

# Process Safety and Disaster Prevention, Occupational Safety

## Basic Policy

Mitsubishi Chemical (MCC) creates action plans comprising annual targets, annual policies, and key measures reflecting the status of activities and results of the previous fiscal year and uses said plans to carry out process safety and disaster prevention and occupational safety activities. In fiscal 2017, we implemented activities in line with the annual goals of zero serious process safety incidents and zero serious occupational accidents as well as the annual policy of effectively understanding workplace weaknesses and steadily making improvements.

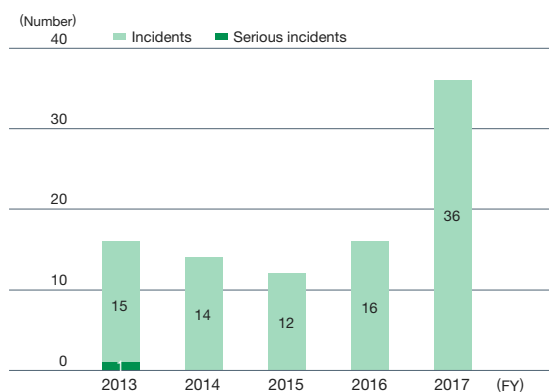
## Preventing Process Safety Incidents and Occupational Accidents, Key Measures

In fiscal 2017, there were 14 incidents, including small fires and leaks of hazardous materials, as well as 22 chlorofluorocarbon gas leak incidents. In particular, the number of such gas leak incidents increased substantially year on year, up by 17 from fiscal 2016.

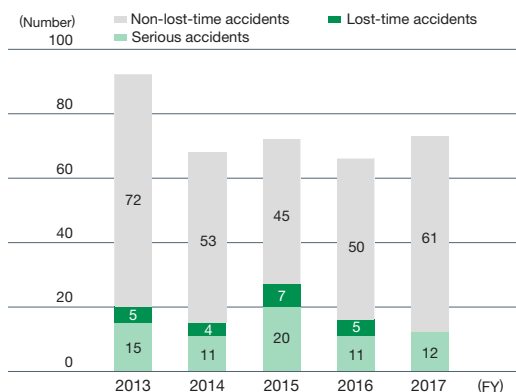
The main causes of the incidents were the corrosion and degradation of facilities and insufficient inspection and checking. Behind these factors, however, were management problems, including delays in response to facility degradation, insufficient knowledge and insufficient education.

In fiscal 2017, 12 serious occupational accidents resulting in four or more days of lost work occurred in Japan. These accidents included such incidents as getting caught or entangled in machinery and falls on level surfaces and from high places. The main causes of these occupational accidents were lack of competency in basic practices and operations and inadequacies in work procedures. Behind these factors were management problems, including insufficient education and training, insufficient safety activities, and insufficient risk assessment.

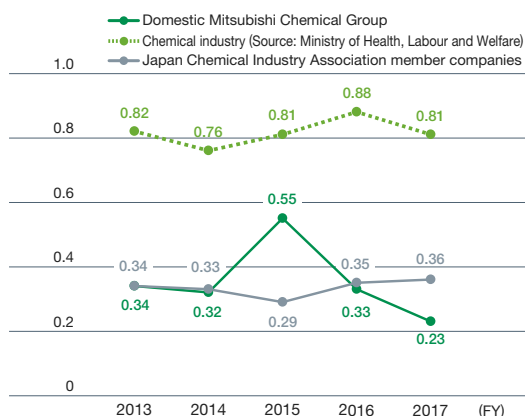
Mitsubishi Chemical Group Process Safety Incidents in Japan



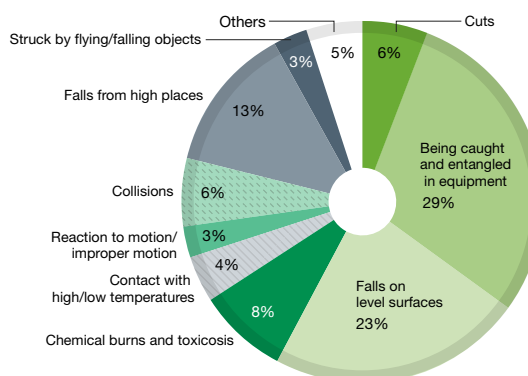
Mitsubishi Chemical Group Occupational Accidents in Japan



Lost-Time Injury Frequency



Mitsubishi Chemical Group Lost-Time Accidents by Classification (FY2013–2017)



\* Data for fiscal 2016 and earlier are the totals of the figures for the previous Mitsubishi Chemical, Mitsubishi Plastics and Mitsubishi Rayon and their respective domestic group companies.

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In light of the problems underlying these process safety incidents and occupational accidents, in fiscal 2018, we are implementing the following key measures.

### ■ Thoroughness and Continuation of Safety Management Activities

In addition to efforts to thoroughly ensure safe practices and operations, we are working to qualitatively enhance safety activities through such means as risk prediction and near-miss reporting as well as to enhance risk assessments and effectively utilize information to prevent the recurrence of incidents and occupational accidents as well as the occurrence of similar incidents and accidents.

