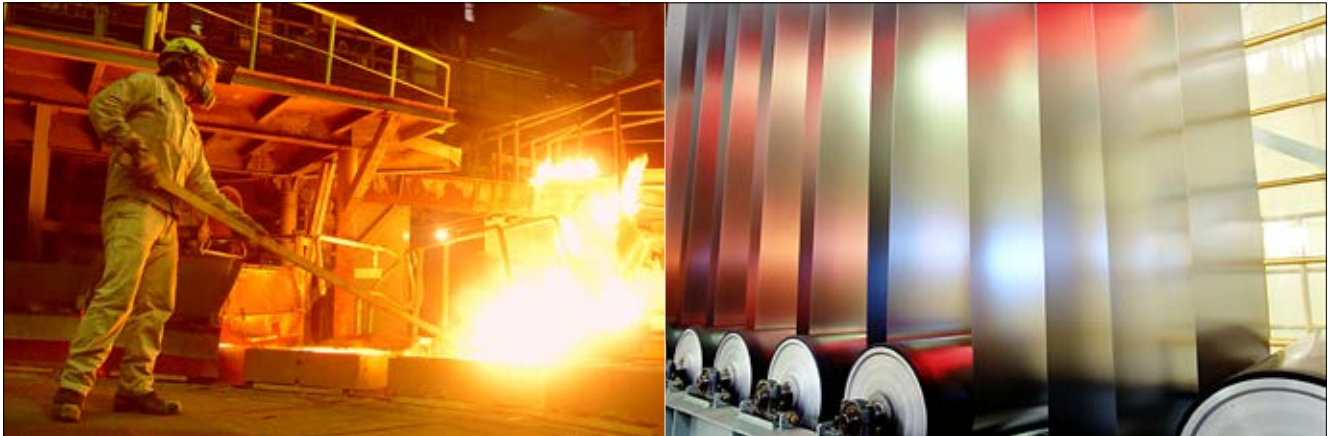




Sustainability Report

2018

JX Nippon Mining & Metals Corporation



We contribute to the development of a sustainable economy and society through innovation in the areas of resources and materials.



Editorial Policy

The JX Nippon Mining & Metals Group is committed to fulfilling its corporate social responsibility (CSR) in all its business endeavors, toward the sustainable development of society.

We issue a sustainability report each year to disclose appropriate corporate information to a broad range of stakeholders, including customers, suppliers, shareholders and investors, employees, industry-government-academia groups, and local communities. As an important communication tool, this report is designed to enhance stakeholders' understanding of our CSR activities.

Sustainability Report 2018 has been prepared in accordance with the GRI Standards* as required by the 10 Principles of the International Council on Mining and Metals (ICMM) and by the ICMM's Assurance Procedures.

* International guidelines issued by the Global Reporting Initiative, incorporating standard items for CSR reporting.

☒ The indicators in this report that are assured by a third-party organization are marked with a check ☒.

Publication Date

December 2018 (publication date of previous report: November 2017; publication date of next report: December 2019)

Reporting Period

In principle, this report covers our business activities for the period from April 2017 to March 2018 (fiscal 2017). To ensure comprehensive disclosure, however, it also includes certain information regarding important events that occurred prior to or after this period.

Definitions of Terminology

"The Company" ("JX Nippon Mining & Metals"): The terms "the Company" or "JX Nippon Mining & Metals" refer to JX Nippon Mining & Metals Corporation.

"The JX Nippon Mining & Metals Group" ("the Group"): The terms "the JX Nippon Mining & Metals Group" or "the Group" refer to JX Nippon Mining & Metals Corporation and all its subsidiaries, as well as Toho Titanium Co., Ltd., a JXTG Holdings subsidiary engaged in the metals business, and its subsidiaries. However, the companies subject to reporting vary among different sections of the report (see "Boundary of the Report" for details).

"The JXTG Group": The term "the JXTG Group" refers to the corporate group formed by JXTG Holdings, Inc., the parent company of JX Nippon Mining & Metals Corporation. Along with the Company, the core operating companies of the JXTG Group are JXTG Nippon Oil & Energy Corporation and JX Nippon Oil & Gas Exploration Corporation.

Boundary of the Report

This report covers JX Nippon Mining & Metals Corporation as well as domestic and overseas Group companies.

The companies for which main indicators must be reported are detailed below, according to the corresponding sections of the report.

Corresponding Sections	Boundary of the Report
Business Overview	Companies included in the consolidated financial statements of JX Nippon Mining & Metals. (The Company and its consolidated subsidiaries below indicated by ●.)
Environment	The Company, its directly controlled operating sites that engage in production activities, and companies that operate factories classified as Type 2 Designated Energy Management Factories under the Act on Rationalizing Energy Use or operating sites of equivalent scale. (Companies below indicated by *.)
Employees, Society, Corporate Governance	The Company and 62 companies in which the Company has 50% or greater voting rights directly or indirectly. (The main companies covered by this report are those below indicated by ★.)

Group Companies Covered by This Report

Domestic

Oya Mines Co., Ltd.★
Kasuga Mines Co., Ltd.★★
Kaneuchi Mining Co., Ltd.★
Kamikita Mines Co., Ltd.
Shakanai Mines Co., Ltd.★
Shin-Takatama Mining Co., Ltd.★
Toho Titanium Co., Ltd.★★★
Toyoha Mine Co., Ltd.★
Namariyama Mining Co., Ltd.★
Japan Copper Casting Co., Ltd.★★★
Nippon Marine Co., Ltd.★
Hanawa Mines Co., Ltd.★
Pan Pacific Copper Co., Ltd.★★
Hitachi Mines Co., Ltd.★
Hibi Kyodo Smelting Co., Ltd.★★

Hokushin Mining Co., Ltd.★
Hokuriku Mines Co., Ltd.★
JX Nippon Mining & Metals Corporation★★
JX Nippon Mining Ecomanagement, Inc.★
JX Nippon Environmental Services Co., Ltd.★★
JX Nippon Coil Center Co., Ltd.★
JX Metals Trading Co., Ltd.★★
JX Nippon Takasho Co., Ltd.★
JX Nippon Exploration and Development Co., Ltd.★
JX Nippon Tsuruga Recycle Co., Ltd.★★★
JX Nippon Tomakomai Chemical Co., Ltd.★★
JX Metals Precision Technology Co., Ltd.★★
JX Nippon Mikkaichi Recycle Co., Ltd.★★★

Overseas

Changzhou Jinyuan Copper Co., Ltd.★★★
Nikko Metals Taiwan Co., Ltd.★★
Japan Korea Joint Smelting Co., Ltd.★★
Nippon Mining & Metals (Suzhou) Co., Ltd.★★
Pan Pacific Copper (Shanghai) Co., Ltd.★★
Nikko Fuji Precision (Wuxi) Co., Ltd.★
Caserones Finance Netherlands B.V.★
Compania Minera Quechua S.A.★★
Gould Electronics GmbH★
Gould Electronics Inc.★
Japan Frontera Resources B.V.★
JX Nippon Mining & Metals Dongguan Co., Ltd.★
JX Nippon Mining & Metals Europe GmbH★

JX Nippon Mining & Metals Korea Co., Ltd.★★
JX Nippon Mining & Metals Philippines, Inc.★★
JX Nippon Mining & Metals USA, Inc.★
Materials Service Complex Malaysia Sdn. Bhd.★
MFN Investment LLC★
MLCC Finance Netherlands B.V.★
Nippon LP Resources B.V.★
Nippon Mining of Netherlands B.V.★
Osorno Ship Holding S.A.★
PPC Canada Enterprises Corp.★
Rupanco Inc.★
SCM Minera Lumina Copper Chile★★

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The design adopts as its motif the blossoms of the Oshima cherry trees that are a symbol of the Group's CSR endeavors.

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Message from the President



At the JX Nippon Mining & Metals Group, we are committed to contributing to the sustainable development of society through our business activities, including our supply chain, based on the social environment and the wishes of stakeholders.

JX Nippon Mining & Metals is a company in the field of nonferrous metals and a core member of the JXTG Group, which aims to become one of Asia’s leading energy, resources, and materials business groups.

Our mission is to provide to society stable supplies of materials, including copper, rare metals, precious metals, and other nonferrous metal resources, as well as electronic materials. Based on this social mission, we carry out a full range of organically connected business operations, from upstream resources development through midstream smelting and refining to downstream operations comprising electronic materials and recycling and environmental services.

Today, initiatives that set targets with specific deadlines to achieve sustainable societies, such as the Sustainable Development Goals (SDGs) and the Paris Agreement, are being promoted on a global scale.

In light of these trends, in 2018 the JX Nippon Mining & Metals Group undertook a review of the material issues for CSR activities, taking into account the connections of the Group’s business activities, including its supply chain, to the economy, the environment,

human rights, and various other social issues. Besides clarifying the definitions of the material issues up to now, we added “Respecting human rights” and “Promoting community involvement and development” as new items, selecting issues in line with the Group’s business activities. Engagement with these issues will also contribute toward achievement of the goals defined as the SDGs. (See pages 27–28 for details.)

Material Issues for CSR Activities

- | | |
|---|--|
| • Ensuring occupational health and safety | • Using nonferrous metal resources effectively |
| • Assuring product quality and safety | • Establishing a recycling-oriented society |
| • Developing human resources | • Establishing a low-carbon society |
| • Providing a rewarding work experience | • Insisting on full compliance |
| • Promoting community involvement and development | • Respecting human rights |

Current State and Challenges of the Copper Business

Copper is central to our business operations. It is widely used in electrical wires and electrical circuits for electronic products, vehicles, and other applications because of its good electrical conductivity, ease of processing, thermal conductivity, and other advantages. Fundamental to human culture, copper is an indispensable metal resource for the future growth of society. Yet the regions where copper deposits are found are distributed unevenly and reserves are finite. We therefore need to make effective use of available resources by improving the extraction percentage and pursuing recycling initiatives, among other means.

Against this background, the JX Nippon Mining & Metals Group sees CSR activities as “nothing more or less than our business activities.” Our corporate social responsibility, in other words, is to achieve stable and efficient supply of high-quality copper and contribute to economic growth and a higher living standard, while addressing such social issues as

reducing environmental impact and respecting human rights. To these ends, we are pursuing innovation in the productivity of resources and materials, drawing on the technology and knowledge we have accumulated over our history spanning more than a century.

What this means for our resources development business and smelting and refining business is that we pursue the efficient mining, concentration, and refining of copper ores, a finite natural resource, not letting any of the copper content go to waste. In our recycling and environmental services business, we seek to supplement natural resources by making use of end-of-life products discarded by society, from so-called urban mines. In our electronic materials business, we support progress in state-of-the-art devices by developing and supplying high-performance metallic materials, while also contributing to the development of a society using Internet of Things (IoT) and artificial intelligence (AI) technologies.

Message from the President



Carrying Out Operations Based on a Corporate Code of Conduct That Meets International Standards

The business operations of the Group are carried out in accordance with the JX Nippon Mining & Metals Code of Conduct created in line with the JXTG Group Philosophy. This Code of Conduct—which is shared by both management and employees—is also compliant with international guidelines, including the principles of the International Council on Mining and Metals (ICMM), of which we are a member, and the Ten Principles of the United Nations Global Compact.

We believe that carrying out our daily operations with a common sense of purpose will maximize the success of the Group as a whole in our quest for innovation in the productivity of resources and materials. We are therefore focusing efforts on instilling the Code of Conduct even more deeply, through such means as distributing this sustainability report to all employees and conducting training.

Medium-Term Management Plan for Fiscal 2017 to 2019

The Medium-Term Management Plan for the three years from fiscal 2017 to 2019 adopts fundamental policies for building a stronger and more stable business foundation on which to pursue the Group's

aim of becoming a global resources and materials company centering on copper.

A review of fiscal 2017 and a look at coming initiatives are given below.

