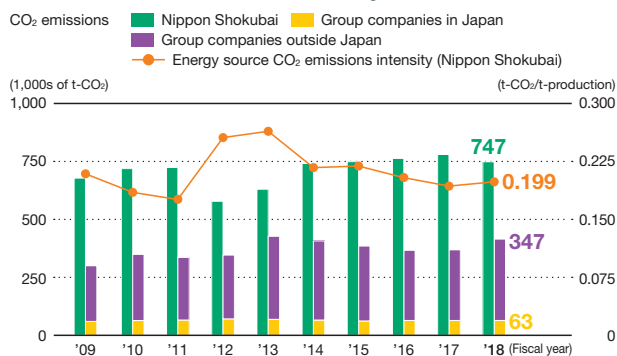
Trends in Energy Consumption and Intensity



* The amount of energy consumed and CO₂ emissions do not include our head offices, research centers, plant administration buildings or employee welfare facilities.

* The amount of energy consumed and CO₂ emissions in fiscal 2018 totaled 8,000 kiloliters and 16,000 tons, respectively, for the head offices, research centers, plant administration buildings, and employee welfare facilities of Nippon Shokubai.

Trends in CO₂ Emissions and Intensity



* CO₂ emissions are totals of energy source and non-energy source CO₂ emissions.

Suppression of fluorocarbon emissions

■ Aggregate calculated leakage of fluorocarbons

The Act on the Rational Use and Proper Management of Fluorocarbons was fully implemented in April 2015 and covers the entire lifecycle of fluorocarbons from production to disposal.

As a "user of specified products," we carry out scheduled simple inspections and periodic inspections as required by law. The amount of fluorocarbon leakage calculated in fiscal 2018 totaled 1,704 t-CO₂ for the entire company, with 1,092 t-CO₂ from the Himeji Plant and 544 t-CO₂ from the Kawasaki Plant. We will continue to strive to reduce the amount of fluorocarbon leakage through initiatives such as strengthening inspections and maintenance and introducing

products that use coolants with a low global warming potential, which will help alleviate global warming.

Calculated Leakage of Fluorocarbons in Fiscal 2018

| | (t-CO ₂) |
|-----------------------|----------------------|
| Himeji Plant | 1,092 |
| Kawasaki Plant | 544 |
| Others | 67 |
| Entire company | 1,704 |

Definitions

Green Electricity Certificate System

Environmental value-added electricity generated from natural energy is certified by a third-party institution, and the certificate issued to the business operator can be traded as a Green Electricity Certificate.

Calculating the CO₂ emissions resulting from our entire supply chain

■ Calculation of Scope 3 emissions

We report our greenhouse gas (GHG) emissions according to the three categories set forth in the GHG protocol: Scope 1, 2 and 3.

Scope1 Direct emissions:
GHG emissions resulting from the burning of fuel or other products as part of business operations

Scope2 Indirect emissions:
GHG emissions resulting from purchased energy, such as purchased electric power

Scope3 Other indirect emissions:
GHG emissions resulting from operations across the entire value chain (from resource extraction to product disposal)

We will continue to calculate Scope 3 emissions in the future as we investigate the possibility of reducing CO₂ emissions resulting from all corporate activities.

Trend in Scope 3 Emissions Calculation extent: Nippon Shokubai only

| No. | Category | Emissions (1,000 t-CO ₂ e) | | |
|-------|--|---------------------------------------|--------|--------|
| | | FY2016 | FY2017 | FY2018 |
| 1 | Purchased goods and services | 1,569 | 1,619 | 1,556 |
| 2 | Capital goods | 53 | 40 | 31 |
| 3 | Fuels and energy-related activities (not included in Scope 1 or Scope 2) | 58 | 62 | 61 |
| 4 | Upstream transportation and distribution | 14 | 15 | 14 |
| 5 | Waste generated in operations | 9 | 7 | 7 |
| 6 | Business travel | 0.3 | 0.3 | 0.3 |
| 7 | Employee commuting | 0.8 | 0.8 | 0.9 |
| Total | | 1,704 | 1,744 | 1,671 |

Initiatives for Eco-friendly Distribution

Promoting modal shift

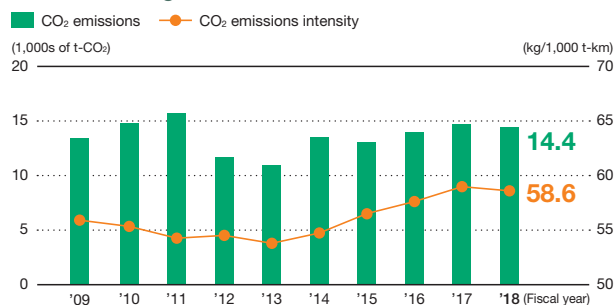
As a way of tackling climate change through our logistics operations, we are taking steps to reduce our CO₂ emission intensity and implement exhaust gas countermeasures to control air pollution.

Although changing economic conditions can affect the amount of goods we transport and our CO₂ emissions, we are advancing initiatives to reduce our CO₂ emission intensity. These include modal shifts, improved transport efficiency, introduction of digital tachometers interlocked with GPS and drive recorders, and energy-efficient vehicle operation such as minimized idling and the installation of energy-efficient tires. In response to an increase in the volume of transportation of one of our main products (ethylene oxide), we increased the number of tank containers available for environment-friendly railway transportation.

We adopted the Kawasaki Eco-Transport System as an air pollution control measure (effective April 1, 2010) and introduced three initiatives: eco-friendly driving and display of “eco-drive” stickers, elimination of vehicles that do not comply with laws regulating NO_x and PM emissions, and widespread adoption of low-emission and energy-efficient vehicles.

Starting in fiscal 2017, we have also been developing joint transportation with other companies in the same business and a new type of ship transportation (roll-on/roll-off shipping) to reduce the environmental impact and stabilize transportation.

Trends in CO₂ Emissions and Intensity Attributable to Domestic Logistics



Railway tank containers and loading and filling equipment for one of our main products (ethylene oxide), which has increased in volume

Definitions

Modal shift

Changing the mode of transportation to a mass transportation method, such as using railways or ships, thereby improving the efficiency of transportation while also reducing energy consumption and environmental impact.

Roll-on/roll-off ship

A ship designed to transport wheeled cargo on trucks or chassis cabs.

Ton-kilometer

Transport ton-kilometer is a unit of transportation measurement referring to the freight transport volume. As an index for precisely expressing transport as an economic activity, it is the product of the freight haul distance (in kilometers) and the transported freight weight (tons).

Kawasaki Eco-Transport System

An environmentally friendly transportation system established by a partial amendment to the “Kawasaki City Ordinance for Conservation of Life Environment, including Pollution Prevention.”

Environmental Protection through Our Products

Products that contribute to the environment

Chemical products have an impact on the environment because they are produced using the Earth's resources and involve the discharge of CO₂ and other waste. However, looking at the entire product life cycle from procurement of raw materials to product disposal, in some stages chemical products contribute to a reduction in the

environmental impacts.

We evaluate how our products are used to reduce the environmental impacts through the supply chain to produce the various products in our daily life and as equipment to produce our products and in the social infrastructure.

| Environmental considerations | Reasons | Applications | Specific Products |
|---|--|---|---|
| Energy conservation and CO ₂ reduction | Conserve energy when using products | Solid oxide fuel cell materials Lithium-ion battery materials Automotive damping materials UV-curable reactive diluents Resist agents Optical electronic materials Particulates for light diffusion | Electrolyte sheets for solid oxide fuel cells IONEL™ ACRYSET™ VEEA™ ACRYCURE™, EPOCEL™ ZIRCOSTAR™ EPOSTAR™ |
| Waste reduction | Reduce waste with high durability | Concrete additives | AQUALOC™, AQUAGUARD™ |
| Chemical emission reduction | Suppress emissions of volatile organic compounds | Water-based paints | ACRYSET™, EPOCROS™ |
| Air and water pollution prevention | Suppress emissions of HCs (hydrocarbons), NOx, dioxin and other pollutants Process wastewater | Removal of HCs (hydrocarbon), NOx, dioxin and other pollutants from exhaust gas Oxidation and decomposition of harmful substances in wastewater Water treatment additives (floculants) | Automotive catalysts, Waste gas treatment catalysts, Denitrification catalysts and equipment Dioxin decomposition catalysts and equipment Wastewater treatment catalysts for catalytic wet air oxidation EPOMIN™ |
| Water resource conservation Effective water resource utilization | Reduce water use | Hollow fibers Liquid detergent builders | Polyvinyl pyrrolidone AQUALIC™L |
| Biodiversity conservation | Biodegradability (decays quickly in the environment) | Detergent ingredients | SOFTANOL™, HIDS™ |

Promoting CO₂ emissions reductions throughout the product lifecycle

We employ the c-LCA method to assess the degree to which our products contribute to reducing CO₂ emissions.

The c-LCA method assesses CO₂ emissions throughout the lifecycle of a finished product incorporating a specific chemical

product compared with a product when assuming that the chemical products are not available. The difference in the volume of emissions is calculated as the net volume of emissions that would be avoided as a result of using that chemical product.

Nippon Shokubai's products that are expected to contribute to the avoidance of CO₂ emissions

| Assessment prerequisites | | | |
|--------------------------|--|---|---|
| AQUAGUARD™ | Calculation of CO ₂ emissions avoided in one year when all apartments are built as long-lasting structures 3.4 million tons | AQUAGUARD™ was developed to reduce cracking and spalling in concrete. The combination of AQUAGUARD™ with a high-range water reducer for concrete is expected to contribute to much longer-lasting concrete structures. | Service period: The lifecycle assessment assumes that a long-life apartment has a 100-year service life and a conventional apartment has a 50-year service life. CO ₂ emissions associated with the building, use and demolition of apartments are evaluated with reference to the "Guidelines for LCA for Buildings" published by the Architectural Institute of Japan. |
| ACRYSET™ | Calculation of CO ₂ emissions avoided when an application-type vibration-damping material is installed in all automobiles manufactured in one year 310,000 tons | We developed an emulsion for application-type vibration-damping materials for mounting on the lower surface of a vehicle body to reduce the noise and vibration from the engine and road surface. Using such material, it is possible to make the vehicle light and energy-efficient. | The annual travel distance is assumed to be 10,000 km with a 10-year service life. Automobiles using asphalt sheeting as a vibration-damping material are compared and evaluated. |
| ZIRCOSTAR™ | Calculation of CO ₂ emissions avoided when ZIRCOSTAR™ is incorporated in all smartphones manufactured in one year 220,000 tons | This product has outstanding optical properties, and using it for plastic lenses, displays, and other optical materials increases the energy efficiency of displays on mobile phones, smartphones, and other handheld devices, contributing to a longer battery life. | According to the usage time described in the Carbon Footprint Product Category Rules, the product was evaluated as being in use for two years. A smartphone incorporating ZIRCOSTAR in the optical material was evaluated as achieving a 3.6% reduction in power consumption as an energy-efficiency benefit. |
| VEEA™ | Calculation of CO ₂ emissions avoided by reduction expected from all the UV curable inks produced in one year 330,000 tons | Use of VEEA™ as UV-curable reactive diluents for inks that are better for the environment makes volatile solvents, as well as related equipment, unnecessary, saves energy and increases productivity. | Printed materials were assumed to be printed in four colors on full A-sized sheets with 3.2 g/m ² of ink. Commercial offset and commercial UV printing presses were compared for evaluation. |

Note: The above assumed values are for comparative purposes only; the actual service life and performance are not guaranteed.