### ■ Thoroughness and Continuation of Facility Management

We systematically inspect, diagnose and repair aging facilities while steadily performing regular monitoring to ensure that signs of irregularities in facilities are quickly detected and dealt with appropriately.

### ■ Human Resources Training

We strive to train people who can think for themselves, have good judgment, and take action. For inexperienced employees, we carry out education on not only operational procedures, but also basic practices and operations and following rules about prohibited behaviors. Furthermore, to enhance risk assessments, we are proactively developing human resources with specialized knowledge and analytical skills.

### ■ Accident and Natural Disaster Response

To minimize and contain harm should an accident or natural disaster occur, we have in place systems for dealing with the areas around our sites and conduct training accordingly. We have in place robust earthquake and tsunami countermeasures and carry out related drills. In addition, we are advancing measures to deal with natural disasters caused by extreme weather due to climate change.

### ■ Focus: Process Safety Evaluations

Aiming to accurately understand and improve its process safety capabilities, since fiscal 2014, MCC has commissioned process safety evaluations from an external organization (the Japan Society for Safety Engineering Process Safety Enhancement Center). These evaluations highlight weaknesses at plants and specific divisions, helping us advance improvements and continuously improve process safety.



Process safety evaluation by an external organization

## Risk Assessment

MCC implements robust risk assessments of processes, operations and chemicals, striving to prevent process safety incidents and occupational accidents. In these risk assessments, we use creative techniques to comprehensively identify and evaluate risks related to process safety, occupational accidents and health. For example, when assessing processes related to product processing, we identify not just occupational accident risks, but process safety risks related to operations and risks related to unsteady conditions, and then take action to reduce the risks thus identified. Furthermore, to effectively reduce risks related to changes, we use mechanisms for identifying all changes and conduct safety assessments under the supervision of expert technicians.

## Use of Past Incident/Accident Information

MCC uses shared information about past process safety incidents and occupational accidents at the company and other companies to help prevent the occurrence of similar issues. When incidents or occupational accidents do occur, we determine the root causes using such analytical tools as VTA<sup>1</sup> and explanation-oriented analysis, then implement countermeasures without fail. Furthermore, regarding occupational accidents that are likely to have serious consequences, such as being caught or entangled in machinery and falls, we carry out company-wide countermeasures, endeavoring to prevent their occurrence.

<sup>1</sup> Variation Tree Analysis: A method of determining the causes of incidents by mapping irregular actions, operations and decisions that lead to incidents in time-series flow charts for people, things and organizations.

## Human Resource Development Initiatives

MCC implements human resource development using educational plans tailored to specific types of work and levels of seniority.

We carry out education and drills for employees who conduct operations at manufacturing sites to ensure that they can correctly carry out basic practices and operations and follow rules about prohibited behaviors. We also use creative techniques to help employees apply the knowledge gained through education at actual work sites. Furthermore, we carry out experiential education using facilities that provide simulated experiences of process safety incidents and occupational accidents to increase employees' sensitivity to danger.

We also carry out initiatives to ensure that technical staff obtain specialized knowledge about risk assessment and analytical methods. These initiatives include specialized education in such areas as chemical engineering and mandatory participation in safety assessment in their respective divisions.

### Focus: Experiential Education

Experiential education is a form of training that provides employees with simulated experiences of process safety incidents and occupational accidents resulting from fires, explosions and other incidents that could really occur in chemical plants. This first-hand experience helps raise employees' sensitivity to danger and motivate them to maintain safe practices and operations.



Experiencing work in high places



Experiencing being caught in machinery



Experiencing a fire and explosion



Experiencing a liquid blast

# Process Safety and Disaster Prevention, Occupational Safety

## Accident and Natural Disaster Response

MCC has in place a range of countermeasures to minimize and contain harm due to accidents and natural disasters. In fiscal 2017, we particularly evaluated the external effects, such as those on neighboring areas, of worst-case accidents at our plants, decided what to do for relevant stakeholders in the event of a disaster at a plant, and reflected these decisions in training.

### Earthquake-Resistant High-Pressure Gas Equipment

MCC uses earthquake resistance design standards to evaluate the earthquake resistance of such facilities as spherical storage tanks with welded steel pipe braces and high-pressure gas facilities designated as vital in terms of earthquake-resistant design. Based on such evaluation, MCC has drawn up plans to improve facilities where necessary and is advancing earthquake countermeasures in line with said plans.

(1) Spherical storage tanks with welded steel pipe braces

We have completed earthquake countermeasures for eight of the nine tanks found to require them. The installation of earthquake countermeasures for the remaining tank is currently under way and expected to be completed in fiscal 2019.

(2) High-pressure gas facilities designated as vital in terms of earthquake-resistant design

We have completed earthquake countermeasures for 17 of the 28 facilities found to require them. Earthquake countermeasures for the remaining 11 facilities are expected to be completed in fiscal 2020.

### Focus: Comprehensive Disaster Drill

On October 23, 2017, the Mizushima Plant and the Kurashiki City Mizushima Fire Bureau held a joint drill based on a fire due to a high-pressure gas leak. In addition to confirming the plant's internal disaster prevention framework and drilling evacuation and firefighting procedures, this comprehensive disaster drill included coordination with the local authorities and practice contacting neighboring residents.



Joint firefighting drill with the public fire bureau and company firefighting team