Finances

In fiscal 2017, the Group's revenue rose approximately 11% year on year to ¥968.4 billion due to such factors as a higher sales volume in the electronic materials business and increased collection volume in the recycling and environmental services business. Operating profit, on the other hand, saw a loss of ¥60.3 billion, down ¥89.0 billion year on year due mainly to the recognition of an impairment loss of ¥128.6 billion on noncurrent assets relating to the Caserones Copper Mine. (See pages 12–13 for details.)

In the copper smelting and refining business, the Saganoseki Smelter & Refinery of Pan Pacific Copper undertook a flash smelting furnace renewal for the

first time since the start of operations in 1973. This will be followed by improvements to auxiliary equipment, enabling a planned 10% increase in copper concentrate processing capacity in fiscal 2019.

In the electronic materials business, thanks to further growth in smartphone demand, as well as increased server demand accompanying the expanding cloud services market, the sales volume of products used in these areas is rising. To meet this demand growth, we are increasing manufacturing equipment at sites including the Kurami Works and Hitachi Works, where treated rolled copper foils and high-performance copper alloys are produced, aiming to boost production capacity by approximately

30% in the first half of fiscal 2020 over fiscal 2017 levels. At the Isohara Works as well, equipment for manufacturing sputtering targets for semiconductors is gradually being increased. Here, too, a rise in production capacity by around 30% in fiscal 2020 over fiscal 2017 levels is planned.

In the recycling and environmental services business, we are continuing to conduct commercial feasibility trials at the Tsuruga Plant on rare metal recycling from spent lithium-ion batteries.

In the titanium business, a new plant was completed for a titanium sponge joint venture in Saudi Arabia; the plant is expected to go into commercial production in fiscal 2018. A new factory producing

nickel powder was also built on the grounds of the Wakamatsu Plant of Toho Titanium. This has resulted in a 50% rise in production capacity of fine nickel powder, a material in multilayer ceramic capacitors used for leading-edge electronic devices.

To open up one more growth strategy option, in July 2018 we acquired all shares in the German company H.C. Starck Tantalum and Niobium GmbH, jointly with the Japan Bank for International Cooperation. The tantalum and niobium products developed, manufactured, and sold by H.C. Starck have synergies with existing businesses of the JX Nippon Mining & Metals Group and offer the promise of new business expansion.

Nonfinancial Factors

Aware that obtaining the trust of stakeholders is essential for carrying out the above businesses, the Group endeavors to improve the integrity and transparency of management based on corporate governance. For the sake of effective governance, we properly implement an internal control system and ensure operations are carried out efficiently and properly.

Seeking to reduce environmental impact, we set long-term targets of an 18% reduction in CO₂ emissions by fiscal 2030 from fiscal 1990 levels, and reduction in the ratio of non-value-bearing waste volume to below 0.5% by fiscal 2030. To meet those targets, the 4th Medium-Term Action Plan (for fiscal 2016 to 2019) defines the goals of keeping the four-year total for CO₂ emissions from domestic operations to below 4.07 million tons, and achieving a ratio of non-value-bearing waste volume below 0.7%. Results achieved through fiscal 2017 met the targets both for CO₂ emissions and for the ratio of non-value-bearing waste volume. (See pages 60, 69, and 71 for details.)

In meeting our corporate responsibility to society, we continue to carry out activities geared to the nature of Group businesses, with special emphasis on

efforts to develop the next generation. During fiscal 2017, we participated in outside events, including booth displays for the University of Tokyo's Komaba Research Campus Open House, and presented experiments and talks on copper for primary, middle, and high school students. During the summer break, we held science experiment classes and factory tours at five operating sites in Japan, providing students, their parents, teachers, and the general public with opportunities to experience the Group's business and operational work. We also put on summer festivals, inviting not only the families of employees but also residents in surrounding communities. In these ways, we provided our stakeholders with many chances to learn about the Group. (See pages 41–42, 54–56, and 77 for details.)

Taking into account the social environment and the wishes of stakeholders, the Group is committed to contributing to the sustainable development of society through its business activities, including the supply chain, with a special focus on the material issues for CSR activities.

Shigeru Oi
President and Chief Executive Officer
Chairman of the CSR Committee
JX Nippon Mining & Metals Corporation

Relationship between the JX Nippon Mining & Metals Group and Society

Nonferrous metals play an indispensable role as materials in contemporary life, and of all such metals, copper is particularly notable for its good electrical conductivity and ease of processing. Copper is therefore used in a wide variety of applications, from electrical wires, buildings, and consumer electronics such as air conditioners and refrigerators, to state-of-the-art electronic devices such as LCD televisions, PCs, and smartphones, and even in cars and trains.

Also found in many applications from industrial to everyday goods are light and strong titanium, made by the Toho Titanium Group, as well as highly corrosion-resistant and ductile rare metals such as tantalum and niobium, made by H.C. Starck Tantalum and Niobium GmbH.

➡ See pages 11–19 for details on each of the Group's businesses.



Overview of JX Nippon Mining & Metals Business Segments



The Medium-Term Management Plan (Fiscal 2017 to 2019)

The JXTG Group has drawn up a Medium-Term Management Plan for fiscal 2017 to 2019 and Group members are now engaged in achieving its goals. In drawing up this plan, the following basic aims were incorporated.

- In order to contribute to the development of society and economy and the creation of a sustainable and vigorous future, the Group endeavors to enhance its core businesses, promote innovation, and operate business globally.
- At the same time, the Group will foster human resources with high ethical standards and willingness to take on new challenges, who are essential in promoting the above, to become one of the most prominent and internationally competitive comprehensive energy, resources, and materials company groups in Asia.

Fundamental Policy of the JX Nippon Mining & Metals Group for the Medium-Term Management Plan

With the goal of becoming a “Global Resources and Materials Company Centering on Copper,” the underlying foundation of the Group will be strengthened and made more stable.

Based on this fundamental policy, three indicators have been set.

1

Establish and strengthen the profit basis by enhancing the profitability of the resources development segment and developing technology-based businesses

2

Improve the financial base by practicing strict financial discipline

3

Aggressively implement strategic investment in growth areas for the sake of the future

In the current business climate, the JX Nippon Mining & Metals Group is moving beyond difficult times as natural resource prices are slowly recovering and moderate growth is continuing in emerging countries. Society is experiencing rapid changes with the emergence of IoT and AI. During the three years of the Medium-Term Management Plan, the Group is called on to establish the kind of profit and financial base that can adapt readily to changes in the business climate.

The first means to this end will be to ensure that the profitability of core businesses is strengthened. While paying attention to investment efficiency, the Group will strengthen competitiveness from upstream to downstream businesses and obtain stable revenue sources. The second means will be to develop and strengthen businesses that will be the mainstays of the future, thereby increasing the presence of the JX Nippon Mining & Metals Group and contributing to realization of a sustainable society.

Planned operating profits (excluding inventory valuation impact) and key factors

	FY2017	FY2017 ACTUAL (for reference)	FY2018	FY2019
Upstream (resources development) (billions of yen)	9.0	-115.9	15.0	30.0
Midstream and downstream (smelting and refining, electronic materials, recycling and environmental services, titanium) (billions of yen)	35.0	53.7	50.0	60.0
Total (billions of yen)	44.0	-62.2	65.0	90.0
Key factors				
Exchange rate (JPY/USD)	110	111	110	110
LME copper price (US cent/pound)	250	292	260	270

Note: The planned figures for fiscal 2017 to 2019 are as announced in May 2017. The Company has applied International Financial Reporting Standards (IFRS) from fiscal 2017.

Business Results in Fiscal 2017

(April 1, 2017 to March 31, 2018)

During fiscal 2017, the global economy continued to enjoy moderate growth, as consumer spending remained strong in the US, China, Europe, and elsewhere. In this situation of global growth, the Japanese economy maintained a gradual recovery, as improved corporate earnings enabled increased private-sector capital investment, and consumer spending rebounded in an improving employment and income environment.

The copper price on the London Metal Exchange (LME) generally trended within the range of 250 to 260 US cents per pound from the start of the fiscal year through June 2017. Thereafter, expectations for increased copper demand due to continued strength in the economy of China, the world's biggest copper consumer, along with the spread of electric vehicles, caused the price to rise starting in July, reaching 321 cents per pound in October. This was followed by a period of occasional weakness, but by the end of December the price was up to 327 cents per pound, driven in part by

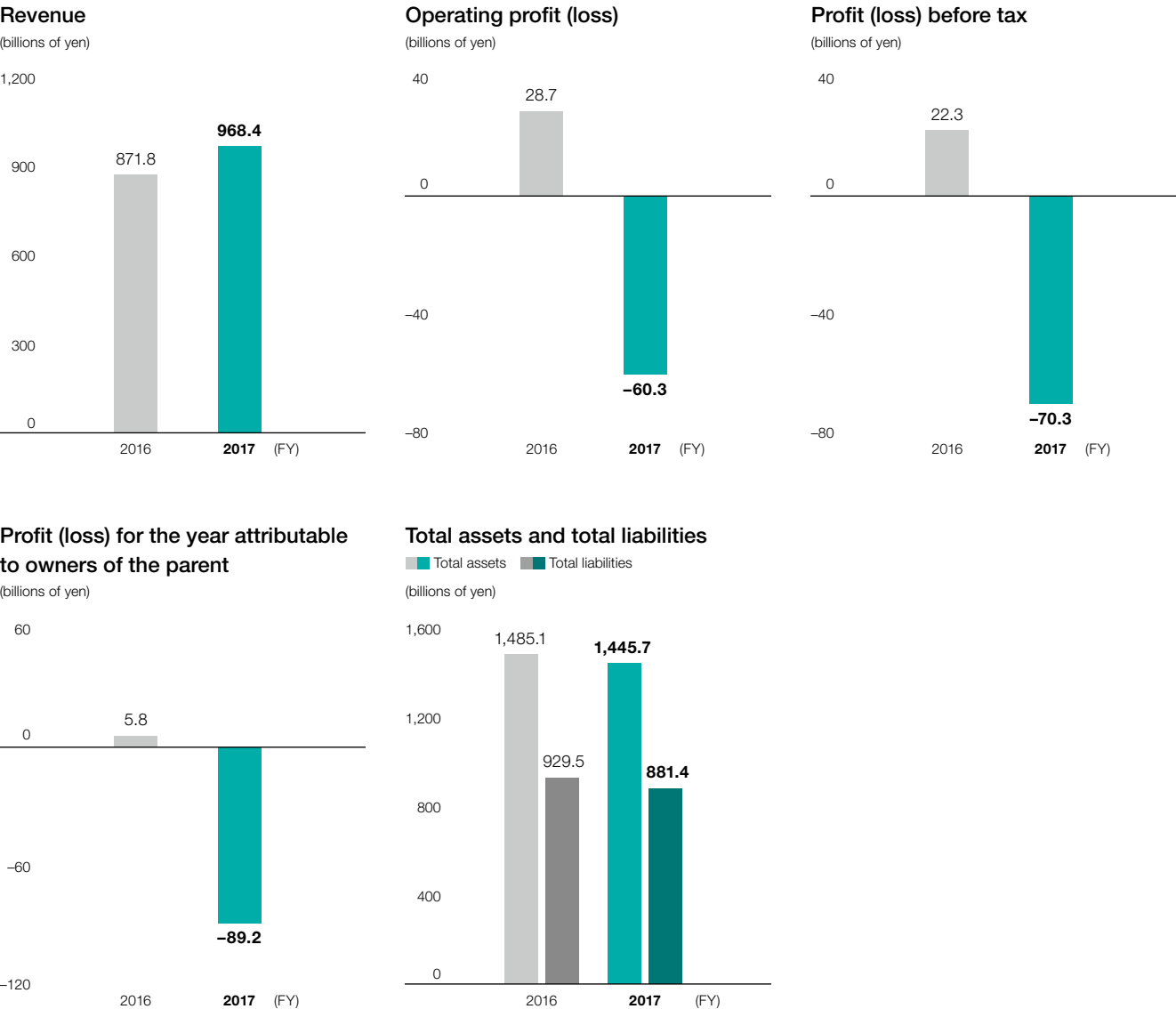
expectations for large tax cuts in the US. From January to the end of the fiscal year in March, the price dropped due chiefly to a rise in US interest rates and concerns about US-China trade friction, closing the fiscal year at 303 cents per pound. As a result, the average price of copper during the fiscal year was 292 cents per pound, up 59 cents year on year.