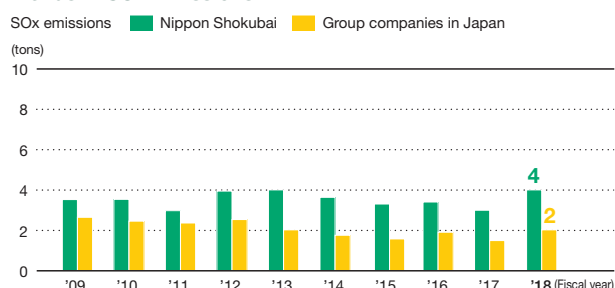
Pollution Control Initiatives Targeting Air and Water

Working to reduce the environmental impact by introducing waste gas treatment catalysts and high-performance activated sludge treatment equipment

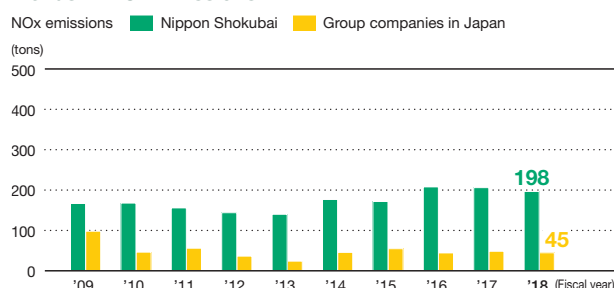
We are monitoring our SOx, NOx and dust emissions, and we have installed denitrification equipment, which we developed in-house, for NOx and scrubbers for dust to prevent air pollution. For SOx, we are reducing our heavy oil consumption and progressing with converting fuel to natural gas to reduce emissions. We use the waste gas treatment catalysts we developed in-house for purification of unreacted raw materials and by products generated in the production processes.

To prevent water pollution, we are working to reduce the environmental impact of wastewater from production processes by using waste liquid treatment equipment. In addition to reusing cooling water for more effective use of our water resources, we have adopted high-performance activated sludge treatment equipment that can stably process even high impact substances and are working on reducing sludge waste as well. All emissions are at levels below municipal and prefectural agreements.

Trends in SOx Emissions

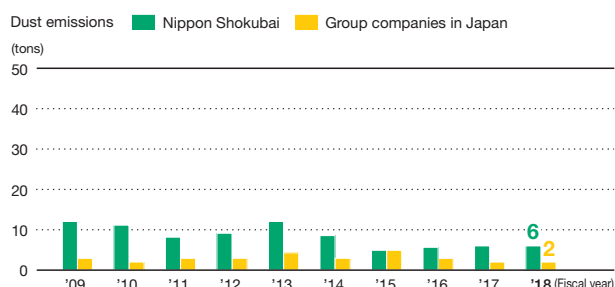


Trends in NOx Emissions



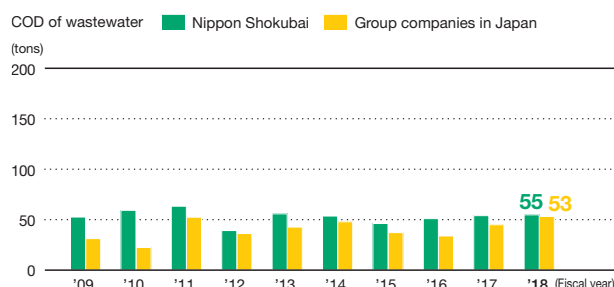
The method of calculation was revised.

Trends in Dust Emissions

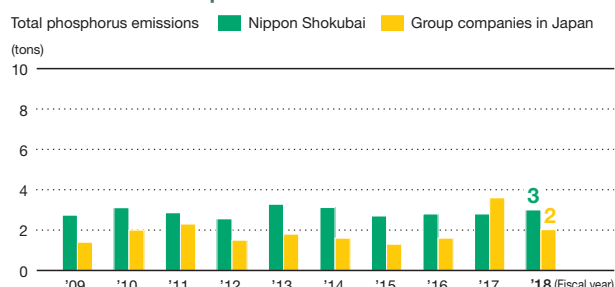


The method of calculation was revised.

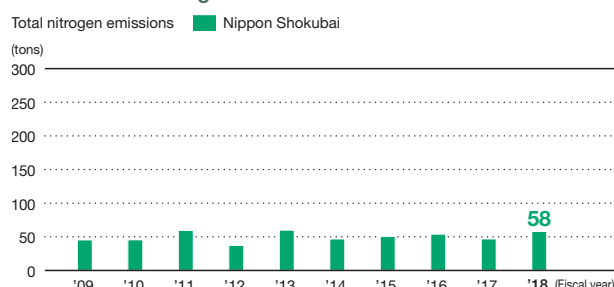
Trends in COD of Wastewater



Trends in Total Phosphorus Emissions



Trend in Total Nitrogen Emissions



Definitions

SOx

A hazardous air pollutant. This is a general term for sulfur oxides such as sulfur dioxide (SO₂) and sulfur trioxide (SO₃), which are generated mainly from the burning of fossil fuels.

COD (Chemical Oxygen Demand)

An index of water pollution caused by an organic substance. It represents the volume of oxygen consumed when an organic substance is oxidized.

NOx

A general term for nitrogen oxides such as nitric oxide (NO) and nitrogen dioxide (NO₂). These substances contribute to acid rain and photochemical smog.

Total phosphorus

This is a total of the inorganic and organic phosphorus contained in wastewater. This is a eutrophication index.

Dust

Fine particles generated through incineration of materials and other processes.

Total nitrogen

This is a total of the inorganic and organic nitrogen contained in wastewater. This is a eutrophication index.

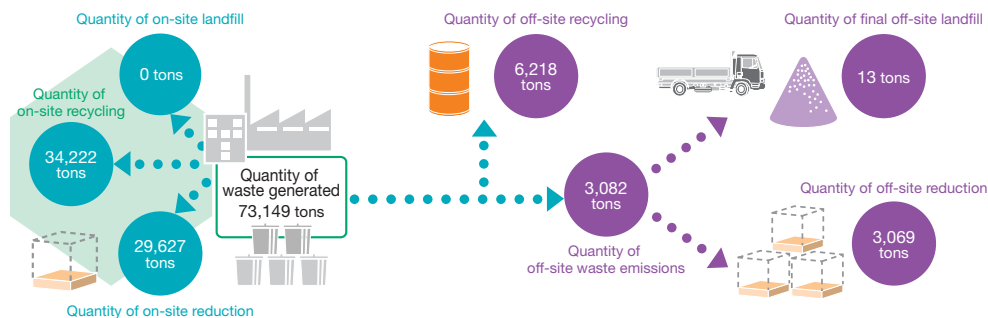
Waste Reduction Initiatives

Reducing the amount of waste subject to final disposal at off-site landfills

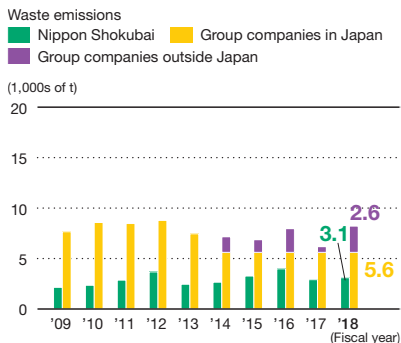
Reducing waste is a necessary initiative to support the creation of a society committed to recycling. By continuing with our zero emissions initiative (defined as “reducing the quantity of waste subject to final disposal at off-site landfills to less than 0.1% of the total amount of waste generated”), we are introducing sorting for the recovery and recycling of our waste.

In fiscal 2018, we are continuing to implement our zero emissions policy by reducing the amount of waste subject to final disposal at off-site landfills. In addition to implementing comprehensive sorting for recovery and recycling, we are achieving this by redesigning our production processes to minimize byproducts, reusing those byproducts and processing product leftovers on site.

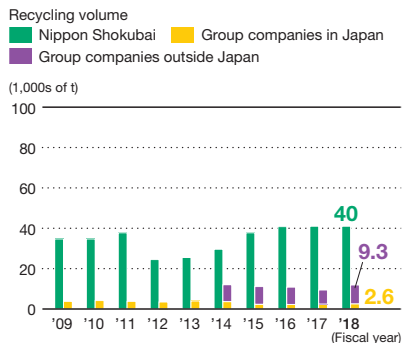
Waste Flowchart



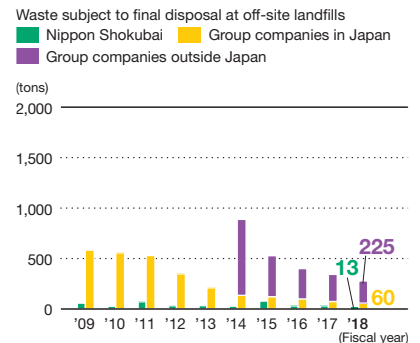
Trends in Waste Emissions



Trends in Recycling Volume



Trends in Amount of Waste Subject to Final Disposal at Off-site Landfills



Employee's Voice

We succeeded in reducing 38 tons per year of waste by improving the process

Our department deals with various functional products. Each year, we review and improve our processes to help reduce waste. This year we focused on the process for functional acrylic materials, because reducing the waste produced by this process had been necessary for a long time. We reviewed the process in cooperation with other related departments.

Because highly reactive substances are handled in this process, it was difficult to determine the conditions that would achieve a reduction in waste and at the same time maintain quality. Using the experience we have accumulated since the launch of the product, we adjusted the operating conditions, and finally we were able to reduce waste by 38 tons per year.

We will continue with our activities to increase safety and reduce waste by looking for seeds in our daily work operations.



Jun Fujiwara

Production No. 1 Section
Fine Production Department
Himeji Plant

Chemical Substances Control Initiative

Reducing chemical emissions

In fiscal 1995, we participated in a voluntary PRTR survey undertaken by the Japan Chemical Industry Association and have set out to reduce our emissions of chemical substances into the environment.

In fiscal 2018, we released 96 tons of substances subject to

the PRTR Law, which represents a 11.0% decrease in emissions compared to fiscal 2015 levels.

We remain focused on further reducing emissions toward our fiscal 2020 target of a 25% reduction from fiscal 2015 levels.

Top 10 Substances Subject to the PRTR Law Released in Fiscal 2018

Calculation extent: Nippon Shokubai only

(tons)

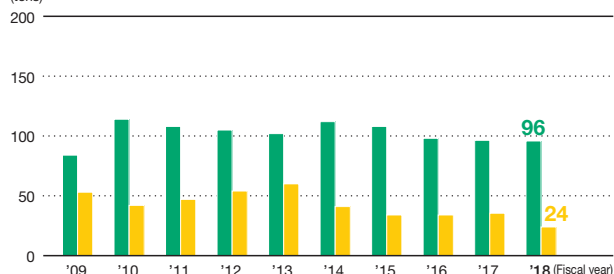
| No. | Government Designation No. | Substance Subject to the PRTR Law | Released into Atmosphere | Released into Water | Total Emissions | Amount Transferred |
|-----|----------------------------|--|--------------------------|---------------------|-----------------|--------------------|
| 1 | 405 | Boron compounds | 0.0 | 34.5 | 34.5 | 0.3 |
| 2 | 4 | Acrylic acid and its water-soluble salts | 14.2 | 0.0 | 14.2 | 0.1 |
| 3 | 321 | Vanadium compounds | 0.0 | 10.5 | 10.5 | 0.2 |
| 4 | 80 | Xylene | 6.4 | 0.0 | 6.4 | 21.5 |
| 5 | 300 | Toluene | 4.9 | 0.0 | 4.9 | 12.0 |
| 6 | 58 | Ethylene glycol monomethyl ether | 4.0 | 0.0 | 4.0 | 0.0 |
| 7 | 56 | Ethylene oxide | 2.9 | 0.0 | 2.9 | 0.0 |
| 8 | 12 | Acetaldehyde | 2.4 | 0.0 | 2.4 | 0.0 |
| 9 | 7 | Butyl acrylate | 2.1 | 0.0 | 2.1 | 0.0 |
| 10 | 411 | Formaldehyde | 1.7 | 0.3 | 2.0 | 0.0 |

Note: In fiscal 2010, acrylic acid and its water-soluble salts, vanadium compounds, and other substances were included in the PRTR.

Trends in Emissions of Substances Subject to the PRTR Law

■ Nippon Shokubai ■ Group companies in Japan

(tons)



Rank-based RC Training

We provide ongoing employee training in RC for the purpose of improving their knowledge, skill, and understanding of overall RC initiatives.

In keeping with our training curriculum for fiscal 2018, we have been providing this training to new employees entering our company, to employees being promoted to the position of subsection chief and to employees being promoted to managerial positions. We will continue improving our RC training capabilities in the future.