The yen-US dollar exchange rate averaged ¥111 for the fiscal year, representing a year-on-year weakening of the yen by ¥3.

In this business climate, the consolidated financial results of the JX Nippon Mining & Metals Group saw an 11.1% year-on-year rise in revenue to ¥968,425 million, but recorded an operating loss of ¥60,328 million due mainly to the recognition of an impairment loss on noncurrent assets relating to the Caserones Copper Mine operated in Chile.

Notes: 1. The Company discloses financial information through its holding company JXTG Holdings, Inc.
2. JXTG Holdings, Inc. has applied IFRS from fiscal 2017.

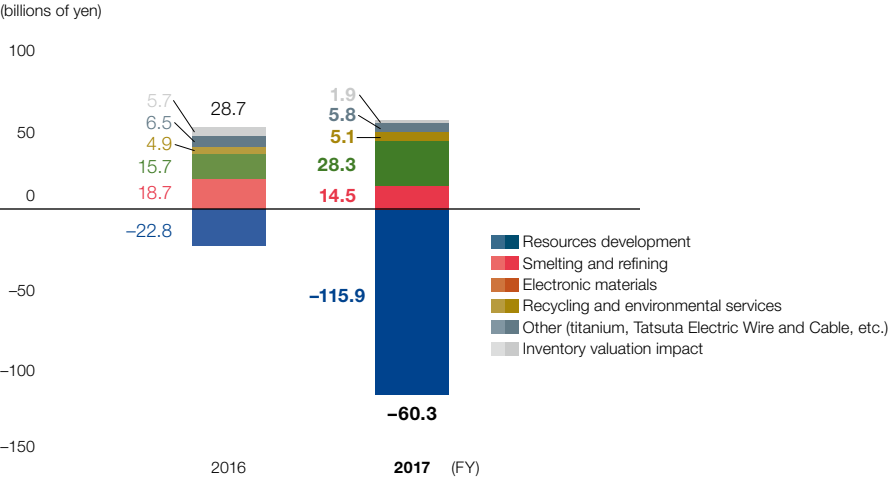
Financial Performance (Consolidated, IFRS)



Segment Information

The Group's business consists of five segments: resources development, smelting and refining, electronic materials, recycling and environmental services, and other.

Operating profit (loss) trends per segment



Year-on-year change in operating profit (loss) for fiscal 2017

(billions of yen)

	FY2016	FY2017	YoY change	Main factors in year-on-year change
Resources development business	-22.8	-115.9	-93.1	As a result of reevaluating assets, including revising the long-term production plans for the Caserones Copper Mine, an impairment loss of ¥128.6 billion was recognized. We also acquired additional mining property in the Los Pelambres Copper Mine and transferred our property in the Collahuasi Copper Mine.
Smelting and refining business	18.7	14.5	-4.2	Operating profit declined year on year as production and sales were lower, impacted by major regular maintenance, including renewal of the flash smelting furnace, at the Saganoseki Smelter & Refinery of Pan Pacific Copper, our copper smelting joint venture.
Electronic materials business	15.7	28.3	+12.6	Sales volumes of our main products were generally higher year on year, boosted especially by demand growth in the information technology field. In addition, sales prices were mostly higher than in the previous fiscal year, resulting in a year-on-year rise in operating profit.
Recycling and environmental services business	4.9	5.1	+0.2	Backed by the recovery in scrap market conditions resulting from the rise in metal prices, both volume collected and margin were higher than in the previous fiscal year, yielding a year-on-year increase in operating profit.
Other (titanium, Tatsuta Electric Wire and Cable, etc.)	6.5	5.8	-0.7	Demand was steady in both the titanium business and the catalysts and chemicals business.

Business Climate Indicators

Trends in key factors affecting Group performance are as indicated below.

Segments affected	Indicators	Units	FY2013	FY2014	FY2015	FY2016	FY2017
All segments	Exchange rate	(JPY/USD)	100	110	120	108	111
	LME copper price	(US cent/pound)	322	297	237	234	292
Resources development business	Equity entitled copper mine production	(thousand tons/year)	127	148	198	200	194
Smelting and refining business	Sales volume of refined copper by PPC	(thousand tons/year)	588	623	595	602	579
Electronic materials business	Sales volume of precision rolled materials	(thousand tons/month)	3.4	3.8	3.7	4.0	3.9
Recycling and environmental services business	Recovered volume of gold	(tons/year)	6.1	5.9	6.4	5.6	5.3

Revenue by Region

(billions of yen)

	Japan	Rest of world	China	Rest of Asia	North America	Europe	Other	Total
FY2016	584.0	419.1	247.6	133.1	23.2	10.8	4.4	1,003.1
FY2017	675.0	293.4	108.4	132.5	27.8	13.8	10.9	968.4

Note: IFRS application started in fiscal 2017.

Segment Overview and Progress in Meeting Medium-Term Management Plan

Resources Development Business

- Key Strategies**
- Maintain the stable operation of the Caserones Copper Mine
 - Become more competitive by achieving thoroughgoing cost reductions at the Caserones Copper Mine

Business Overview

At the Caserones Copper Mine, which the Group has taken the lead in developing since acquiring mining property in 2006, copper concentrate production began in May 2014.

We have also invested in some of the world's largest copper mines, including Los Pelambres and Escondida. Our equity entitled copper mine production totaled around 200,000 tons in fiscal 2017.

Advances in Fiscal 2017

The Caserones Copper Mine continued to operate at a loss in fiscal 2017, as in the previous fiscal year. Among contributing factors were the costs of natural disaster countermeasures, high production costs because some of the copper concentrate process operations were not yet stable, and the increase in various costs for ramping up to full production as early as possible. On May 1, 2018, a new Caserones Division was established to provide agile, centralized administration of the Caserones Copper Mine; the division is now working to overcome these issues.

Moreover, to generate synergies between the resources development business and the smelting and refining business and to strengthen business management, we decided to focus investment on assets of higher importance to the Company. We therefore increased our share of the Los Pelambres Copper Mine and transferred our share of the Collahuasi Copper Mine.

Caserones Project

Acquisition of mining property	May 2006	Production plans	March 2013: Start of SX-EW refined copper production May 2014: Start of copper concentrate production		
Acquisition price	US\$137 million				
Initial investment amount	US\$4.2 billion (initial investment in production equipment, etc.)				
Equity shares (as of March 31, 2018)	JX Nippon Mining & Metals: 51.50% Mitsui Mining & Smelting: 25.87% Mitsui & Co.: 22.63%				
Mine life	28 years (2013 to 2040)				
Total production volume (28-year lifetime)	Copper: 3,550,000 t (copper concentrate 3,140,000 t, SX-EW refined copper 410,000 t) Molybdenum: 87,000 t				

	First 10 years	28-year average	28-year total	
Copper	Concentrate (copper content)	150,000 t/year	110,000 t/year	3,140,000
	SX-EW refined copper	30,000 t/year	10,000 t/year	410,000
	Total	180,000 t/year	120,000 t/year	3,550,000
Molybdenum	3,000 t/year	3,000 t/year	87,000	

Note: The Caserones Copper Mine commenced commercial operation in May 2014. It is to be closed in 2040 when its mineral resources are depleted.



Caserones Copper Mine



SAG (semi-autogenous grinding) mill
After being crushed to 200 mm or smaller in crushing equipment, the ore is reduced to around 0.2 mm in the grinding process.



Flotation
A process in which ore that has been ground in the SAG mill is separated into copper concentrate and tailings.

Smelting and Refining Business

Key Strategies • Achieving safe and stable operation of facilities and becoming more cost competitive

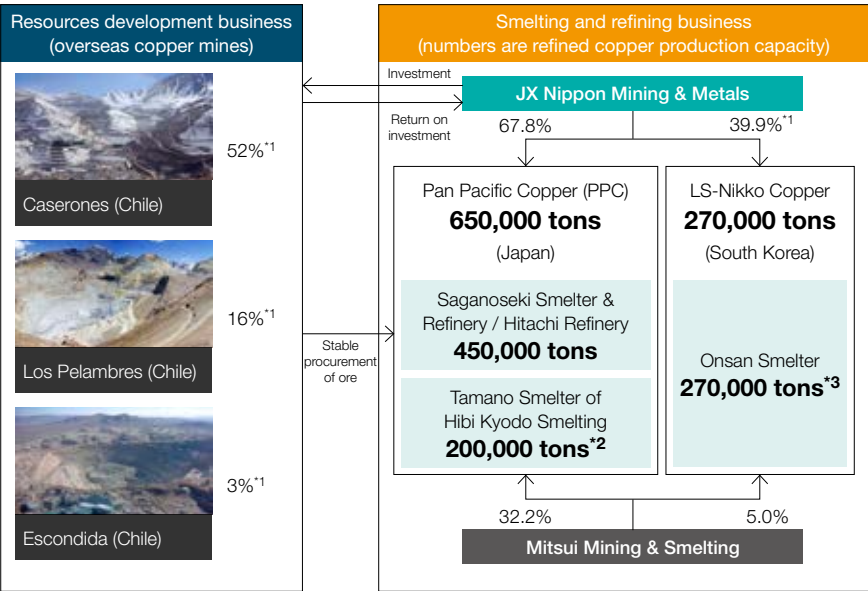
Business Overview

Our refined copper production capacity is among the largest in the world, at approximately 920,000 tons a year combined for Pan Pacific Copper's sites in Japan and LS-Nikko Copper in South Korea. We efficiently produce high-quality refined metal products, including copper and precious metals, and provide stable supplies to Asian markets where demand is expanding.

Advances in Fiscal 2017

We took measures to increase earnings, such as achieving more favorable sales prices and reducing costs and stabilizing operations at each of the smelting and refining facilities. During major regular maintenance at the Saganoseki Smelter & Refinery, we renewed the body of the flash smelting furnace used for 44 years since it was built in 1973. This task was completed on schedule, and measures to prepare for increased copper concentrate processing were carried out as planned.

Outline of Resources Development and Smelting and Refining Businesses



Saganoseki Smelter & Refinery



Tamano Smelter of Hibi Kyodo Smelting



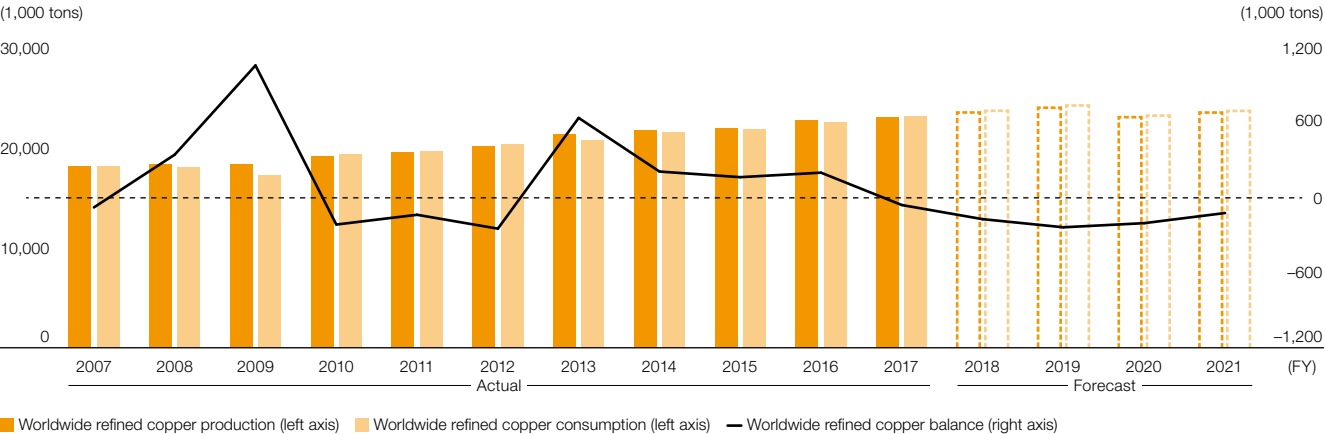
Onsan Smelter

*1 Indirect ownership portion of JX Nippon Mining & Metals (as of March 31, 2018)

*2 PPC's offtake of the total production capacity of 290,000 tons

*3 The amount corresponding to JX Nippon Mining & Metals' equity share of the total production capacity of 680,000 tons

Global Supply and Demand of Refined Copper



Worldwide refined copper production (left axis) Worldwide refined copper consumption (left axis) — Worldwide refined copper balance (right axis)

Electronic Materials Business

Key Strategies • Improve profitability in existing fields
• Boost competitiveness by making use of IoT and AI

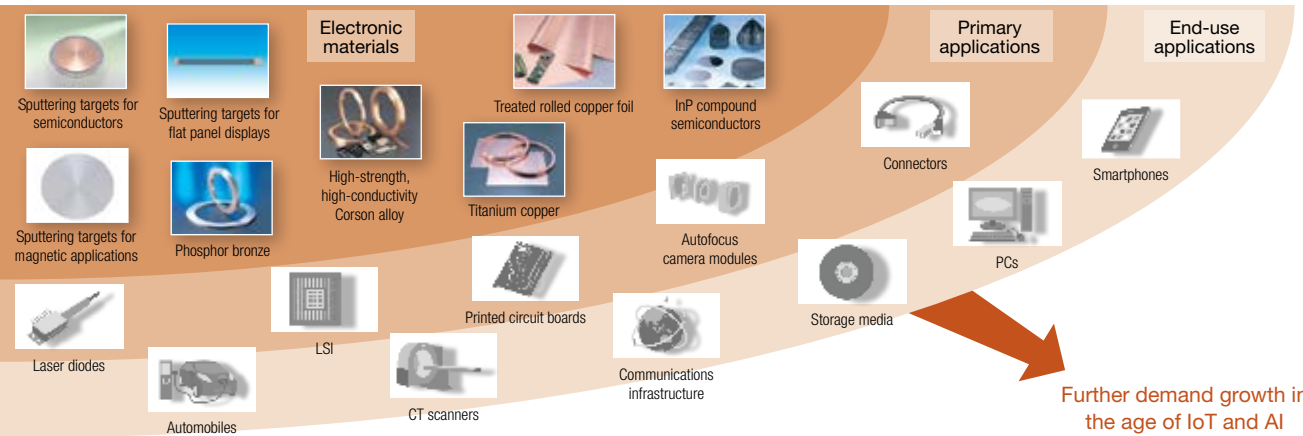
Business Overview

We develop and provide high-quality, high-performance electronic materials in a timely manner, drawing on our technological advantages related to nonferrous metals in areas including high-purity refining, high-density sintering, surface treatment, and precision rolling and fabrication. Our materials are matched to rapidly advancing needs in the electronic equipment and automotive markets, where we maintain high global shares.

Advances in Fiscal 2017

Along with the ongoing steady expansion in smartphone-related areas of demand, a larger cloud services market means continued high growth in areas of demand related to servers and data centers. As a result, sales volumes of most products increased year on year. Further demand growth is expected with the advance of the IoT and AI society and growth in fields related to eco-friendly vehicles, leading-edge information technology, and medical care. We are therefore investing in production capacity increases to meet future market needs. At the Kurami Works and Hitachi Works, among other sites where treated rolled copper foils and high-performance copper alloys are produced, we are boosting manufacturing equipment such as melting and casting equipment, rolling machines, annealing furnaces, and surface roughening lines. At the Isohara Works, we are increasing equipment capacity for making sputtering targets for semiconductors (high-purity metal refining, melting, etc.).

Outline of Electronic Materials Business (Main Products and Applications)



Global Market Share of Our Principal Electronic Materials Products

Product	Global market share (in 2017)	Primary applications	End-use applications				
			PCs	Mobile phones, smartphones	Digital appliances, AV	Communications infrastructure and data centers	Automobiles
 Sputtering targets for semiconductors	60% No. 1	CPUs, memory chips, etc.	○	○	○	○	○
 ITO targets for flat panel displays	30% No. 1	Transparent conductive films	○	○	○		○
 Sputtering targets for magnetic applications	60% No. 1	Hard disks, etc.	○		○	○	
 InP compound semiconductors	50% No. 1	Optical communication devices, ultra-fast ICs			○	○	○
 Treated rolled copper foil	80% No. 1	Flexible printed circuit boards	○	○	○		○
 Phosphor bronze foil (thickness less than 0.1 mm)	65% No. 1	Connectors, springs for electronic parts	○	○	○		○
 High-strength, high-conductivity Corson alloy	60% No. 1	Lead frames, connectors	○	○	○	○	○
 Titanium copper	70% No. 1	High-end connectors, etc.	○	○	○		○

Recycling and Environmental Services Business

- Key Strategies
- Promote differentiation from competitors
 - Enhance the global resource collection network

Business Overview

In the recycling business, the Group efficiently recovers copper, precious metals, rare metals, and other resources from recycled materials, harnessing the processes that utilize technologies from our smelting and refining business. In the environmental services business, we provide zero-emissions treatment of industrial waste materials to render them harmless without producing any secondary waste. In Japan, we established the Hitachi Metal-recycling Complex (HMC) Department of the Hitachi Works, engaging in the recovery of a wide variety of valuable metals. At the same time, we have been taking steps to strengthen our nationwide network with recyclers and hydrometallurgical refiners for collection and processing of recycled materials. By establishing bases outside Japan in the U.S. and Taiwan, and building stronger ties with major recyclers, we are seeking to increase the volume of collected materials.

Advances in Fiscal 2017

Regarding the collection of recycled materials, both volume collected and margin increased thanks to the recovery in scrap market conditions resulting from the rise in metal prices. The grade of precious metals collected, however, continues on a downward trend as manufacturers seek to reduce the quantities of such metals used in products.

Outside Japan, we continue to carry out active collection efforts mainly in North America and Europe, with JX Nippon Mining & Metals USA as a base. Activities at the Zhangbin Recycling Center of Nikko Metals Taiwan are also gaining momentum. Meanwhile, we continue to conduct commercial feasibility trials on rare metal recycling from spent lithium-ion batteries.

At the five Group companies that perform services such as preprocessing of recycled materials and industrial waste treatment, the volume of collected waste and other materials was mostly unchanged from previous years. As for treatment of equipment containing low concentrations of PCBs, stable operations continued at JX Nippon Tomakomai Chemical, which also worked to increase the collection volume from inside and outside Hokkaido.

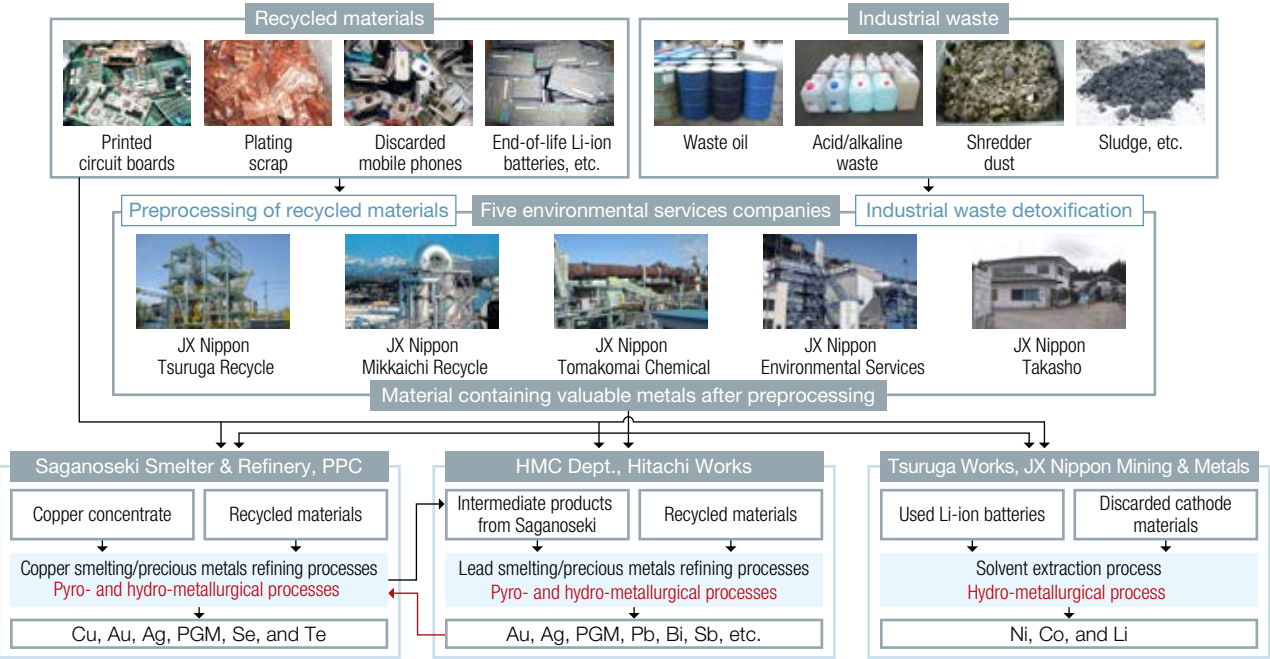


Analysis facility: Recycled Materials Analysis Center, HMC Department, Hitachi Works



Overseas collection center: Zhangbin Recycling Center, Nikko Metals Taiwan

Outline of Recycling and Environmental Services Business



Titanium Business

- Key Strategies
- Strengthen the titanium metal business by bringing the Saudi Arabia project to early commercial operation and establishing an optimal production system for titanium sponge
 - Advance differentiation strategies in the catalysts and chemicals business and expand production capability

Business Overview

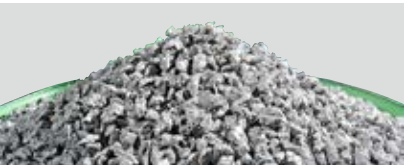
Titanium, a light, strong metal resistant to corrosion, has wide-ranging uses, from aircraft to desalination plants, electric power plants, and other applications. Group company Toho Titanium is engaged in the manufacture of titanium metals, as well as catalysts and electronic materials, using materials and technologies related to titanium production, such as catalysts for manufacturing polypropylene, and materials for electrodes and dielectrics in multilayer ceramic capacitors.

Advances in Fiscal 2017

The titanium metal business recorded stable performance overall, backed by robust production of aircraft, a main end use of titanium, and demand for general industry uses such as electric power. The catalysts and chemicals business also remained strong. The new plant has been completed for the titanium sponge joint venture in Saudi Arabia, and is expected to go into commercial production in 2018. In a separate initiative, a new plant was built to produce nickel powder used in multilayer ceramic capacitor electrodes, raising production capacity by 50%.