RC training for new employees

Definitions

PRTR (Pollutant Release and Transfer Register)

A regulatory system that requires the reporting of emissions of designated chemical substances into the air, water and soil as well as the volume of waste transferred. Data compiled and submitted to governmental agencies are disclosed to the public.

Environmental Accounting

The values determined in our environmental accounting were aggregated according to the *Environmental Accounting Guidelines for the Chemical Industry* published in 2003 by the Japan Chemical Industry Association and the Japan Responsible Care Council. We also made reference to the *Environmental Accounting Guidelines 2005* published by the Ministry of the Environment of Japan.

Environmental protection costs & environmental protection benefits

Applicable period: April 1, 2018–March 31, 2019

Calculation extent: Nippon Shokubai only

(millions of yen)

| Classification | | Main Initiatives | Amount Invested | Expenses | Effects | Relevant Page |
|--|---|--|-----------------|----------|--|---------------|
| Environmental protection cost related to control of the environmental impacts of our production and service business operations (Business area cost) | 1. Pollution Control Cost | Preventing air and water pollution, controlling hazardous substances | 78 | 2,204 | No pollution problems occurred. | P.9,11 |
| | 2. Global Environmental Protection Cost | Initiatives to reduce energy consumption and to tackle climate change | 2,325 | 2,961 | We conducted energy efficiency efforts equivalent to 2,300 kL (crude oil) annually. | P.5~8 |
| | 3. Resource Recycling Cost | Appropriate treatment and disposal of industrial waste | 0 | 586 | We maintained zero emissions by sorting and recycling our solid waste. | P.10 |
| Cost of controlling the environmental impacts of production and service operations occurring upstream & downstream (Upstream/downstream cost) | | Reuse of resources | 0 | 53 | Some of drum containers are reused. | — |
| Environmental protection cost related to management activities (Environmental management cost) | | Operation of environmental management structure; acquisition and maintenance of ISO 14001 registration | 0 | 669 | All our plants successfully acquired certifications, and we are seeking to enhance our environmental management systems. | — |
| Environmental protection cost related to R&D activities (R&D cost) | | Reduction of the environmental impact through development and manufacturing of green products | 0 | 2,159 | Conducting R&D of products that contribute to the environment. | — |
| Environmental protection cost related to social activities (Social activity cost) | | Environmental-related contributions | 0 | 30 | Implementing forest development initiatives. | P.19,20 |
| Cost of dealing with environmental remediation (Environmental damage cost) | | — | 0 | 4 | — | — |
| Total | | | 2,403 | 8,666 | | |

Economic effects (monetary benefits) resulting from environmental protection initiatives

(millions of yen)

| Effect | | Amount |
|-------------|---|--------|
| Income | Operating revenue from recycling used products and waste generated by principal business activities | 36 |
| Cost saving | Reduction in expenses associated with energy conservation | 712 |
| | Reduction in waste disposal cost accruing from resource conservation and recycling | 1,901 |
| Total | | 2,649 |

Reference Total investment for the period: 14,646 million yen
Total R&D expenses for the period: 12,248 million yen



Environmental Accounting

This system collects and analyzes the costs and effectiveness of environmental protection in business activities, quantitatively and to the maximum extent, and makes the data available to the public. It is focused on sustainable development for companies with the goal of efficiently and effectively promoting environmental protection initiatives while maintaining a good relationship with society.

Process Safety and Disaster Prevention Initiatives

Under the Corporate Credo “Safety takes priority over production,” all our employees take part in various activities to ensure safety.

Basic Approach to Safety Issues

We have incorporated the lessons learned from the accident at the Himeji Plant in 2012 to reinforce our basic approach to safety issues. We have clarified our Corporate Credo and the safety management principles presented below, as well as the roles of the company at each organizational level, and are ensuring that all employees stay fully informed.

Safety management principles

We are putting into practice the fundamental principles for safety management, behavior principles during production activities and other guidelines that are established in the Safety Management Regulations of our company.

<Fundamental principle of safety management (excerpt)>

(1) Assure safety based on our Corporate Credo, “Safety takes priority over production.”

<Behavior principle during production activities>

(1) Stop operation immediately if you discover something abnormal in the functioning of equipment.

No one will ask who was responsible.

Message from management regarding safety issues

On Safety Oath Day in fiscal 2018, our President requested us to reconfirm our roles and responsibilities, and reminded us to always think and act with our responsibilities to society in mind. He also urged us never to forget our Corporate Credo: “Safety takes priority over production.”

He gave instructions for safety discussions to be held in every company workplace during our Safe Operation Month (September 16 to October 15), at which everyone should reconfirm their individual roles and responsibilities.

In addition, the President visited the Himeji and Kawasaki Plants three times each for inspections and to talk to employees. In his feedback after the inspections, he emphasized that full implementation of the Corporate Credo “Safety takes priority over production” is vital to ensure safe and stable production activities.

Preventing accidents caused by a loss of collective memory

To show our determination never to forget the accident in 2012 and our resolve never to let such an accident happen again, we held a Safety Oath Ceremony in front of the Safety Oath Monument at the Himeji Plant in fiscal 2018, renewing our commitment to continually improving our safety competency.



Safety Oath Ceremony



Corporate Credo, Safety Oath



Inspection of Himeji Plant by President



Inspection of Kawasaki Plant by President

Promotion of Voluntary Safety Initiatives

Since its foundation, Nippon Shokubai has ensured safe production with the technologies we developed in-house, and the voluntary safety initiatives we have introduced are aimed at zero Class A and Class B severe process safety accidents.

Efforts to prevent accidents and malfunctions

We employ HAZOP to identify latent risks in a plant. We are working to prevent incidents by systematically implementing HAZOP for both routine and non-routine work, and also by conducting Management of Change and non-routine work management.

As small group initiatives, we are promoting HMI activities at the Himeji Plant and TPM activities at the Kawasaki Plant to identify problems and implement improvements.

We will continue with our multi-faceted approach to prevent accidents and malfunctions.

Systematic implementation of safety measures

When an accident happens, we investigate the cause in stages and introduce measures to prevent any recurrence. Long-term maintenance of facilities is incorporated in our maintenance plans and implemented according to the plans. We are also systematically dealing with the aging degradation of our facilities.

Earthquake preparedness

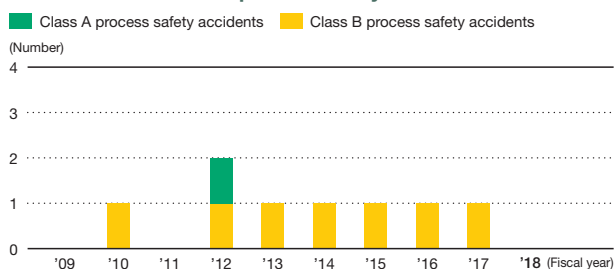
Following the Great East Japan Earthquake of 2011, we reviewed our earthquake preparedness in the event of a future major earthquake and tsunami from both the tangible and intangible aspects and are adopting the necessary measures, which are periodically reviewed and reinforced.

Regarding the existing measures that are in place to improve the seismic resistance of high-pressure gas facilities, we confirmed that all spherical reservoirs with steel tube bracing and those towers and tanks that are important high-pressure gas facilities have seismic designs that meet the seismic standards for reporting to the relevant authorities. We continue to implement seismic resistance measures for our piping facilities in fiscal 2019.

Results of process safety accidents

In fiscal 2018, we had zero class A and B process safety accidents. We will continue our efforts to prevent process safety accidents while constantly improving safety activities.

Trends in the number of process safety accidents



Definitions

HAZOP (Hazard and Operability Study)

A safety evaluation method for systematically evaluating the adequacy of safeguards in plants and eliminating latent risks in plants through comprehensive detection

HMI (Himeji Monozukuri Isshin) activities

These activities advance improvement and innovation at the Himeji Plant.

TPM (Total Productive Maintenance) activities

These improvement activities seek to realize production methods that pursue the highest overall efficiency in production systems.

Enhancing education and training

To upgrade the skills and expertise required to maintain safe operations, we are fulfilling the requirements for training-related risk management at our chemical plants.

As in fiscal 2017, we again invited instructors from the Sanyo Association for the Advancement of Science & Technology and held courses on risk management. With a focus on foremen and higher levels, 48 employees took the classes. Furthermore, to improve the safety competency of our managerial staff, we again held a lecture on safety management as in fiscal 2017 with 50 people participating from all workplaces including people from the research segment.

To increase the competency of the employees who implement HAZOP and to train the next generation, we invited outside lecturers to both plants and held HAZOP trainings again in fiscal 2018.

At both plants, we have collected "know-why" information so that people can understand the origins of our procedures and rules and to enable skills to be passed on. We are using this information for teaching.

The opinions voiced by our employees have encouraged us to continue conducting training both inside and outside the company to improve knowledge of safe operations and to increase safety awareness.



HAZOP training

Maintenance and improvement of safety management efforts

Each year, RC inspections are conducted by executive management at both Himeji and Kawasaki plants. In fiscal 2018, they verified the safety management activities at both plants.

The Executive Officer of the RC Division at head office conducted audits as the head of the auditing committee, to ensure continuous improvements to our safety management.

High-pressure gas safety accredited plants

The Ministry of Economy, Trade and Industry accredited the Chidori Plant and the Ukishima Plant located at our Kawasaki Plant as "Accredited Completion Inspection Executors" and Accredited Safety Inspection Executors" for high-pressure gas. Reaccreditation inspections are conducted every five years.

This accreditation permits continuous operation of high-pressure gas production facilities and autonomous safety inspections by companies with competent self-managed safety systems. Accreditation for our Ukishima Plant was renewed in February 2019.

Process Safety and Disaster Prevention Initiatives

Improving emergency drills

We have established disaster prevention arrangements at every workplace, and we systematically conduct a variety of emergency drills every year.

At our Himeji Plant we conducted Comprehensive Emergency drills in collaboration with the Aboshi and Shikama Fire Stations. At our Kawasaki Plant we conducted Comprehensive Emergency drills with the Rinko Fire Station and the local disaster prevention council, and at our Suita Research Center we also conducted Comprehensive Emergency drills with the Suita Minami Fire Station.

By feeding back issues that were made apparent in the emergency drills in the next trainings, we will continue to review and strengthen our disaster prevention, including related arrangements, education and training.



Comprehensive Emergency drill at the Himeji Plant



Comprehensive Emergency drill at the Kawasaki Plant



Comprehensive Emergency drill at the Suita Research Center

Strengthening a culture of “safety prioritization”

We believe that to strengthen a culture of safety prioritization, we must be aware that safety is not something provided by others, but rather it is something that we think about and gain individually, and we must reflect this knowledge in the behavior of organizations and individuals.

Both of our plants are undertaking unique efforts to strengthen a culture of safety prioritization. For example, employees at our Himeji Plant conducted self checks of fundamental safety behavior, and employees at our Kawasaki Plant undertook safety behavior check activities.

Commendations

At the Hyogo High Pressure Gas Safety Managers' Convention of the Hyogo High Pressure Gas Safety Organization, an employee of our Himeji Plant received the Chairman's commendation as an excellent high-pressure gas safety manager.



Receiving award at the Hyogo High Pressure Gas Safety Managers' Convention

Responsible Care Activities

Logistics Safety Initiatives

We have commissioned Nisshoku Butsuryu Co., Ltd. to handle all our logistics operations. To ensure the safety and quality of our logistics tasks, they cooperate closely with the Environmental Safety and Quality divisions of both our Himeji and Kawasaki Plants, where we work diligently to prevent logistics accidents.

Again in fiscal 2018, our Head Office conducted audits of logistics safety and discussed at Nisshoku Butsuryu regarding their RC initiatives.

We are committed to improving our ability to respond to accidents on transportation routes by periodically conducting drills, with the aim of minimizing damage should an accident occur during product shipment. To further enhance the ability, we have concluded a commission contract with the Maritime Disaster Prevention Center (MDPC) concerning services for responding to accidents involving hazardous substances. We also conduct tabletop exercises related to our collaboration with the MDPC.