Overview of Saudi Arabia Project

Name	Advanced Metal Industries Cluster and Toho Titanium Metal Company Limited (ATTM)	
Head office	Yanbu, Kingdom of Saudi Arabia	
Operations	Manufacture and sale of titanium sponge at a new plant constructed in Saudi Arabia	
Established	February 29, 2016	
Fiscal year-end	December 31	
Equity shares	Toho Titanium 35.0%	
	Advanced Metal Industries Cluster Company Limited* 65.0%	
	→ (Cristal: 32.5%, Tasnee: 32.5%)	
Other	* A company equally owned by Cristal and Tasnee, Cristal's parent company.	
	Production capacity 15,600 t/year	Investment amount approx. US\$480 million
	Plant construction started May 2015	Completed May 2017

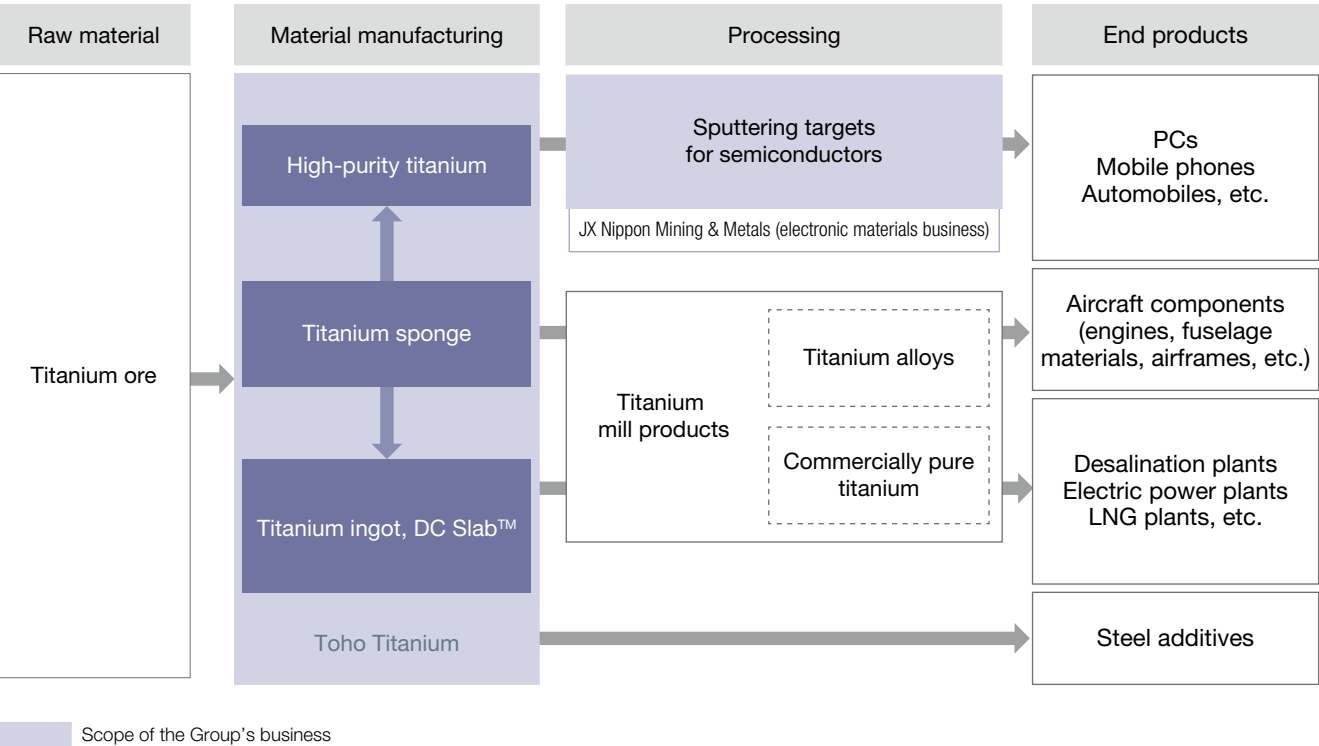


Titanium sponge



Saudi Arabia plant

Outline of Titanium Metal Business



Developing Technology-Based Businesses (Developing and strengthening businesses that will be the mainstays of the future)

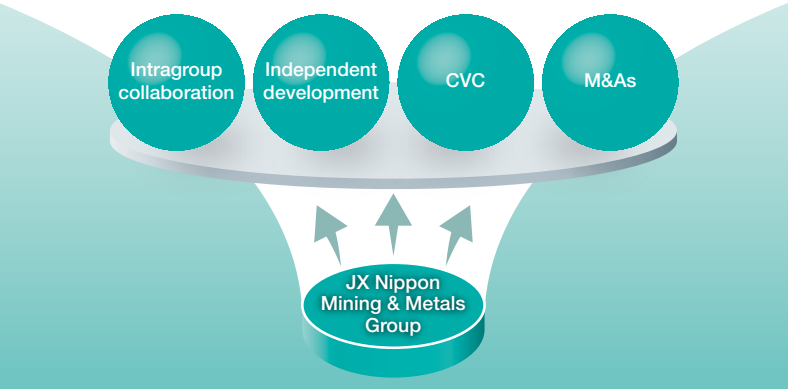
- Key Strategies
- Develop markets, strengthen sales, and develop technologies in anticipation of the arrival of the IoT society
 - Proactively devote management resources to promising areas

Of special note

The JX Nippon Mining & Metals Group is spending a total of ¥200 billion on implementing the Medium-Term Management Plan. This will consist mainly of strategic investment in growth fields in midstream and downstream operations, where demand is expected to expand greatly with the advance of IoT and other new technologies. Directions that future business expansion could take include intragroup collaboration (harnessing Group-held technologies), independent development, CVC (corporate venture capital), and M&As.

By means of ongoing strategic investment in these directions, we plan to create new businesses, mainly in electronic materials, and obtain stable earnings.

Directions for business expansion



Amount of capital investment in Medium-Term Management Plan

	(billions of yen)
Strategic investment	70.0
Maintenance and others	130.0
Total	200.0

Technology-Based Business: Developments in and after Fiscal 2017

Entry into the high-purity tantalum and niobium metal powders business

In July 2018, the JX Nippon Mining & Metals Group acquired all shares of H.C. Starck Tantalum and Niobium GmbH (“HCS TaNb”) in Germany. HCS TaNb is one of the world’s leading suppliers of tantalum and niobium powders and other products that are used in capacitors, semiconductor materials, and SAW devices, and the company’s quality technologies and strong marketing enable it to have its excellent product lineup. The full-fledged emergence of the IoT society is expected to bring about an enormous increase in the number of electronic parts and devices in use. By combining the technologies and market knowledge of JX Nippon Mining & Metals and HCS TaNb, we will be able to strengthen our sales and product development capabilities and pursue efficient management and other synergies, contributing to the advancement of the IoT society through stable supply of the materials.

Acquisition of shares in Toho Titanium Co., Ltd. and Tatsuta Electric Wire and Cable Co., Ltd.

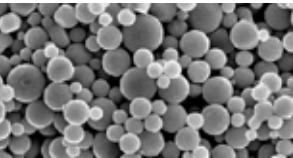
In June 2018, JX Nippon Mining & Metals acquired the shares in Toho Titanium Co., Ltd. and Tatsuta Electric Wire and Cable Co., Ltd. that had previously been held by JXTG Holdings. By establishing direct capital relationships with these two companies and integrating them into our operating structure, we aim to achieve faster and more effective business development in the downstream areas of Group business. This will enable us to go beyond the existing businesses of these firms to take advantage of the synergies in new businesses, such as metal paste and next-generation semiconductor interconnect materials.

Participation in copper paste business for solar panels and electronic equipment

In June 2018, JX Nippon Mining & Metals acquired a 21.2% stake in Material Concept, Inc., a Tohoku University spin-off. Up to now, the material used for the wiring and electrodes of solar panels, electronic equipment, and the like has been silver paste. The copper paste under technology development by Material Concept has conductivity similar to that of silver paste, but promises to be cheaper and greatly reduce material costs, raising expectations for its use as a viable alternative. The Company plans to participate also in commercializing copper paste and ramping it up to full mass production.



Tantalum ore and high-purity tantalum powder



Nickel powder of Toho Titanium Co., Ltd.



Copper paste

Production Sites in Japan and Overseas Operating Sites

As of July 1, 2018

Domestic

- 1

JX Nippon Tomakomai Chemical Co., Ltd.
- 2

Esashi Works of JX Metals Precision Technology Co., Ltd.
- 3

Shirakawa Plant of JX Nippon Takasho Co., Ltd.
- 4

Isohara Works of JX Nippon Foundry Co., Ltd.
- 5

Hitachi Works of Hitachi Refinery of Pan Pacific Copper Co., Ltd.
- 6

Tatebayashi Works of JX Metals Precision Technology Co., Ltd.
- 7

Nasu Works and Metal Mold Production & Development Center of JX Metals Precision Technology Co., Ltd.
- 8

Kurami Works of Kurami Office of JX Nippon Coil Center Co., Ltd.
- 9

JX Nippon Mikkaichi Recycle Co., Ltd.
- 10

Kakegawa Works of JX Metals Precision Technology Co., Ltd.
- 11

Tsuruga Plant of JX Nippon Tsuruga Recycle Co., Ltd.
- 12

Takatsuki Plant of JX Metals Trading Co., Ltd.
- 13

Hibi Smelter of Pan Pacific Copper Co., Ltd.
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Yahata Plant of Toho Titanium Co., Ltd.
- 15

Saganoseki Smelter & Refinery of Pan Pacific Copper Co., Ltd.
- 16

Kasuga Mines Co., Ltd.

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The Roots of CSR in the JX Nippon Mining & Metals Group

The roots of the JX Nippon Mining & Metals Group's CSR go back to the place where JX Nippon Mining & Metals was founded—the Hitachi Mine (in Ibaraki Prefecture), first developed more than 110 years ago. Throughout the process of working to resolve the problem of smoke pollution at the Hitachi Mine, the Company maintained its stance of promoting community involvement and development as it strove to build up its business. It also created an environment in which mine employees could work with peace of mind and cultivated an ethos of respect for its employees. This approach was ahead of its time, but it lives on in the Group today.

Living in Harmony with Local Communities

How the smoke pollution problem became the occasion for building good relations with the local community

When the Hitachi Mine first went into operation in 1905, there was no established technology for effectively recovering sulfur dioxide generated from the sulfur content of ores in the smelting process. It was not long before the smoke emitted from the Hitachi Mine, which contained sulfur dioxide, began to cause withering of trees in the surrounding forests and widespread crop damage.

Although it was an era in which Japan had not yet established laws concerning compensation for such cases, the management of the Hitachi Mine company, led by Yataro Kado, the first head of general affairs, acted in good faith, paying damage compensation to the residents. As soon as someone reported damage, the Company investigated. It also signed agreements in advance in areas likely to suffer damage as the business expanded, in attempts to reduce the unease of residents. Sincere efforts like these led to the building of relationships of trust between the Company and the community.

Staking the future of the Company on the construction of a 155.7-meter giant stack

Along with paying compensation to residents affected by the smoke pollution, the Company tried various measures to disperse and dilute the exhaust smoke, such as building a flue and a large round chimney. Despite such efforts, the damage continued to spread. The Company's founder Fusanosuke Kuhara then proposed building what at the time was the world's tallest smokestack to disperse the smoke over a wide area. Seen as being too far removed from the

accepted methods for dealing with smoke pollution at that time, the proposal was widely opposed within industry, government, and academic circles. Nonetheless, Kuhara decided to go ahead with the project, backed up by weather observations and experimental data.

Construction of the giant stack required a total of nearly 37,000 workers and a massive financial investment. After it was completed in December 1914, what was then the world's tallest stack at 155.7 meters did in fact succeed in dramatically reducing smoke pollution.

Tree-Planting Programs to Reforest the Devastated Mountains

The next project the Hitachi Mine undertook was to embark on full-scale tree-planting programs to restore forests in the surrounding mountains that had been devastated by smoke pollution. The Company stationed a forestry expert at an agricultural testing station it set up near its smelter to test and selectively breed trees and crops, including smoke-resistant Oshima cherry.

A total of five million saplings grown by the Hitachi Mine based on this research were planted to reforest an area of approximately 1,200 hectares. An additional five million saplings were distributed to local residents free of charge, for planting in city areas, bringing the total including those planted by the mine to 10 million trees.

The Ethos of Community Involvement and Development Continues Today

As a result of these efforts, greenery returned to the mountains, and the city of Hitachi became famous throughout Japan as “the city of cherry trees.” In 1993, the stack suddenly collapsed, leaving only the bottom one-third in place. The repaired stack currently stands at a height of 54 meters, but the spirit of community involvement and development that it symbolizes continues to this day.

In the words of the mayor of Hitachi at the time, “The scale of the giant stack represented the scale of our predecessors’ aspirations. Even if the stack itself no longer looks the same, the spirit of community building that it stands for remains as strong as ever.”



The world's tallest smokestack in its day (background) and large round chimney (foreground)



The giant stack today



Planting Oshima cherry trees

The Words of Founder Fusanosuke Kuhara

“Pollution problems are ever present. They are like an eternal cross that the human race must bear. As science advances, pollution becomes more diverse. How many people have devoted strenuous efforts and pains to stopping this problem from growing?... The same can be said for the Hitachi Mine. Without the pollution problem, the history of the mine could not be told. In December 1914, the Hitachi Mine finished building on its own what is said to have been the world's tallest smokestack at the time, marking an end to the problem. This was a valuable experience, through which, over a period of around 10 years, the Company and the local citizens together suffered, anguished, and then came up with a solution on their own.”

From the preface to a 1963 book by Umanojo Seki on the story of Hitachi Mine's smoke pollution



Fusanosuke Kuhara



Hitachi Mine employee housing



Hospital

Creating Environments Where Employees Can Work with Peace of Mind

Another CSR legacy instilled in the Group is our belief that employees are a company's assets.

Kuhara realized that to achieve business success at the Hitachi Mine, which was located in an area distant from urban regions, it would be important to provide an environment in which employees could work with peace of mind. He therefore focused his efforts on raising the standard of living at the mine, and set about putting in place the infrastructure to enable employees to live with their families. He accordingly built an entire community, providing not only housing but also schools, hospitals, a railroad, and recreational facilities.

Carrying on that philosophy, Yataro Kado, as head of general affairs and general manager of the mine, believed in encouraging simplicity and fortitude, as well as simple hard work, while also thinking about the happiness of all employees. He made it a practice to investigate and resolve employees' dissatisfactions or complaints regarding the mine, and worked to maintain harmony among workers both in the workplace and in employee housing. The culmination of these efforts was the “friendly discussion group” he launched in 1920. The aim was for management and employees to hold talks focusing primarily on employee welfare.

In this environment that combined work and home, the Company organization built a climate of respect for employees, while a sense of togetherness took root among the employees themselves and the creed of “the Mine as One Big Family” was born.

This philosophy lives on in the Group even today. Guided by these principles, we maintain an open, supportive working environment in which employees feel free to exchange opinions regardless of position, age, or gender.

Learning about the Roots of CSR in the JX Nippon Mining & Metals Group

The story of a company and community battling pollution, told in novel form

Naoki Prize-winning author Jiro Nitta wrote the novel *Aru machi no takai entotsu* (A tall stack in a town), telling the story of a community and company aiming for coexistence and mutual prosperity. The novel is based on the actual story of the Hitachi Mine and surrounding residents together confronting the smoke pollution problem. Woven into this story is the determined spirit of the mining company owner. It is a work that paints a vision of company–community relations, and brings the reader in touch with the roots of CSR in the Group.

In 2018, shooting on a movie version of the novel began in the city of Hitachi where the story unfolded, and elsewhere. Production is underway, targeting release of the movie in 2019. It is hoped that the movie will be an opportunity for more people to become familiar with the novel.



Filming in progress



JXTG Group Philosophy

Mission

**Harnessing the Earth’s power
for the common good and for the day-to-day life of each individual,
we will contribute to the development of our communities
and help to ensure a vibrant future
through creation and innovation in energy, resources, and materials.**

Our Five Core Values

**As a member of
the community**

High ethical standards

Based on our core principles of integrity and fairness, we conduct all of our business activities in accordance with our high ethical standards.

Health, safety, and environment

We give the highest priority to health, safety, and environmental initiatives, which are vital to the well-being of all living things.

**Supporting
day-to-day life**

Focus on customers

We strive to meet the expectations and evolving needs of our valued customers and of society as a whole through the stable provision of products and services while creating new value as only we can.

**For
a vibrant future**

Taking on challenges

Taking changes in stride, we rise to the challenge of creating new value while seeking innovative solutions for today and tomorrow.

Moving forward

Looking to the future, we continue to grow, both as individuals and as a company, through the personal and professional development of each and every employee.

JX Nippon Mining & Metals Code of Conduct

Ensuring a stable supply of nonferrous resources and materials is our social mission. We are engaged in a wide range of operations from exploration, mining, smelting & refining to metal fabrication and electronic materials production. Based on “JXTG Group Philosophy” and complying with Code of Conduct stipulated below, we will continue to pursue technical rationality and efficiency and make improvements in quality & product properties and other matters in all aspects of our operations from development, production and marketing. At the same time, we will continue to promote recycling of resources and materials to achieve zero emission. This is our way of achieving continuous innovation in the productivity of resources and materials.

In the conduct of our business, we are committed to maintaining and enhancing a harmonious relationship with a wide range of stakeholders, including our customers and the communities in which we operate. We are committed to contributing to the sustainable development of society on a global scale.

1. Our social mission

Based on continuous technological development and full awareness of our responsibilities in designing products, we will develop and produce a variety of products efficiently while minimizing waste. At the same time, we will promote recycling and reduce the impact of our operations on the environment. By doing so, we hope to obtain the satisfaction and trust of our customers and of society as a whole.

2. Compliance with laws and regulations and engagement in fair trade

We will comply with domestic and/or overseas laws and regulations and will engage in fair, transparent, and free competition and trade based on the fulfillment of our social responsibilities.

3. Disclosure of corporate information and protection of personal information

We will communicate not only with our shareholders, but also with the public at large, and will disclose corporate information in an active and equitable manner while focusing on the protection of personal information.

4. Creation of an optimum health, safety and working environment

We will place top priority on health, safety, and disaster prevention and will ensure a comfortable working environment that respects employees’ personality, human rights, and individuality.

5. Environmental conservation

Based on the awareness that tackling environmental issues is an essential requirement for corporate existence, we will engage in activities aimed at conserving the global environment, including biodiversity, in a voluntary, active, and continuous manner.

6. Enhancement and strengthening of risk management

We will establish a risk management system based on scientific data to enhance and strengthen risk management.

7. Harmonious relationship with society

We will commit ourselves to social contribution activities and work as a good corporate citizen to achieve a harmonious relationship with the rest of the society of which we are part.

8. International business operations

In international business operations, we aim to contribute to sustainable development by protecting the fundamental human rights of people in countries and areas where we operate, and by respecting their cultures and customs.

9. Elimination of antisocial activities

We stand firm against all antisocial forces and groups that threaten social order and safety.

10. Management responsibilities

Management executives will take the lead in implementing this code of conduct and ensure it is thoroughly implemented across the Group. In the event of any non-compliance with the code of conduct, the management executives will investigate the causes, work to prevent reoccurrence, disclose information to the public promptly and accurately, and be held accountable for the event.

CSR Promotion System

CSR Committee and Subcommittees

The JX Nippon Mining & Metals Group has a CSR Committee, an advisory body to the president that formulates basic policies and action plans relating to its CSR activities. It also evaluates progress in implementing the plans and the Group's performance from economic, environmental, and social perspectives. The committee is chaired by the president and consists of the members of the Company's Executive Meeting. The committee meets twice a year, in principle, and in addition to formulating basic policies, promotion systems, and action plans for CSR activities, it reviews progress in implementing the relevant action. The findings of these reviews are used when formulating new policies, systems, and plans. In fiscal 2017, the committee met twice, on May 10 and October 23, 2017.

Under the CSR Committee are the Compliance Committee, the Safety and Environment Committee, and the Citizenship Committee. These committees formulate action plans for their respective areas of responsibility and review progress in implementing the relevant action, among other activities.

CSR Promotion System



CSR Promotion Managers

CSR promotion managers are appointed at each of the Group's operating sites and companies. They are responsible for ensuring that basic policies, promotion systems, and action plans for CSR activities are implemented faithfully in line with the actual conditions at each site and company. They formulate their own individual CSR plans and report on progress at CSR promotion manager meetings held twice a year. These meetings also function as opportunities to exchange information among participants.



Initiatives for Increasing CSR Awareness

CSR Workshops

We offer ample opportunities for face-to-face CSR training targeting Group officers and employees. In fiscal 2017, the following training was provided.

- **Workshop entitled “The Latest Trends in CSR and Examples of CSR Activities at Operating Sites” (June 7, 2017)**
An instructor from sustainability consulting firm Cre-en Inc. was invited to provide training based on actual examples of CSR activities in companies' operating sites, including basic approaches to CSR and the latest trends.
- **CSR officer workshop (March 9, 2018)**
An instructor from SusTB Communications conducted a workshop aimed at deepening understanding of such topics as CSR, the SDGs, and ESG, including how to interpret sustainability reports.



Publication of Sustainability Report 2017

Once a year, the Group publishes a sustainability report that compiles the policies and results of its CSR activities. This report is distributed to all Group officers and employees and to stakeholders. In fiscal 2017, 8,000 copies of the full report were printed in Japanese and 430 were printed in English. In addition, a total of 1,000 copies of the condensed digest version were printed in English, Chinese (simplified and traditional), Korean, and Spanish.

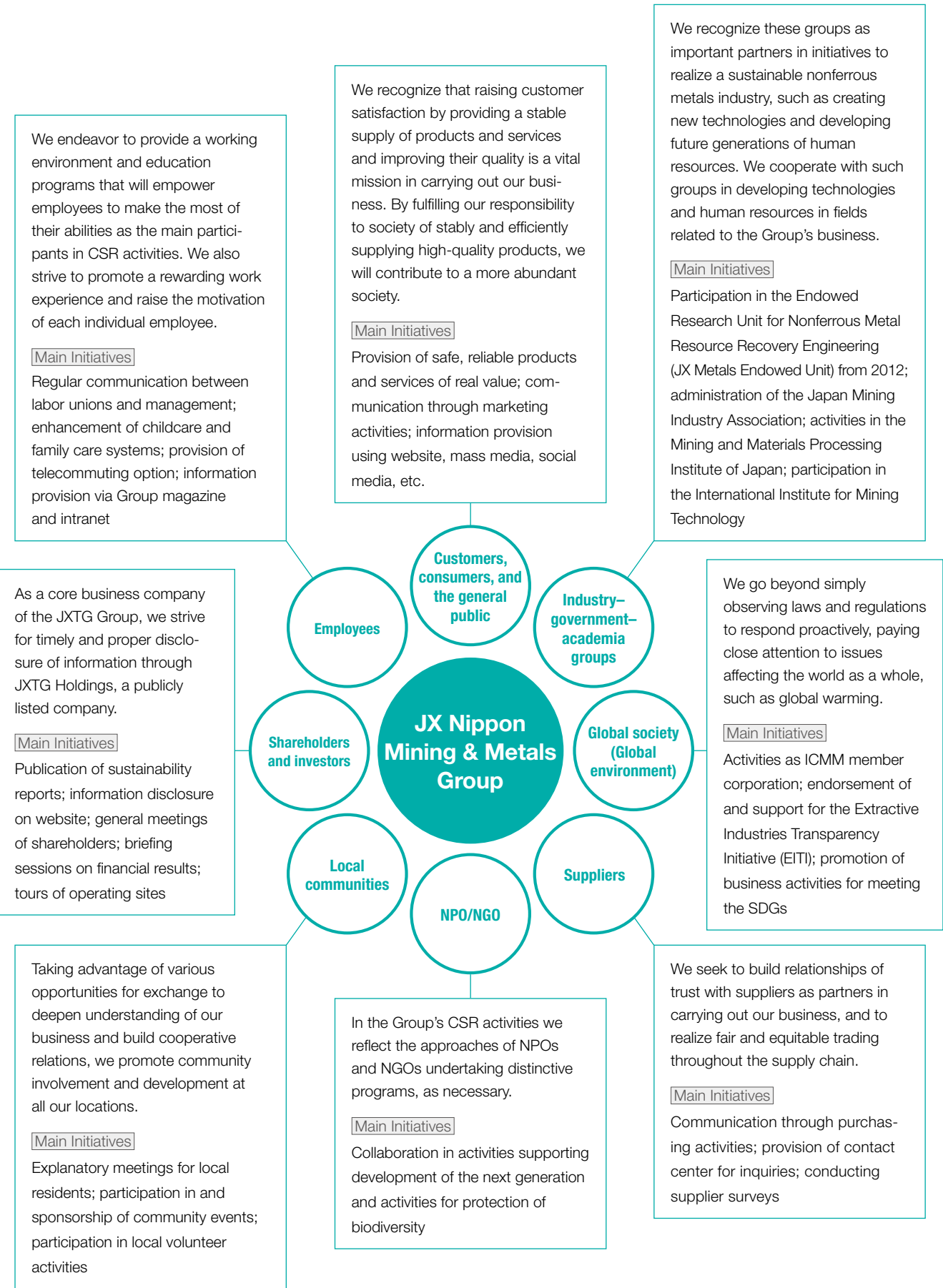


CSR Surveys

Surveys of employees were conducted to determine the extent of employee awareness of CSR and involvement in its practice. (See pages 97–98 for the results.)