Training for accidents during product transportation



MDPC Responder 1
(Vehicle equipped with materials and equipment for initial response)



Example of materials and equipment for initial response

Occupational Safety and Health Initiatives

Toward achieving the target of zero industrial injuries, we implement activities to ensure occupational safety and health, including improving the working environment, reducing risk factors, and creating pleasant workplaces.

Ensuring Continuous Improvement of Occupational Safety and Health

We have been continuously improving our occupational safety and health based mainly on our Occupational Safety and Health Management System (OSHMS). In addition, we are striving to reduce industrial injuries by systematically implementing various basic safety initiatives, including “*kiken yochi* (KY)” risk prediction, “*hiyari hatto*” near miss and “5S” campaigns, as well as by conducting a variety of education and training courses.

Risk assessment

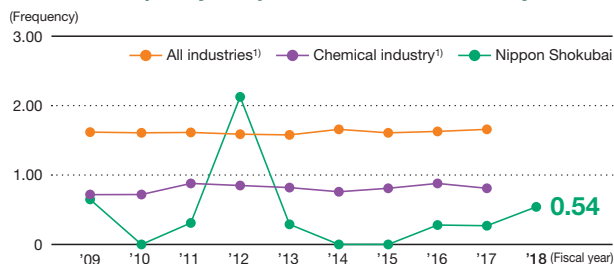
In accordance with the Occupational Safety and Health Management System, we have been undertaking Risk assessment tasks to reduce or eliminate the sources of risks. Moreover, we are systematically implementing risk assessments for chemicals handled at each workplace and working to decrease risks.

Occurrence of industrial injuries

In fiscal 2018, we experienced two injuries with loss of workdays and eight injuries with no loss of workdays. Our contractors experienced one injury with loss of workdays and six injuries with no loss of workdays.

The frequency of injuries with loss of workdays at our company is the lowest for all industries and the chemical industry. Total number of industrial injuries at our company has been between 13 and 17 a year since fiscal 2016. In recent years, industrial injuries have occurred at a high rate among younger workers at our company and our contractors, so we are enhancing safety education and hands-on training for inexperienced young workers to raise their safety awareness.

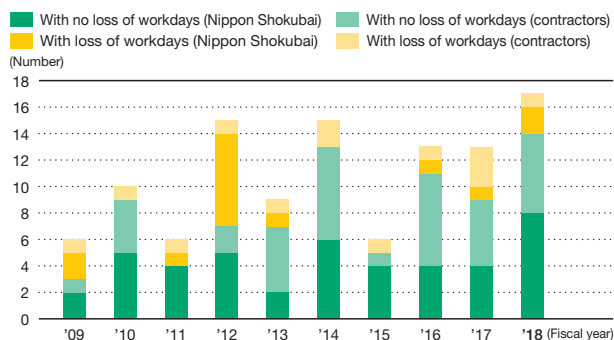
Trends in Frequency of Injuries with Loss of Workdays



* Industrial injuries per million working hours

1) Source: “Survey on Industrial Accidents” by the Ministry of Health, Labour and Welfare

Trends in total number of industrial injuries (with loss of workdays and with no loss of workdays)



Definitions

Near miss (*hiyari hatto*, HH)

Even where no accidents have occurred in day-to-day operations, we monitor workers' experiences of “near misses” or “scare” in order to clarify why such events occur and how we can avoid them. From the results, we can adopt safety measures applicable to both facilities and actions.

Basic safety initiatives

In an effort to prevent industrial injuries, we are committed to daily safety activities targeting work-related risks. Specifically, we remain focused on our “5S” campaign in the workplace, our “*hiyari hatto*” practice of collecting reports on near miss incidents, and our “KY” or risk prediction campaign before work. This includes Group KY before work, self-KY by individual workers and KY coordination between workers and the control room via Mobix radio. To maintain and enhance the sensitivity to danger, we conduct KY training and KY workshops using case sheets, with the aim of improving the level of daily safety activities. We are also working to familiarize ourselves with the basic safety behavior: (1) Think before you act, (2) Pointing and calling, and (3) Hold the handrail when stepping on stairs, by putting up posters and providing related education, thereby helping to prevent industrial injuries.



“Basic safety behavior” poster

On-site training sessions

We hold a variety of on-site training sessions that provide operators and workers with hands-on training in skills such as flange disassembly and reassembly, as well as ascending and descending rope ladders. Training also includes dealing with exposure to liquids, electrical hazards, and risks of working at height as well as demonstrations of hazards of being caught in and entangled in rotating machinery.



Ascending and descending rope ladders Experiencing entanglement

Addressing the health issues of company retirees

Since our company was established, we have never manufactured products containing asbestos; however, we have used insulation and sealing materials that contained asbestos.

For this reason, we support our retirees by offering consultations on health issues and providing health check-ups to those who request them. Information regarding these services is posted on our website.

KY Campaign (risk prediction campaign)

This campaign is intended to prevent injuries by highlighting, at meetings before work, the risk factors (unsafe behaviors and unsafe conditions) that remain hidden in work practices and by implementing measures to address them.

5S Campaign

This campaign promotes the 5 “S” practices, which can be translated as sort, set in order, shine, standardize and sustain.

Chemical Safety Initiatives

Toward achieving the goal of zero legal and social problems related to chemical substances throughout the lifecycle of products, we are committed to the proper management of chemicals through initiatives including complying with laws and regulations and providing related information.

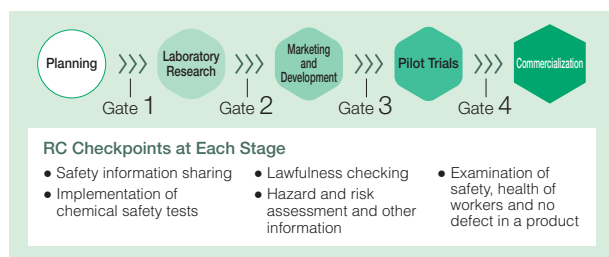
Comprehensive management of chemical substances throughout the product lifecycle

Toward achieving the goal of zero legal and social problems related to chemical substances throughout the lifecycle of products from the R&D stage to disposal at the end of the product's service life, Nippon Shokubai is committed to the proper management of chemicals and implements a variety of initiatives, including upgrading our internal systems to comply with national and international laws and regulations related to chemical products, and providing customers with information on relevant laws and regulations as well as product safety information.

Ensuring the safety of new products

We have introduced a gate system at each stage from R&D to commercialization. We apply our technical expertise to examine the safety of chemical products throughout the product lifecycle and determine at each stage whether to proceed to the next stage.

Gate System



Product Safety Initiatives

We prepare GHS-compliant SDSs, warning labels, and Yellow Cards and provide information to customers while providing training sessions for our employees. Regarding application-specific products used in pharmaceutical raw materials, pesticides, cosmetics and food additives, our Product Safety Review Sub-committee conducts strict checks while ensuring compliance with the Product Liability Act.

Addressing import/export controls

To ensure legal compliance regarding imports and exports, we have streamlined our process for strengthening company regulations, keeping our employees informed about whether a product has been subject to import/export restrictions and improving our shipping management system for coordination with our enterprise resource planning (ERP) backbone accounting system. We also conduct regular internal training on import/export management.



Definitions

GHS

An abbreviation for Globally Harmonized System of Classification and Labeling of Chemicals, GHS reflects the physical, health and environmental hazards of chemicals determined in accordance with international standards. Under this system, chemical products identified as presenting a hazard are categorized according to international standards and displayed on containers and in the respective SDS. Countries around the world have also introduced this system on the recommendation of the United Nations. This system is enforced in Japan through the Industrial Safety and Health Act.

SDS (Safety Data Sheet)

The Safety Data Sheet lists a chemical's properties as well as data on its hazards, applicable laws, proper handling and transportation requirements, and specific emergency response measures in a prescribed format. We prepare an SDS for each of the products we manufacture and develop and provide them to our customers. We are implementing a system for distributing these documents to all employees through our chemical substance management system.

Accommodating chemical registration requirements within and outside Japan

In collaboration with specialized institutions and our Group companies outside Japan, we are responding appropriately to laws and regulations that require us to register chemical substances, including the Act on the Evaluation of Chemical Substances and Regulations of their Manufacture, etc. and the Industrial Safety and Health Act in Japan, as well as TSCA in the United States and REACH in Europe.

Establishment of a chemical substance management system

We are implementing a comprehensive chemical substance management system that can respond quickly to risk assessments, the issuance of SDS, and surveys from customers querying us on the chemical content of our products. We have created and launched this system by providing centralized management of various types of information encompassing chemicals, raw materials, hazardous materials, and regulations, and are continuously committed to updating the information and improving the system functions.

Sample SDS



Sample warning label



Promoting a voluntary initiative of the JCIA

We participate in GPS/JIPS, a voluntary initiative for strengthening chemical management promoted by the Japan Chemical Industry Association, which prepares and releases a safety summary to the public.

GPS/JIPS

To achieve the UN-mandated goal of "minimizing chemical risks to human health and the environment from manufacturing and using chemical products with the aim of achieving the targets by 2020," the chemical industry is strengthening its chemical management on a global scale (Global Product Strategy, or GPS). The Japan Chemical Industry Association is promoting an initiative named Japan Initiative of Product Stewardship (JIPS) in Japan which conducts risk evaluations of chemicals, prepares safety summaries that clearly list the results of the evaluations and releases this information to the general public to improve public awareness.

Yellow Card

Carriers who transport hazardous products must carry a yellow card for reporting information about their cargo to fire squads in the event of an accident. The yellow card lists a product's hazards, first aid procedures in an accident, and emergency contact information. As part of its promotion of RC, the Japan Chemical Industry Association prepares and manages guidelines on the procedures for preparing a yellow card in order to strengthen first aid measures in the event of an accident.

Quality Initiatives

Our basic policy related to quality is to provide products and services that fully satisfy our customers while earning their trust. We also work to maintain or improve our quality levels.

Ensuring Continuous Improvement of Quality

Customer satisfaction initiatives

All our plants and all Group companies inside and outside Japan engaged in manufacturing and logistics have introduced quality management systems. We implement our quality assurance initiatives from the customer's perspective from the product development stage through manufacturing and delivery.

We are dedicated to the continuous improvement of our quality management system to ensure our customers are satisfied with the stable high quality of our products and services.



Quality control convention

Promoting initiatives to address quality issues

We respond quickly to any complaints or inquiries from customers concerning our products and share information throughout the company by compiling it into a database to visualize the progress of the response. At the same time, we are preventing quality issues from occurring through company-wide distribution of case studies.

We also issue monthly reports on claims and complaints that occurred at our Group companies, thereby ensuring sharing of information and preventing the emergence of quality problems.

Supply chain initiatives

Nippon Shokubai promotes initiatives to ensure supplies of safe and reliable products throughout the entire supply chain, from procurement of raw materials to manufacture and sales of products. In accordance with our regulations for green procurement management, we have independently assigned substances that are regulated or highly hazardous to two categories: "prohibited substances" and "restricted substances." We are promoting the development of green products and the procurement of raw materials with low environmental impact while controlling the inclusion of such substances in our products. For information transmission sheets, we have introduced chemSHERPA, which was developed under the guidance of the Ministry of Economy, Trade and Industry.



chemSHERPA

This shared system for transmitting information about chemicals contained in products to supply chains was developed under the leadership of the Ministry of Economy, Trade and Industry in Japan. Full-scale utilization began in April 2018.

Toward gaining greater public trust

We have established quality management systems and ensured the safety and reliability of our products. In response to growing social demand for product quality and reliability, the quality assurance segment of our Head Office has conducted quality audits of our plants and Group companies to check the quality assurance systems and the status of quality management at all production sites.

In fiscal 2018, executive management conducted RC inspections on the theme "preventing quality troubles and ensuring quality governance." The inspections confirmed that at both the Himeji and Kawasaki Plants, past problems have been thoroughly reviewed and communicated throughout the company, that the quality system incorporates an adequate mechanism for preventing irregularities, and that the quality awareness is shared among the employees to ensure the quality-related governance at the plants.

We participated in the formulation of the Guidelines for Enhancing the Quality Assurance System, which were released by the Japan Petrochemical Industry Association in response to recent inadequate quality incidents that had occurred at other companies. While familiarizing the entire Group with these Guidelines, we conduct quality audits and RC inspections to check for any inappropriate behavior related to quality.

[Guidelines for Strengthening the Quality Assurance System (structure)]

1. Strengthening the quality assurance system by top management
2. Further awareness improvement of all employees (including top management) about quality assurance
3. Preventing occurrence of inadequate or inappropriate incidents related to quality
4. Response to inadequate or inappropriate incidents if they occur
5. Connecting quality data

Introducing products with halal certification

We have acquired halal certification from the Japan Muslim Association for the products described below, which were approved by the Shariah Research Institute of Takushoku University.

Parts of Southeast Asia, most notably Malaysia and Indonesia, are home to many Muslims, and demand for halal-certified ingredients and production processes from food-related businesses has been increasing. In response to this situation, we have acquired halal certification for products for which acquisition of the certification is strongly urged by customers.

Note: The products for which we have acquired halal certification as of April 1, 2019 are succinic acid, succinic acid disodium, maleic anhydride, AQUALIC FH (a thickener), AQUALIC MH (a feed binder) and AQUALIC IH (a flocculant).



Halal Certification

A certification with religious relevance, granted by the relevant organizations when certain standards are satisfied, for products and services targeted at Muslim customers.

Communication with Society

Guided by the Nippon Shokubai Group Mission of “**TechnoAmenity** — Providing affluence and comfort to people and society with our unique technology,” we have adopted a number of social initiatives. These include maintaining clear and open communication with the public as a good corporate citizen that protects the natural environment, works in harmony with local communities and trains the next generation.

Protecting the Natural Environment

With the awareness that all our business activities benefit from the natural environment and impact the natural environment, we are committed to mitigating climate change and protecting the natural environment to preserve biodiversity.

Forest development initiatives

Our employees have volunteered to participate in activities to protect and restore the natural environment. These activities are aimed at training individuals to think independently and take action on the environment.

■ Contributing to Our Forests and Water Resources

Location: Akasai Valley, Hara, Haga-cho, Shiso-shi, Hyogo prefecture
Start of activity: November 2008

We have been, for example, undertaking management of the headwater forest in the Akasai Valley where originates the Ibo River that passes by our Himeji Plant. In addition, we are learning to impart the importance of protecting biodiversity through our research on the creatures inhabiting the Akasai River. In fiscal 2018, we undertook the initiatives in May and October.



Commemorative tree planting at the 10th anniversary ceremony of the initiative



Forest for water resources

■ Contributing to the “Yugawara Myriad Leaves Forest”

Location: Kajiya, Yugawara-machi, Ashigarashimo-gun, Kanagawa prefecture

Start of activity: November 2013

In the headwater forest of upper reaches of the Shinzaki River in Yugawara-machi, we conduct forest improvement and nature observation tours. Working together with local residents, it has become a place to interact with and nurture the forest. In fiscal 2018, we undertook the initiatives in May and October.



Yugawara Myriad Leaves Forest

■ Japan-China Friendship Forest Development and Global Warming Prevention

Location: Ejina Horo Banner, Inner Mongolia Autonomous Region, China

Start of activity: October 2008

In order to prevent desertification in inland China and regenerate the vast forests that were once there, we have been undertaking tree planting at this area. In fiscal 2018, we traveled to the area in November and checked the growth of the over 1,000 trees that had been planted in previous years.



Landscape in 2008 at beginning of tree planting



Landscape in 2017

■ Japan-Indonesia Friendship Forests of Banten Bay for Biodiversity Preservation

Location: Serang, Banten Province, Republic of Indonesia

Start of activity: September 2018

Nippon Shokubai has launched an initiative to develop forests in Banten Province in the Republic of Indonesia, where PT. NIPPON SHOKUBAI INDONESIA is located. The initiative is aimed at restoring mangrove forests, which are habitats of diverse creatures and are sometimes called “the cradle for sea lives.” On September 13 in 2018, 58 of our members participated in the activity to plant 300 saplings. (In 2018, a total of 10,000 saplings were planted.)



Planting saplings



Envisioned forest

Note: The forest development initiatives in Japan and China are undertaken in cooperation with NPOs through the Green Fund of the National Land Afforestation Promotion Organization. The forest development initiative in Indonesia is undertaken in cooperation with local NPOs.

Conserving and popularizing the *Nojigiku* chrysanthemum

To protect, conserve, and popularize the endangered *nojigiku* chrysanthemum, the prefectural flower of Hyogo, our Himeji Plant has cultivated 160 varieties of this flower, including foundation stock, in a 2,000-square-meter green yard by the plant. Cultivation began in 1972 and by 1974 the Himeji Plant began distributing seedlings annually in cooperation with the Hyogo prefectural government. In fiscal 2018, we distributed 25,000 seedlings to 274 organizations, including local governments, kindergartens, elementary and junior high schools and community associations.



Nojigiku in a conservation garden

Working in Harmony with Local Communities

Believing that establishing a relationship of trust with local community residents is crucial for stable business operation at each plant, we take various opportunities to communicate with them.

■ Cleanup campaign

We conduct periodic cleanups of the environs around all our plants as a local beautification initiative. In the Suita district, we are participating every year in the Kanzaki Riverbank Cleanup Campaign that is conducted as part of the Adopt-a-River Program promoted by Osaka Prefecture.



Cleanup activity

■ Sweet potato harvest party

We grow sweet potatoes in the potato fields we have created in the green yard of the Himeji Plant. Every year, we invite neighborhood kindergartners and nursery school children to enjoy harvesting our crop of sweet potatoes. We have been holding this activity since 1971, as it has helped us forge strong ties in the community. In fact, some of the children who harvested potatoes in the past are now employed with us. In fiscal 2018, about 1,000 preschoolers and their parents took part.



Children harvest potatoes

Training the Next Generation

We host and participate in various events to help people become familiar with chemical technologies. We also provide internship opportunities to have work experience through hands-on training. Through initiatives that take advantage of our unique business characteristics, we are contributing to developing the abilities of children who will form the next generation.

■ Children's Chemistry Experiment Show

We have been presenting an Experiment Show titled "Superabsorbent Polymer, the Mysterious Powder." The children enjoy experimenting with chemistry and show great interest.

● Children's Chemistry Experiment Show 2018

Date: October 20-21, 2018
Site: Kobe International Exhibition Hall
Sponsor: "Dream Chemistry 21" Committee
Participants: approx. 400

● Science Booth Exhibit

Date: July 21-22, 2018
Sponsor and Site: Himeji City Science Museum
Participants: approx. 280



Children's Chemistry Experiment Show

■ Hosting internship trainees

Our Himeji and Kawasaki plants and our Suita Research Center provide internship opportunities for students from technical colleges. In fiscal 2018, a total of 24 students from 18 colleges gained experience and skills — such as how to take measurements with analytical instruments — through this program.



Internship

Production Site Reports

Himeji Plant

Plant Outline

| | |
|---------------------|--|
| Plant Manager | Kazukiyo Arakawa, Executive Officer |
| Location | 992-1 Aza-Nishioki, Okinohama, Aboshi-ku, Himeji |
| Number of employees | 1,222 (including research centers) |
| Products | Acrylic acid, acrylates, maleic anhydride, superabsorbent polymers, resin modifiers, electronic information materials, De-NOx catalysts, dioxins decomposition catalysts, and other products |
| TEL | +81-79-273-1131 |
| FAX | +81-79-274-3723 |



Kazukiyo Arakawa, Plant Manager

Fiscal 2018 Results of RC Activities

■ Occupational safety and health

Three injuries with loss of workdays (including contractors),
five injuries with no loss of workdays (including contractors)

■ Process safety and disaster prevention

Zero Class A and Class B process safety accidents

■ Environmental protection

Energy source CO₂ emission intensity: 170 kg-CO₂/t (target: 181 kg-CO₂/t)

To support occupational safety and health, we undertook risk/problem reduction activities at every workplace. At the same time, we implemented the basic safety behavior: (1) Think before you act, (2) Pointing and Calling, (3) Hold handrail when stepping stairs, to familiarize ourselves with actions to protect ourselves.

For process safety and disaster prevention, we compiled safety technology information, reviewed Management of Change, promoted

alarm management, and introduced new equipment diagnosis technology.

For environmental protection, we increased cogeneration facilities in fiscal 2018 to reduce energy consumption, while introducing initiatives to improve the energy balance in the Plant and reinforce the electricity/steam supply system for emergencies.

We will continue to promote RC activities, to earn greater confidence from the public as a responsible chemical company.

Commitment to human capital development

The Himeji Plant holds an Operator Training Course for young operators who have been working for the Company for around 10 years in the manufacturing segment and who are expected to be in charge of education and training in their workplaces. In this training program, the participating operators from different workplaces are gathered in a control room-like special facility for on-site communication, where the roles of the foreman, control room operator, on-site instructor and operator are allocated to the trainees. By experiencing a series of work such as issuing manuals, preparation, operation and completion, trainees are able to reconfirm the importance of the fundamental principles of operation. This experience-based technical training is aimed particularly at helping trainees improve their non-technical skills (determining the situation, instruction and reporting, communication, leadership, teamwork, and so on).

Many trainees feel that experiencing the role of foreman substantially help improve their skills. Some departments offer their own training for their workers using this facility to improve the skills of their operators.



Operator training course

Pictograms

At the Himeji Plant, we are committed to comprehensively implementing the basic safety behavior to eliminate industrial accidents and other problems. In addition to the basic safety behavior, we illustrated the basic rules and practices that should be observed in pictograms so that anyone can understand at a glance, and placed them at 131 locations inside the Plant.

A total of 13 types of pictograms were prepared. The Plant members designed and prepared them on their own.



A pictogram in position



Examples of pictograms

Kawasaki Plant

Plant Outline

| | |
|---------------------|---|
| Plant Manager | Teruo Kamei, Managing Executive Officer |
| Location | Chidori Plant 14-1 Chidori-cho, Kawasaki-ku, Kawasaki Ukishima Plant 10-12 Ukishima-cho, Kawasaki-ku, Kawasaki |
| Number of employees | 362 |
| Products | Ethylene oxide, ethylene glycol, ethanolamine, secondary alcohol ethoxylates, polymers for concrete admixture, acrylic acid special ester, and other products |
| TEL | +81-44-288-7366 |
| FAX | +81-44-288-8492 |



Teruo Kamei, Plant Manager

Fiscal 2018 Results of RC Activities

■ Occupational safety and health

Zero injuries with loss of workdays, eight injuries with no loss of workdays (including contractors)

■ Process safety and disaster prevention

Zero Class A and Class B process safety accidents

■ Environmental protection

Implemented measures for energy conservation amounting to 741 kl/year (crude oil equivalent)

In occupational safety and health, we had eight injuries with no loss of workdays, including chemical burns. We reviewed the criteria for wearing personal protective equipment and prepared accident case sheets to raise awareness of workplace risks. Joint patrols are conducted by related departments to prevent similar problems.

Regarding process safety and disaster prevention, we systematically implemented measures to prevent deterioration of aging equipment and

conducted emergency drills.

For environmental protection, we implemented measures for energy conservation focusing mainly on steam reduction. For substances subject to the PRTR Law, we implemented measures including the collection of boron from wastewater.

We will continue to promote RC activities to ensure that our plant remains safe and reliable.

Initiatives by the Education & Improvement Activity Center

Recently, the number of young employees at the Kawasaki Plant who are in their 20s have been rapidly increasing. To consolidate the foundation of people, facilities, and systems that support the Plant, training the young employees is crucial.

In view of this situation, the Education & Improvement Activity Center was set up as a department to promote planning and training within the Plant. The Center is working on restructuring the training system in cooperation with the education committee and production segment in the Plant.

Initiatives by the Education & Improvement Activity Center include offering on-site practice of piping work for young operators in the collective training course, and using past accident cases as training materials to help improve operational skills and specialized knowledge.

To evaluate each employee's growth quantitatively, we set an index for human resources development.

Using the human resources development index, we see daily operations as opportunities for human resources development and allocate points to each operation so as to visualize the growth of each employee. The index is also used by managers as a tool to train their subordinates.