Our Relationship with Stakeholders

Taking into consideration the JXTG Group Philosophy, the JX Nippon Mining & Metals Code of Conduct, and the Group supply chain, we have identified the following stakeholders of relevance in undertaking our CSR activities. By accurately grasping the needs of various stakeholders and addressing these sincerely, we seek to gain the trust of society.



Review of Material Issues for CSR Activities

The JX Nippon Mining & Metals Group recently undertook a review of the material issues for CSR activities to reflect changes in the business climate surrounding the Group and in the needs of society as it targets greater sustainability.

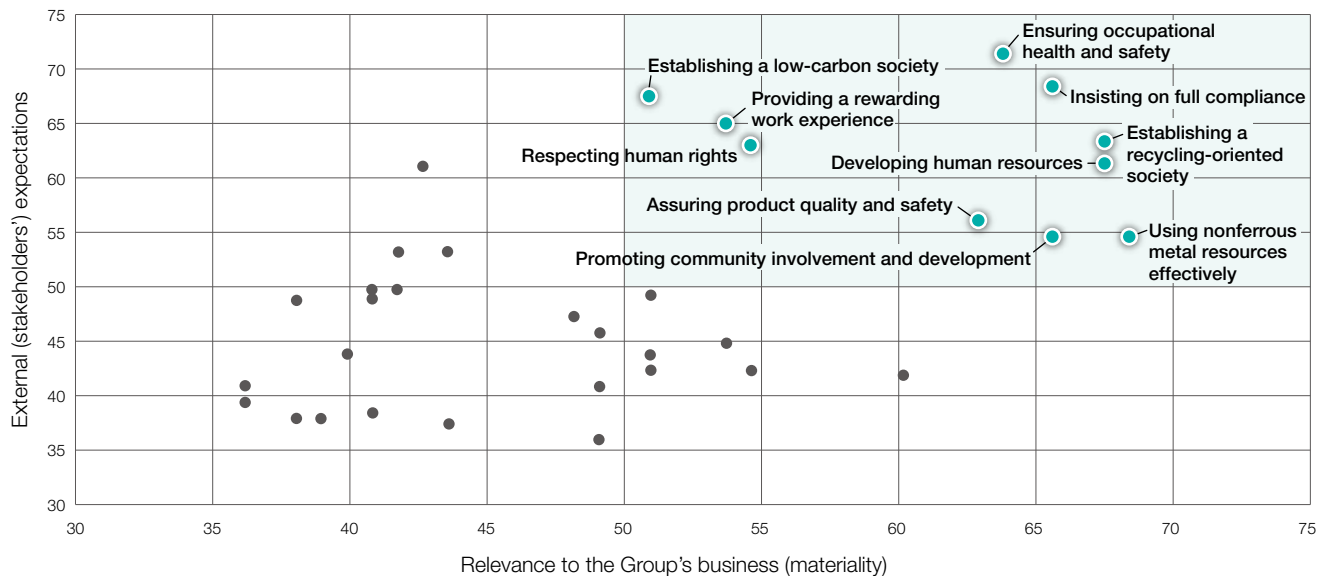
In the review process, we looked at various CSR issues and analyzed their materiality from a combination of two standpoints: external (stakeholders’) expectations and relevance to the Group’s business (materiality).

On this basis, we identified issues to be accorded top priority, and these material issues now guide the Group’s CSR activities. Through ongoing communication with various stakeholders, we will aim to raise our corporate value.

Material Issues for CSR Activities: The Review Process

1	Determining social issues to be considered	After a comprehensive study of international guidelines (GRI Standards, ISO 26000, etc.), as well as global and domestic initiatives (EITI, ICM, Responsible Business Alliance [RBA], the SDGs, Charter of Corporate Behavior, etc.), and trends among other companies in the industry, we identified 34 social issues to be considered.
2	Prioritizing from an external standpoint: Analyzing external (stakeholders’) expectations	The 34 social issues identified in the first stage of the process were analyzed from the external standpoint of stakeholder expectations according to assessment weightings provided by ESG survey institutes and other factors. (Vertical axis in diagram below)
3	Prioritizing from the Group’s standpoint: Determining relevance to the Group’s business (materiality)	The relevance of each issue to the Group’s business (materiality) was determined based primarily on cross-divisional workshops (or discussions), exchanges of views in CSR promotion manager meetings and officer training sessions, and employee surveys. (Horizontal axis in diagram below)
4	Identifying material issues for CSR activities	We conducted assessments that combined external (stakeholders’) expectations with relevance to the Group’s business (materiality) to identify issues of particularly high materiality, and selected these as the material issues for our CSR activities. In identifying these material issues, deliberations took place in the CSR Committee, which is an advisory body to the president, and the choice of issues was approved by the Executive Meeting members including the president.

Identifying material issues for CSR activities



Our 10 Material Issues for CSR Activities

The JX Nippon Mining & Metals Group conducts its business activities with particular attention to the standpoints represented by the 10 material issues for CSR activities selected through the aforementioned review process.

For the peace of mind of society (pages 29–58)		Related SDG items	
Ensuring occupational health and safety	 		P29–
Assuring product quality and safety			P36–
Developing human resources			P40–
Providing a rewarding work experience	  		P47–
Promoting community involvement and development	 		P53–
For protecting the environment (pages 59–84)			
Establishing a low-carbon society	 		P67–
Establishing a recycling-oriented society	  		P70–
Using nonferrous metal resources effectively	   		P74–
For earning trust as a corporation (pages 85–96)			
Insisting on full compliance	 		P87–
Respecting human rights	  		P92–

Initiatives Relating to the SDGs

The Sustainable Development Goals (SDGs) are international goals and targets defined in the 2030 Agenda for Sustainable Development adopted at the United Nations Sustainable Development Summit in September 2015. They consist of 17 goals and 169 targets for achieving a sustainable world, targeting the year 2030.

The JX Nippon Mining & Metals Group will contribute to achievement of the goals defined through the SDGs by taking action on our material issues for CSR activities.





From its inception, the Group has always considered the maintenance of occupational health and safety to be an essential condition for the continuation of its business, and it has endeavored to provide an environment where employees can work with peace of mind. The Group drew up the Basic Policy on Health and Safety aimed at the elimination of accidents and illnesses, and strives to foster a culture of safety.

Ever since its founding, the Group has endeavored to provide an environment where employees can work with peace of mind. On the theme of "Safety First," the Group drew up the Basic Policy on Health and Safety aimed at the elimination of accidents and illnesses, and strives to foster a culture of safety.

We place the highest priority on ensuring the health and safety of all people working at the JX Nippon Mining & Metals Group and thereby strive to create a safe and secure workplace.

1. We will continuously improve health and safety management levels through the establishment and efficient operation of the health and safety management system.
2. We will work to identify, eliminate, and reduce hazards and harmful factors in all areas of business operations and to ensure no accidents occur.
3. We will work to maintain and improve employees' mental and physical health by ensuring good communication and a comfortable working environment.
4. We will actively provide information and education in order to develop human resources that can act spontaneously and have strong safety competencies.
5. We will not only comply with health and safety laws and regulations but also establish and observe necessary voluntary standards.

The Group formulates the Management Policy on Health and Safety each fiscal year. The goals and key policy measures are set based on analysis of health and safety performance in the previous year. The policy is discussed and approved by the Central Health and Safety Committee and then promulgated across the Group.

Goals	Key policy measure
1 Accidents with lost work days or worse: zero 2 Explosions and fires: zero 3 Occupational diseases: zero 4 Rate of lost work days due to ordinary illnesses: a reduction by 10% or more from the average in the past three years	Creating a culture of safety Key Safety Activities We are identifying all possible risk sources and enacting rigorous measures to prevent major risks that can lead to serious accidents.

In compliance with the Industrial Safety and Health Act, the Group has formed health and safety committees at each operating site and in each Group company. At the Head Office, the Central Health and Safety Committee holds an annual meeting, attended by representatives of each business segment, in addition to the regular meetings held five times a year. Members go over various measures for health and safety, discuss the Management Policy on Health and Safety, and deliberate measures to prevent the recurrence of accidents. The meetings are chaired by the General Manager of the Environment & Safety Department. Health and safety patrols are conducted once a year, and Group safety staff meetings are held twice a year to discuss health and safety management status and measures and to exchange related information. Workshops are also held twice a year for employees performing actual operations. In cases where unique safety measures are found to be in place at a specific operating site or Group company, steps are taken to share these measures across the entire Group, such as by presenting implementation examples at Group safety staff meetings and conducting factory tours.

Environment and safety audits are conducted by a team under the supervision of the president to examine operating sites directly run by the Company and major domestic Group companies. Issues discovered in the audits are reported to the president. The team also notifies the operating site of the issues, requesting

improvements and following up by monitoring progress. Audits were conducted at 12 sites (including Group companies) in fiscal 2017. No major matters were identified.



Conducting an environment and safety audit at the Kurami Works

To ensure full compliance with the latest revisions to laws and regulations concerning health, safety, and the environment, regular compliance inspections are performed by the Environment & Safety Department and by an outside organization, and a legal compliance monitoring system has been introduced to obtain the latest information on legal revisions on a weekly basis. When information on important legal revisions is obtained under this system, instructional handbooks and manuals are created and issued, facilitating a prompt response by each operating site. In addition, we have compiled instructional handbooks outlining laws, guidelines, notices, and other rules related to particular items in order to enhance understanding of legal requirements by those involved.

Health and Safety Activities

Safety Performance in 2017

Occupational Accidents, etc.*1

Our safety record for 2017 is shown in the table below. The total number of occupational accidents at domestic operating sites declined for the second straight year, and accidents with lost work days or worse were reduced by half year on year.

	Category	2015	2016	2017
Safety performance at domestic operating sites	Fatal accidents (persons) ²	0	1	0
	Accidents with lost working days (persons) ²	12	14	7
	Accidents without lost working days (persons) ²	25	11	15
	Total (persons)	37	26	22
	Frequency rate of industrial accidents ³	0.55	0.26	0.25
	Accident severity rate ³	0.05	0.00	0.01
	Explosions and fires (occurrences) ²	4 ⁴	2 ⁴	0
(For reference) Safety performance at overseas operating sites	Accidents with lost working days (persons)	9	8	13
	Accidents without lost working days (persons)	8	9	3
	Total (persons)	17	17	16

*1 Data on safety performance is compiled on a calendar-year basis (Jan. to Dec.).

*2 The figures include the performance of Group companies and subcontractors (but exclude Toho Titanium).

*3 Both the frequency rate of occupational accidents (the number of casualties caused by occupational accidents per million hours of total actual work) and the accident severity rate (the number of work days lost per thousand hours of total actual work) are rates for the Company's employees.

*4 There were no physical injuries due to fire or explosion.

(For reference) In 2017, the frequency rate of occupational accidents and the accident severity rate of all businesses in Japan were 1.66 and 0.09, respectively. (Source: Ministry of Health, Labour and Welfare, "Survey on Industrial Accidents")

Achievements of Health and Safety Activities in 2017 and Remaining Issues

As a key policy measure in our Management Policy on Health and Safety for 2017, we chose "Creating a culture of safety." The aim is to have each operating site (workplace) take the lead in implementing measures centered on the key safety activities to create a culture of safety in their own workplace and eliminate accidents there.

Activities to Build a Safety Culture

Definition of a Safety Culture

Safety culture is the assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, protection and safety issues receive the attention warranted by their significance.

(Adapted from the definition by the International Atomic Energy Agency [IAEA])

The Group has undertaken various activities toward creating a culture of safety, having made "Safety First" part of the Basic Policy on Health and Safety, and having adopted the above definition of safety culture.