Training for young operators

Improvement activities based on hazard assessment

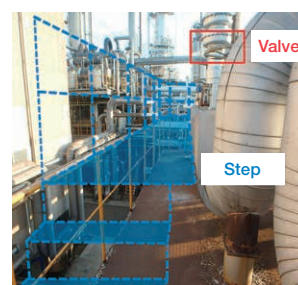
The Kawasaki Plant conducts hazard assessment to identify unsafe operations and prevent industrial accidents or process safety accidents.

For each operation at each workplace, the hazard assessment evaluates the impact of a potential accident or disaster based on a combination of the probability of a specific hazard and the seriousness of the hazard if it occurs. Each operation is scored on a scale from one to five.

For operations that score high, improvement activities to lower the hazard level are conducted, including modifying equipment and revising operational processes.

Each workplace set its own numerical targets for risk reduction, etc. and systematically implements activities for improvements.

An example of one such activity in the workplace is installing a step where a valve which is not frequently operated is positioned high up, posing the risk of a fall, to allow safe operation.



Installing a step to operate a valve that is high up

Suita Research Center

Suita District Outline

| | |
|---------------------|--|
| Representative | Kin-ya Nagasuna, Director, Innovation & Business Development Division, Managing Executive Officer |
| Location | 5-8 Nishi Otabi-cho, Suita, Osaka |
| Number of employees | 370 |
| R&D organizations | Innovation & Business Development Division, Ethylene Oxide Research Department, Performance Chemicals Research Department, Catalysts & Green Energy Materials Research Department, Process Technology Center, Malonates Business Development Office, Health & Medical Business Development Office, AI Promotion Team |
| TEL | +81-6-6317-2202 |
| FAX | +81-6-6317-1578 |



Kin-ya Nagasuna, Director
Innovation & Business Development Division



Fiscal 2018 Results of RC Activities

■ Occupational safety and health

Zero injuries with loss of workdays, one injury with no loss of workdays (including Himeji Research Center)

■ Process safety and disaster prevention

Zero Class A and Class B process safety accidents

■ Environmental protection

Recycling 100% of waste

In the Suita District, after the withdrawal of the Suita Plant at the end of 2014, the Research Center has led enthusiastic RC activities, including initiatives for process safety and disaster prevention.

In fiscal 2018, in occupational safety and health, we had an injury involving glass with no loss of workdays. Aiming to eliminate accidents related to glass in research activities, we established handling guidelines and invited external instructors to hold safety training to prevent similar accidents.

For process safety and disaster prevention, in addition to holding

training by external organization for risk management in process development, we conducted various emergency drills, including joint drills with public fire departments.

For environmental protection, under the initiative of the zero emissions committee members selected from each workplace, we implemented comprehensive sorting of waste and continued to achieve 100% recycling of waste in fiscal 2018.

We will continue to promote RC activities, with the aim of ensuring safe research activities with no accidents.

Commitment to education

The research segment conducts systematic education and training for researchers in ability development, intellectual property, and RC.

In fiscal 2018, as part of the RC education, we held a Chemical Hazard Hands-on Training. 28 researchers who have been in service for less than five years participated in the training and learned about the inflammability of liquids, gas explosions, explosions by impact, ignitibility of powders, and dust explosions.

In this training, the danger of the chemicals handled in laboratories are systematically explained and their associated accidents are also explained. After the explanation, small-scale fires and explosions are demonstrated.

Actually seeing and hearing flames and the sound of an explosion helped participants to recognize the danger of the substances they are handling, which helped raise their awareness of safety.



Chemical Hazard Hands-on Training

Initiatives to eliminate unsafe behavior

The research segment promotes the “*anzen-10byou katsudou*,” aimed at eliminating unsafe behavior. In this initiative, the KY self-check cards designed to remind risk factors hidden in experimental operations are distributed to researchers. Using these cards, researchers are encouraged to stay calm for 10 seconds before moving their hands, to lower the risk of injury. Associated illustrations are posted at the entrance of laboratories and in the worksite to familiarize the members with the activity.

Based on cases of “*hiyari hatto*” near miss incidents, we began to place illustrations to raise awareness to eliminate unsafe behavior that is likely to take place in Suita Research Center. In October, we placed illustrations to prevent passing or crossing zones other than at the pedestrian green belts or crosswalks.



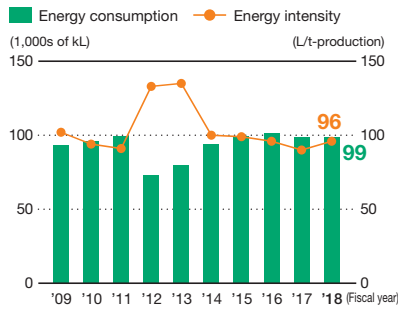
Illustration posted

Illustration for
“*anzen-10byou katsudou*”

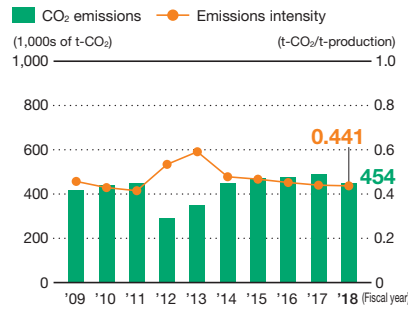
Plant Data

Himeji Plant

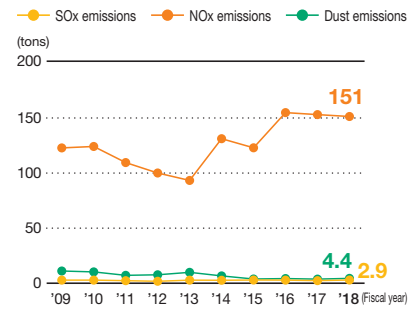
Trends in Energy Consumption and Intensity



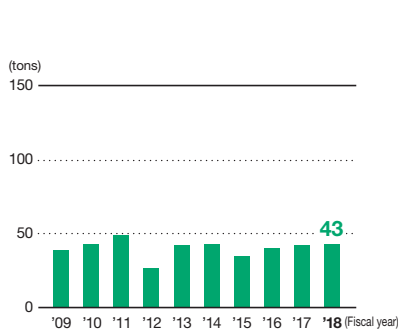
Trends in CO₂ Emissions and Intensity



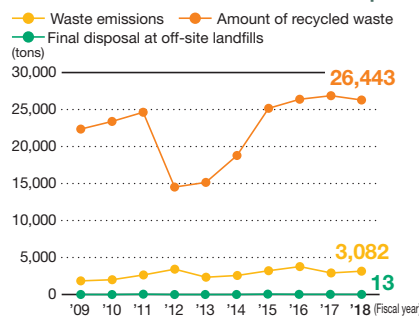
Trends in Emissions of SO_x, NO_x, and Dust



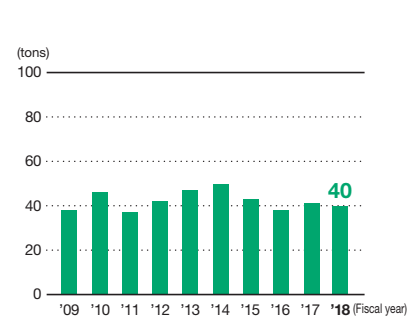
Trend in COD of Wastewater



Trends in Amount of Waste, Recycled Waste, and Waste for Final Off-site Landfill Disposal

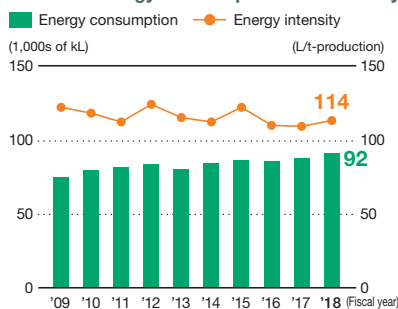


Trend in Emissions of Substances Subject to the PRTR Law

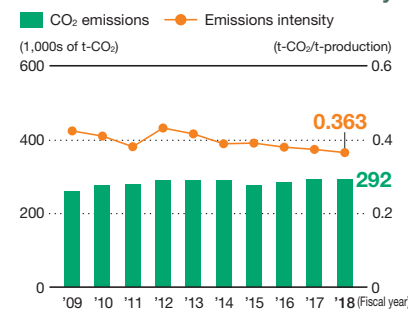


Kawasaki Plant

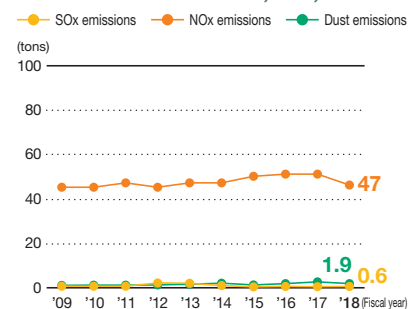
Trends in Energy Consumption and Intensity



Trends in CO₂ Emissions and Intensity

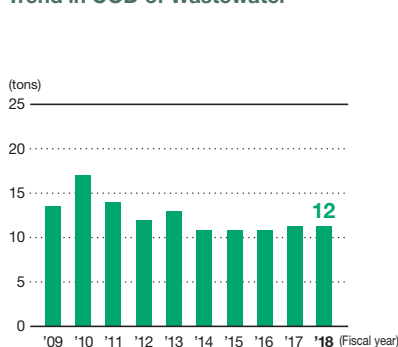


Trends in Emissions of SO_x, NO_x, and Dust

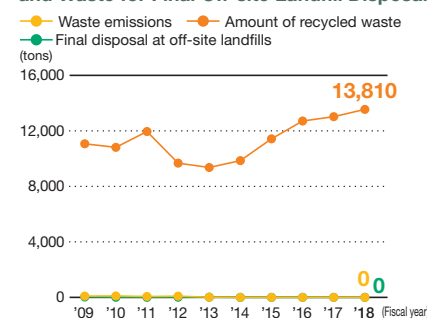


The method of calculating emissions of NO_x and dust was revised.

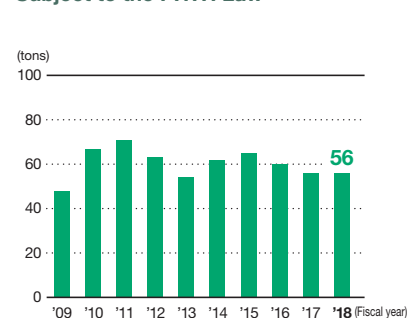
Trend in COD of Wastewater



Trends in Amount of Waste, Recycled Waste, and Waste for Final Off-site Landfill Disposal



Trend in Emissions of Substances Subject to the PRTR Law



Vanadium compounds have been designated since fiscal 2010.

Providing Support for Group Companies

In the interests of strengthening group management, we are providing active support for the RC initiatives of our Group companies.

Support for Environment and Safety Activities

RC discussions

To promote and improve RC initiatives for Group companies both inside and outside Japan, our RC Division holds RC discussions. In fiscal 2018, the discussions were held at six companies in Japan and one company overseas.

In these discussions, we received reports on the policies, planning and achievements of each company's RC initiatives as well as reports on individual improvements on-site. We also exchanged opinions with each company and provided them with advice and support.



RC discussion at Tokyo Fine Chemical Co., Ltd.



RC discussion at Nippon Shokubai America Industries, Inc.

RC Meeting

We hold RC Meeting as an opportunity for our Group companies outside Japan to adopt the good practices of other companies to improve their own activities.

In fiscal 2018, persons in charge of environment and safety at our Group companies outside Japan gathered in Indonesia for the meeting, where they reported the plans and results of RC activities of their companies, and presented cases of initiatives for reducing risks and industrial injuries, as well as emergency drills and individual activities for improvements at worksites. The meeting was aimed at enabling the Group companies to share the information and helping them improve their initiatives.



RC Meeting

Environment and safety exchange meeting

Persons in charge of environment and safety at our Group companies in Japan gather at a company in charge to hold an environment and safety exchange meeting.

The exchange meeting for fiscal 2018 was held at Nippon Nyukazai Co., Ltd.

At the meeting, the company in charge presented their RC activities. The information was shared among the Group companies in Japan to be used for improving initiatives at each company. Also at the meeting, participants examined the industrial injuries that occurred at Nippon Shokubai and its Group companies in Japan, and analyzed the cause in the aspects of men, materials and management, and formulated countermeasures to prevent any similar injuries from occurring.

Environmental and safety audits

We conduct environmental and safety audits at our Group companies in Japan to strengthen our environmental safety management system.

In these audits, we confirm compliance with legal requirements as well as regulatory compliance related to safety and the environment. We also determine whether our environment and safety management systems are properly implemented.

Starting from fiscal 2018, the person in charge of the environment and safety at each Group company participated in an audit of other Group companies, as an opportunity to get to know the RC initiatives and the techniques used to implement management systems at other companies.



Environmental and safety audit at Chugoku Kako Co., Ltd.

Support for Quality Activities

Strengthening the quality assurance system

To promote Group-wide quality initiatives, we are enhancing support for quality assurance activities by our Group companies both inside and outside Japan.

For Group companies in Japan, we provide appropriate advice and support on their quality activities and quality issues through the quality roundtable meetings, while conducting quality audits to confirm the quality governance of each company. We also host quality exchange meetings as a forum for persons in charge of quality to exchange information and share quality issues.

For Group companies outside Japan, we have introduced a quality database to facilitate sharing of quality issues and quality information. We conduct quality audits to verify the quality management system at each company. We also host quality manager meetings for members in charge of quality at overseas sites to share quality issues and exchange information.



Quality exchange meeting

Initiatives of Group Companies

Group Companies in Japan

NISSHOKU TECHNO FINE CHEMICAL CO., LTD.

Principal business | Manufacture and sale of (meth)acrylic acid derivatives and photo/electro chemicals

Nisshoku Techno Fine Chemical has a high percentage of young employees, and has therefore focused its efforts on preventing industrial injuries by activities such as offering hands-on education programs both inside and outside the company. But unfortunately, in fiscal 2018, four industrial injuries occurred at the company and its contractors. A common cause of these industrial injuries was found to be inadequate work procedures and insufficient risk assessments. The company therefore reevaluated the dangers and hazards involved in its work and reviewed work standards, while improving its facilities to enhance safety. In seeking to reestablish zero industrial injury records, the company will enhance education both inside and outside the company to raise employee sensitivity to danger, while continuing risk assessment activities and utilizing "KY" risk prediction and "HH" near miss incident reporting.

The company undertook environmental protection efforts with the goal of reducing intensities for amounts of waste generated, emissions of substances subject to the PRTR Law and energy use compared to fiscal 2017. Thanks to maintenance of stable production, the company was able to achieve the goal to a certain extent.

For process safety and disaster prevention, the company is working to improve its ability to respond in an emergency. In addition to the annual comprehensive emergency drills, the company conducts continuous emergency drills at each of its worksites and receives guidance and training from the Joint Disaster Prevention Team on the handling of equipment.



Comprehensive emergency drill

Interview

Reducing product waste by reviewing operating conditions for metallic salt products

Metallic salt products are our major products. It is crucial for our company to ensure their stable production and reduce costs.

The production facilities for metallic salt products require periodic cleaning. Production must be suspended during the cleaning, and the process is associated with generation of product waste.

To address this problem, we aimed to reduce the frequency with which the equipment is cleaned as much as possible, and we reviewed the facility operating conditions in cooperation with the Production Technology Dept. By examining the conditions for preparation and reaction in detail, we succeeded in reducing the frequency of facility cleaning by around 65% compared to the previous fiscal year. Along with this reduction, we were also able to reduce product waste during cleaning and the amount of waste cleaning liquid used, thereby achieving reductions in both costs and waste.



Fumihito Yoshikawa

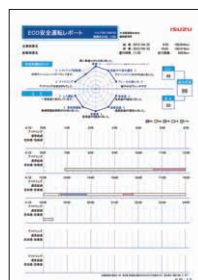
Subsection Chief, Production No. 2 Section, Production Dept.
Nisshoku Techno Fine Chemical Co., Ltd.

Nisshoku Butsuryu Co., Ltd.

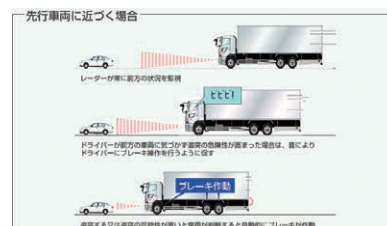
Principal business | Logistics of chemicals

The Nisshoku Butsuryu Group continues to sharpen its focus on environmental protection, logistics safety, and logistics quality. At the same time, it aims to become an even better logistics company that warrants the full confidence of shippers and customers alike by implementing a management system according to ISO international standards. The following are examples of its initiatives.

- Proactively pursuing safety management (transportation safety management) as a truck transport company and introducing an advanced driving information system known as Mimamorikun, which is a combination of digital tachometers, GPS units, and drive recorders, safety devices such as lane-departure warning devices and supplemental rear-view cameras, and vehicles equipped with pre-collision warning systems, thereby supporting energy-efficient driving methods, safe driving and accident response
- Conducting risk assessments, the "hiyari hatto" near miss campaign, and KY risk prediction as part of the initiatives to prevent industrial injuries during filling and loading of products
- Systematically conducting voluntary checks on tankers and renewing aged tankers in an effort to prevent leaks during transport
- Implementing joint transportation with other companies in the same industry for small cargo transportation to respond to environmental changes such as the shortage of drivers and regulations on work hours, and to enable safe and stable transportation of chemicals



Mimamorikun advanced driving information system



Pre-collision warning system
(Since November 2014, this feature has gradually become mandatory.)

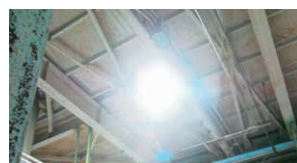
TOKYO FINE CHEMICAL CO., LTD.

Principal business | Manufacture and sale of disinfectants for industrial use, brine, antifouling agents, stabilizers of vinyl chloride resins, etc.

In fiscal 2018, the final year of its 6th RC Promotion Basic Plan, Tokyo Fine Chemical implemented RC initiatives under the Corporate Credo, "Safety takes priority over production" with a policy of establishing a safe and effective production system. As a result, the company achieved a record of zero facility accidents for process safety and disaster prevention, while for occupational safety and health, it achieved a record of zero industrial injuries.

In environmental protection, the company replaced its lighting facilities with LED lights, reducing energy use and greenhouse gas emissions.

The company will continue to steadily implement the 7th RC Promotion Basic Plan and work to increase operational safety.



LED lights installed in the plant



Lighting in a laboratory replaced with LED lights

Group Companies in Japan

NIPPON NYUKAZAI CO., LTD.

Principal business | Manufacture and sale of surfactant and other chemicals

In fiscal 2018, Nippon Nyukazai progressed with the RC activities of the 4th RC Plan (spanning fiscal 2017-2020) in its second year.

Regarding occupational safety and health, the company had an injury due to contact with a hazardous substance with no loss of workdays. Following this accident, the company voluntarily made a mobile risk simulation device, which allows employees to experience cases of occupational injuries, with the aim of preventing occurrence of any similar accidents.

As a new action for process safety and disaster prevention in fiscal 2018, the company held two case presentation meetings inviting experienced employees to talk on their experiences of accidents and failures. By allowing the experiences of veteran employees to be shared by employees of subsequent generations, the company aims to help them sharpen their sensitivity to dangers.

As to communication with society, to provide general consumers with safety information, the company prepared and made public a safety summary of Bisphenol A di(2-hydroxypropyl) ether (GSS) as part of its GPS/JIPS initiatives promoted by the Japan Chemical Industry Association. This initiative was highly evaluated and the company received the JIPS award (encouragement prize) in February 2019.

The company will continue to work to make its operations safe and to enhance its RC efforts.



Risk simulation



JIPS Award (encouragement prize) ceremony

NIPPOH CHEMICALS CO., LTD.

Principal business | Manufacture and sale of iodine, iodine compounds, raw materials for pharmaceuticals and pesticides and natural gas

With the company-wide slogan "absolutely zero industrial injuries," Nippon Chemicals has been implementing RC activities with the participation of all members toward establishing a safety culture.

In fiscal 2018, as part of its initiative to enhance compliance, an inspection on compliance with the Industrial Safety and Health Act was conducted at all departments to further promote safety management. At each workplace, emergency drills and training in response procedures for process safety and disaster prevention were held to enhance preparedness.

The company is also committed to reducing energy consumption and waste emissions by promoting EMS activities. As an initiative for logistics safety, the company conducted joint training with carriers, simulating an accident during product transportation.



Training for accidents during product transportation (detecting toxic gas leakage)



NIPPON POLYMER INDUSTRIES CO., LTD.

Principal business | Manufacture and sale of acrylic resins

Nippon Polymer Industries completed construction of a new cold temperature warehouse for dangerous materials to replace its old cold temperature warehouse (internal temperature 10°C) at the end of July 2018.

This warehouse stores Class 5 dangerous materials (and some Class 4 materials), including polymerization initiators that are autoreactive at temperatures higher than ambient temperature. While the former warehouse had vested legal interests, the new warehouse was the first construction for a specified plant in the area covered by the Himeji Municipal Fire Department after the revision of the law. The company therefore consulted the fire department multiple times on necessary safety measures. With various sensors and an in-house power generation system designed and installed from a new perspective, the construction was approved as a facility for dangerous materials that will ensure sufficient safety.

The company will continue to enhance its facilities related to process safety and disaster prevention, placing the highest priority on safety.



New cold-temperature warehouse for dangerous materials

CHUGOKU KAKO CO., LTD.

Principal business | Manufacture and sale of adhesive-processed Principal business products and fine sphere particles

Chugoku Kako Co., Ltd. has conducted continuous general emergency drills (revised in fiscal 2015) for the entire plant as part of its process safety and disaster prevention initiatives. Starting from fiscal 2017, the company has received direct guidance from the local fire department on how to handle fire pumps and fire hoses to extinguish a fire, with the aim of helping employees improve their emergency response by learning specialized knowledge and skills.

Regarding occupational safety, the company has implemented measures to prevent heatstroke, including applying thermal barrier coating on the roofs of old plants that are not sufficiently air-conditioned to improve the work environment in summer and providing salty candies to workers.

The company will continue its efforts to improve the workplace environment to make it safe and comfortable.



Thermal barrier-coated roof

Group Companies Outside Japan

Nippon Shokubai America Industries, Inc.

Principal business

Manufacture and sale of superabsorbent polymers, polymers for concrete admixture, water soluble polymers and acrylic emulsions

In 2018, Nippon Shokubai America Industries, Inc. (NAII) continued to take initiatives to raise the awareness of safety and the environment at its two plants in the United States.

The Chattanooga plant installed guardrails at the ends of equipment where there was a risk of operators falling, and also set up a lifter stool to make valve operation easier. A large neutralization tank was also introduced to reduce the use of hydrochloric acid and alkali.

The Houston plant held its annual Safety Slogan contest before its major planned shutdown. The winning slogan for 2018 was "TAKE 5 & Stay Alive!," representing a call to take time to assess the risk before starting dangerous operations. This slogan was used on hard hat stickers and a large banner to warn employees. The plant also conducted its annual emergency drill jointly with neighboring American Acryl LP.

Regarding occupational safety and health, the company makes effective use of KY reporting, focusing its daily occupational activities. Environmental safety committee meetings were held periodically, where matters of concern were discussed and safety countermeasures were formulated. Under the Corporate Credo "Safety takes priority over production," the Houston and Chattanooga plants have achieved zero injuries with no loss of workdays for five and seven consecutive years, respectively.



Winner of the Safety Slogan Contest 2018



Emergency drill

Interview

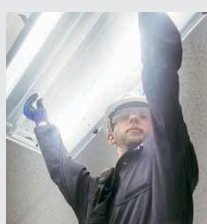
Improved visibility and reduced power consumption

In 2018, we replaced the lighting equipment in the buildings of our production and administration departments with energy-efficient LED bulbs. This has improved visibility and safety on our plant's work floors.

It is also expected to reduce annual power consumption by 123 MWh. We are therefore considering similar replacement at other facilities including warehouses.

Mr. Garrett Manchester

Mechanical Maintenance Electrician,
Mechanical & Engineering Department
Nippon Shokubai America Industries,
Inc. Houston, TX



Interview

Renovated emergency showers

When replacing the broken electric heat tracing system with a hot water system, we renovated our existing emergency showers. The galvanized pipes were clogged with scale and rust and incapable of providing the required flow rate. Because of the water constantly running through the pipes to prevent them from freezing, a large amount of discharged wastewater froze up, causing workers to slip.

We renovated the emergency showers at two places in the water discharge area and one place in the railway unloading area. We replaced their pipes with copper pipes and set up a circulation line to prevent freezing. In summer, the circulation line is not used because city water is used. We have planned periodic maintenance for the water tank installed for the circulation line and we have carried out necessary repairs on other emergency showers. We will continue to make further improvement.

Mr. Barry Coppinger

Facilities Coordinator
Nippon Shokubai America Industries,
Inc. Chattanooga, TN



SINO-JAPAN CHEMICAL CO., LTD. (Taiwan)

Principal business

Manufacture and sale of surfactant and other chemicals

In Taiwan, regulations on air pollution have been increasingly tightened in line with the growing public awareness of environmental conservation. Sino-Japan Chemical Co., Ltd. converted its boiler combustion system from conventional heavy oil fuel combustion to natural gas fuel combustion in 2018.

This conversion substantially improved the results of the periodic inspection of the boiler smokestack, with sulfur oxides reduced to zero and nitrogen oxides reduced to a third of the figure in 2017. This conversion was also effective in preventing heat damage to the furnace walls and corrosion of pipes, giving improved steam efficiency.

Furthermore, to mitigate air pollution by volatile organic compounds, the company improved the facility for feeding methyl alcohol, which is used as a raw material, to prevent leaks while feeding.



Natural gas-fueled boiler

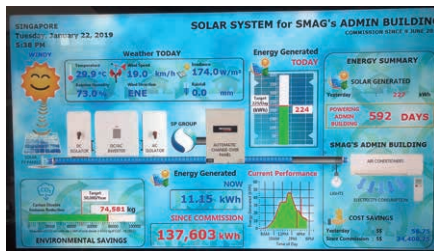
Group Companies Outside Japan

SINGAPORE ACRYLIC PTE LTD

Principal business | Manufacture and sale of crude acrylic acid

In recent years, natural gas accounts for around 95% of the sources of power generation in Singapore. Solar power accounts for 2% of the remaining 5%, while coal and oil comprise the rest. Solar energy, however, has plenty of potential in Singapore, where the average amount of annual solar radiation is greater than other warm countries. This makes solar power a significant option as a renewable energy for green electricity.

Recently, SMAG (a chemical complex formed by four neighboring Japanese chemical manufacturers), of which Singapore Acrylic is part, installed a solar power generation system on the roof of its administrative building as a measure to reduce the CO₂ emissions of its administrative department. The solar power system has been incorporated in the existing power grid for SMAG and generates a maximum of 90% of the electricity consumed by the administrative building. To promote environmental activities, a monitor is set up in the lobby to make visible the energy obtained from sunlight.



The screen of the monitor set in the lobby

PT. NIPPON SHOKUBAI INDONESIA

Principal business | Manufacture and sale of acrylic acid, acrylic esters, and superabsorbent polymers

In Indonesia, the period from January 12 to February 12 is designated as the National Occupational Safety and Health Month. During this period, Nippon Shokubai Indonesia organized various events and activities with the aim of helping its employees and contractors enhance their knowledge and raise the safety awareness. These events include competitions for correct and quick handling of equipment such as fire hoses, SCBA (self-contained breathing apparatus) and fire extinguishers, as well as for dealing with leaks and first aid. The company also hosted a safety poster contest and safety quizzes, and invited EHS essays. The President awarded prizes to the winners of each event.

The company also renewed the certification for its occupational health and safety management system (SMK3), satisfying 85.54% of the 166 criteria (the highest Gold rank).

Nippon Shokubai Indonesia hosted the 8th RC Meeting (between Nippon Shokubai and representatives of Group companies outside Japan in charge of environment and safety) from November 28 to 30, 2018. The participants shared information and improved their RC abilities.



Occupational Safety and Health Month



SMK3 certificate renewed

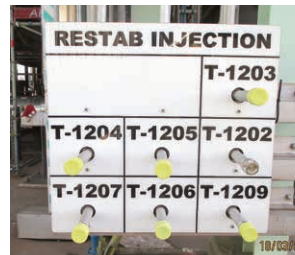
NIPPON SHOKUBAI EUROPE N.V. (Belgium)

Principal business | Manufacture and sale of acrylic acid and superabsorbent polymers

In 2018, Nippon Shokubai Europe N.V. worked on enhancing safety of its first acrylic acid plant as a whole. If the temperature of acrylic acid rises in the distillation process, the newly added temperature monitoring system will issue a warning to the control room. If the situation turns into an emergency, the operator will inject a polymerization inhibitor using mixed gas.

This mixed gas is effective in finely blending the polymerization inhibitor and acrylic acid because of the air bubbles generated at injection. The polymerization inhibitor may stop or ease polymerization or a temperature rise, giving the emergency response team enough time to evacuate the plant and restore the production plant to a safe state.

A temperature rise in the distillation process will cause a rapid pressure rise. The company recently equipped the distillation process with a system to prevent pressurization, enabling sufficient gas release in an emergency. As a result, the risk of explosions in devices or even more serious situations can be avoided.



Polymerization inhibitor injection slots



Mixed gas cylinders for injecting the polymerization inhibitor

NISSHOKU CHEMICAL INDUSTRY (ZHANGJIAGANG) CO., LTD. (China)

Principal business | Development, manufacture and sale of superabsorbent polymers and polymers for concrete admixture

As part of the company's Near-Miss Kaizen Activity 2018, 63 proposals (19 of which were related to safety) were submitted. Once every half-year period, rewards are given to those who submitted the best and those who submitted the most numerous proposals.

The company also conducts emergency drills twice a year jointly with the local fire department and the regional emergency response center, with the aim of improving employee capabilities in the event of an emergency.

In November, to help employees improve their first-aid capabilities, the company organized a first-aid training session inviting professional instructors from outside the company.

The company also hosted a quality manager meeting in October 2018, at which managers in charge of quality affairs at overseas sites shared quality issues and exchanged information.



Near-Miss Kaizen Activity 2018 award ceremony



First-aid training

About this RC Report 2019

This RC Report 2019 was prepared to explain in more detail our RC initiatives reported in the **TechnoAmenity** Report, which we began publishing in 2019.

In preparing this Report, we have focused on increasing both the readability and ease of understanding for the benefit of our stakeholders. Since fiscal 2005, we have been including the results of an objective third-party evaluation of our RC initiative undertaken by the Japan Chemical Industry Association.

TechnoAmenity Report 2019 presents our initiatives toward achieving the Nippon Shokubai Group Mission “**TechnoAmenity** — Providing affluence and comfort to people and society, with our unique technology,” covering financial information such as our business performance, business plans and results, as well as our corporate social responsibility (CSR) initiatives, which have been reported in the CSR Report until last year. We would recommend that you read the TechnoAmenity Report along with this RC Report 2019.

Scope of This Report

Organization

(Unless otherwise stated, all provided data refers solely to Nippon Shokubai Co., Ltd.)

NIPPON SHOKUBAI CO., LTD.

Osaka Office, Tokyo Office
Himeji Plant, Kawasaki Plant
Himeji Research Center
Suita Research Center

Group Companies in Japan

NIPPOH CHEMICALS CO., LTD.,
TOKYO FINE CHEMICAL CO., LTD.,
CHUGOKU KAKO CO., LTD.,
NIPPON POLYMER INDUSTRIES CO., LTD.,
NISSHOKU TECHNO FINE CHEMICAL CO., LTD.,
NIPPON NYUKAZAI CO., LTD.,
Nisshoku Butsuryu Co., Ltd.


Group Companies Outside Japan

Nippon Shokubai America Industries, Inc.
PT. NIPPON SHOKUBAI INDONESIA
NIPPON SHOKUBAI EUROPE N.V.
SINGAPORE ACRYLIC PTE LTD
NISSHOKU CHEMICAL INDUSTRY (ZHANGJIAGANG)
CO., LTD.
SINO-JAPAN CHEMICAL CO., LTD.

Reporting period: April 1, 2018–March 31, 2019

Publication date: October 2019

Third-Party Review



「日本触媒 RC Report 2019」
第三者検証 意見書

2019年7月12日

株式会社 日本触媒
代表取締役社長 五嶋 祐治郎 殿

一般社団法人 日本化学工業協会
レスポンシブル・ケア検証センター長
永松 茂樹

■ 報告書検証の目的
本検証は、株式会社日本触媒が作成した「RC Report 2019」(以後、報告書と略す)に記載されている下記の事項について、レスポンシブル・ケア検証センターが化学業界の専門家の意見を表明することを目的としています。
1) パフォーマンス指標(数値)の算出・集計方法の合理性及び数値の正確性
2) 数値以外の記載情報の正確性
3) レスポンシブル・ケア活動
4) 報告書の特徴

■ 検証の手順
・本社において、各サイト(事業所、工場)から報告される数値の集計方法の合理性、及び数値以外の記載情報の正確性について調査を行いました。調査は、報告書の内容について各業務責任者及び報告書作成責任者に質問すること、並びに資料提示・説明を受けることにより行いました。
・姫路製造所において、本社に報告する数値の算出方法の合理性、数値の正確性、及び数値以外の記載情報の正確性の調査を行いました。調査は、各業務責任者及び報告書作成責任者に質問すること、資料提示・説明を受けること、並びに証拠物件と照合することにより行いました。
・数値及び記載情報の調査についてはサンプリング手法を適用しました。

■ 意見
1) パフォーマンス指標(数値)の算出・集計方法の合理性及び数値の正確性について
・パフォーマンス数値は本社及び姫路製造所において、合理的な方法で正確に算出・集計されていることを確認しました。
2) 数値以外の記載情報の正確性について
・報告書に記載された情報は、正確であることを確認しました。原案段階では表現の適切性あるいは文章の分かり易さに関し指摘しましたが、現報告書では修正されており、修正すべき重要な事項は認められません。
3) レスポンシブル・ケア活動について
・2012年の事故の教訓が風化しないよう、色々努力されている点を評価します。
・日本・中国での「森づくり」に続き、2018年度はインドネシアでマングローブの植林活動を始められており、森づくり運動を着実に広めている点を評価します。
・貴社が監査、ヒアリング、会議を通じ、幅広くグループ会社を支援されている点を評価します。
・日本乳化株式会社で行われた事故・失敗事例発表会はなかなか良い取り組みだと思います。水平展開を期待します。
・レスポンシブル・ケア教育で、歴史と考え方についてもきちんと教育されている点を評価します。
・姫路製造所は、非常に多種類のプラントを有しています。その中で、オペレーターの運転管理の負荷を減らす目的で、アラームマネジメントに取り組まれている点、ノンテクニカルスキル向上を目的としたオペレータートレーニング講座を催されている点を評価します。また、製造所の整理・整頓もなかなか良好と評価します。労働災害防止に向けては、5S活動、ヒヤリハット活動、各種 KY 活動を展開しています。更に、安全基本行動の定着度はビデオを用いて評価しています。今後、安全基本行動定着の更なる徹底を期待します。
4) 報告書の特徴
・本年度より、財務情報とCSRへの取り組みを紹介する「TechnoAmenity Report」と、レスポンシブル・ケア活動について更に詳しく紹介する、本報告書を発行されています。記載内容をレスポンシブル・ケア活動に特化されたことにより、各事業所、及びグループ会社の活動の様子がよくわかるようになっています。

以上

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TechnoAmenity

Providing affluence and comfort to people and society,
with our unique technology.

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Our company logo
represents the spirit of
TechnoAmenity

Hexagon

Cosmo yellow

Earth green

Horizon between
two colors

► One of the fundamental symbols used in chemistry

► Represents the hidden energy of the sun

► Represents the life-supporting nature of the earth

► Represents the future we always seek