Despite these efforts, in 2016 there was a fatal accident at a Group company, following an earlier one in 2014. Through 2016,

moreover, no major improvement had been seen in the number of lost work days or worse directly connected to serious accidents. Starting in 2017, therefore, the Group sought to eliminate serious accidents by endeavoring to create a culture of safety centering on the above-noted key safety activities.

Initiatives for Improving Risk Assessment

The latest report on industrial accident occurrences makes clear the urgent need to eliminate serious accidents. Essential to achieving this goal will be to raise the level of risk assessment, focusing also on "identification of risk sources" and "imagining accident scenarios." Inviting outside instructors (representatives of The Japan Industrial Safety and Health Association and occupational safety consultants), the Group provides guidance sessions and follow-up training from time to time.

Besides continuing to offer training and guidance sessions, as well as follow-up training, we will seek to create safer working environments by developing key individuals who can confirm the suitability of risk assessment and provide guidance at work sites.



Follow-up training by an instructor from The Japan Industrial Safety and Health Association (at Hibi Smelter)

Promoting Physical and Mental Health

The Group realizes how important it is that all employees are able to maintain good physical and mental health as they work. We also recognize the significance of good mental health in ensuring an enjoyable life for employees and their families as well as heightening productivity and making the work experience more fulfilling. The Group set up counseling services for providing face-to-face, telephone, and online counseling to support employees and their

families in maintaining good mental health. In addition, employee stress checks are provided annually; in fiscal 2017, they were provided for 2,568 JX Nippon Mining & Metals employees and 3,289 employees of Group companies. Workshops on improving the working environment and other such events are held as necessary, as we take various measures to reduce stress and provide a better place to work.

Other Activities

Presentations on Safety Improvements

At JX Nippon Coil Center, presentations are held to showcase examples of measures taken at the initiative of on-site workers specifically to improve safety.

Representatives of workers at each site give explanations of improvements in the workplace (including demonstrations), followed by an assessment of their responses to questions by a panel of reviewers made up of executives and managers. Having presentations take place in the workplace reduces the feeling of distance between reviewers and presenters, improving workplace cohesion and safety awareness, while helping to improve communication between workers and management.



Safety Commendations

A safety commendation system exists at operating sites directly run by the Company and domestic affiliated companies. Through this system, the president officially commends operating sites that have continuously operated without an accident for a designated period, the length of the period being determined according to the number of personnel. In fiscal 2017, commendations were given to the following five sites: Shimoda Hot Springs, Toyoha Mine, Saganoseki Smelter & Refinery of Pan Pacific Copper Co., Ltd. (including Japan Copper Casting Co., Ltd., Nissho Kou-un Co., Ltd., PPC Plant Saganoseki Co., Ltd.)



Toyoha Mine (5-years)



Kurami Office, JX Metals Trading (5-years)

Operating Sites That Have Obtained OHSAS 18001

Fiscal year certification was acquired	Operating sites
Fiscal 2006	Hibi Smelter, Pan Pacific Copper Co., Ltd. (including Hibi Kyodo Smelting Co., Ltd., Tamano Smelter)
Fiscal 2008	Hitachi Works (including Technology Development Center, Hitachi Refinery of Pan Pacific Copper Co., Ltd., JX Nippon Environmental Services Co., Ltd., Hitachi Office of JX Nippon Foundry Co., Ltd.), Kurami Works (including JX Nippon Coil Center Co., Ltd., Kurami Office of JX Metals Trading Co., Ltd.), Saganoseki Smelter & Refinery of Pan Pacific Copper Co., Ltd. (including Japan Copper Casting Co., Ltd., Nissho Kou-un Co., Ltd., PPC Plant Saganoseki Co., Ltd.)
Fiscal 2009	Isohara Works (including Isohara Administration Office of JX Nippon Foundry Co., Ltd.), JX Nippon Tomakomai Chemical Co., Ltd., JX Nippon Mikkaichi Recycle Co., Ltd., JX Nippon Tsuruga Recycle Co., Ltd.
Fiscal 2010	Tatebayashi Works of JX Metals Precision Technology Co., Ltd.
Fiscal 2011	Esashi Works of Metals Precision Technology Co., Ltd.
Fiscal 2013	Nasu Works and Kakegawa Works of JX Metals Precision Technology Co., Ltd.
Fiscal 2014	Longtan Works of Nikko Metals Taiwan Co., Ltd.

Health and Safety Activities

JXTG Group Safety Education Center

Role as an Educational Facility of the JXTG Group

To eliminate accidents, enhancing the risk sensitivity and safety awareness of individual employees is essential. Risk sensitivity means the ability to correctly recognize risks as dangerous. Sharpening this ability leads employees to follow rules and keep away from dangers. The Safety Education Center attempts to raise risk sensitivity by providing trainees with simulated experiences of accidents that have actually occurred in the past so that they can come to recognize the dangers instinctively. Around half of all accidents are recurrences of past accidents. For this reason, undergoing training at the center is an effective way to reduce the number of accidents that occur.

Further efforts are being made to raise the quality of the education, by building a more effective curriculum while improving the teaching skills of instructors.



Examples of Experiential Risk Training at the Safety Education Center

Introduction of Virtual Reality (VR) Technology for Experiential Risk Training

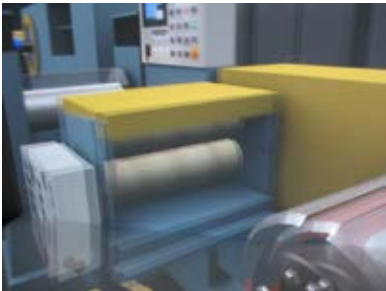
The effectiveness of safety education by means of simulated risk experiences depends on (1) making trainees feel what it is like to be involved personally in an accident, and (2) making them think about the psychological state of victims, causes, and accident-prevention measures. To enhance this effectiveness, VR technology has been introduced for four kinds of experiential risk training: steam explosion, being struck by heavy machinery, entanglement in a high-speed rotor, and falling from a high place. By creating a vivid impression that an occupational accident is occurring right in front of the trainees, this technology enables more realistic and practical experiential risk training. The introduction of VR in safety education is a new initiative, by which trainees will learn necessary knowledge, such as typical circumstances following an accident, psychological analysis of victims, and methods for avoiding accidents. The training has been well received by trainees and plans are being made to introduce additional VR experiences.



Steam explosion VR experience



Heavy machinery accident VR experience



High-speed rotor accident VR experience

Benefits of Training at the Safety Education Center and Strengthening of Supplementary Education at Operating Sites

During the period from January 2013 when the center was established to March 31, 2018, the total number of trainees had reached 7,791. The annual accident rate per 1,000 employees for those who have undergone the training is around half that of those who have not; moreover, the types of accidents covered by the curriculum have been declining in frequency. Such results show the clear benefits of this education. Due to the center's limited capacity to accommodate trainees, however, it currently takes three to four years to provide training to all employees and others working in the Group, including subcontractors. To prevent a drop in risk sensitivity during this time among those who have undergone training, similar safety education programs have been started at individual operating sites. The educational content is tailored to the situation at each operating site, such as its accident history and

rules. Furthermore, education of the instructors responsible for experiential risk training at each site raises their ability as promoters of safety and enhances their skills.

Training of these safety education instructors is the responsibility of the Safety Education Center. Through the training, they learn guidance principles and classroom skills from the three viewpoints of leadership, motivation, and communication.



Training of safety education instructors

TOPICS 1 Preventing Collisions between Heavy Machinery and People

The Group has set prevention of collisions between heavy machinery and people as a key safety issue. Behind this choice of an issue to address is the high risk of collisions on the manufacturing floor, where forklifts and other such machinery are in frequent use, increasing the potential for serious accidents. The Group has already considered and implemented various measures at workplaces, including demarcation of separate routes for heavy machinery and people. Currently, we are involving the entire Group in considering the introduction of measures that go a step beyond

conventional approaches, making use of the latest preventive safety technology.

From fiscal 2017 to 2018, a system for automatically braking heavy machinery was trialed at the Saganoseki Smelter & Refinery of Pan Pacific Copper, while a system that issues warnings and commands to both operators and workers was trialed at JX Nippon Coil Center. The following is a description of the heavy machinery automatic braking system and its benefits. The adoption of this system at the Saganoseki Smelter & Refinery has already been decided.

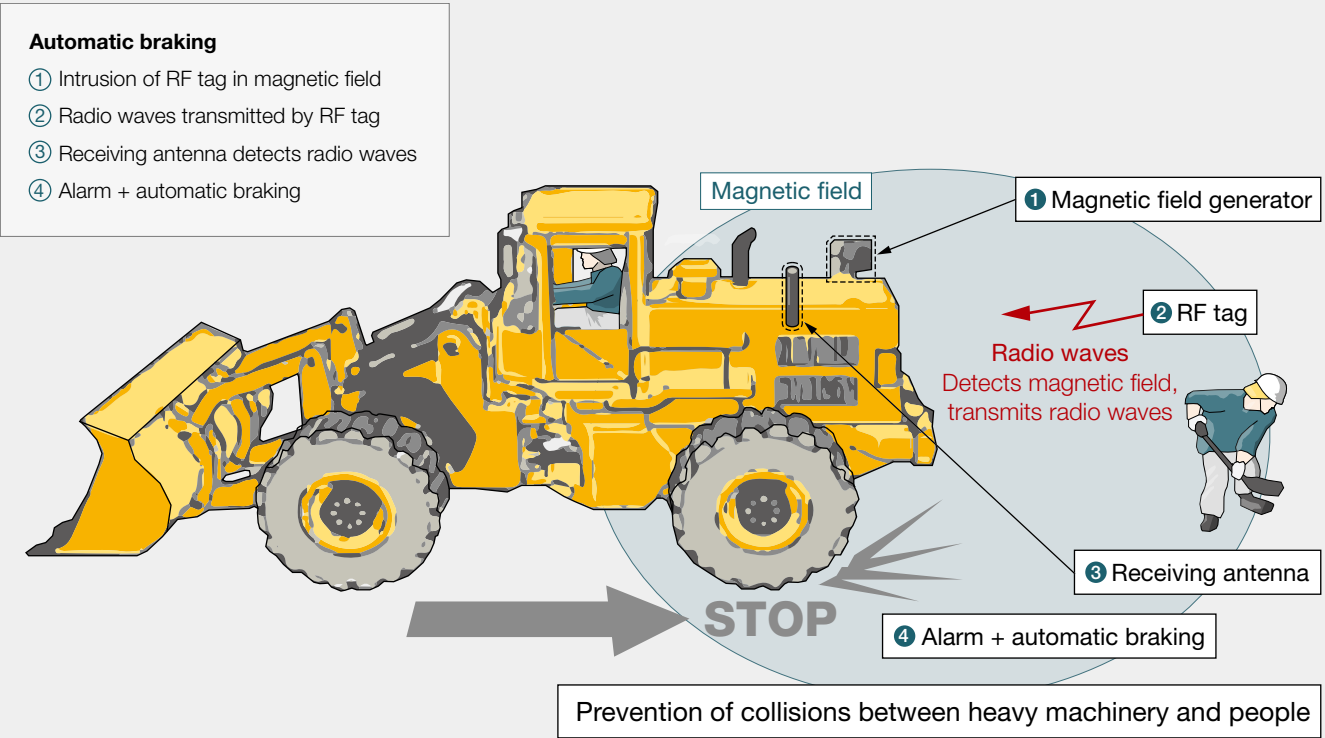
Heavy Machinery Automatic Braking System “WS System”

The “WS System” (Worker Safety System) developed by NIPPO Corporation is the first automatic braking system for heavy machinery to be certified as compliant with Safety 2.0,* a safety standard drawn up by the Institute of Global Safety Promotion. Unlike conventional systems that give warnings, the WS System has been developed to prevent serious accidents by physically stopping the heavy machinery when its sensors detect an obstacle via RFID (Radio Frequency Identification), stereo cameras, or other means.

The system using RFID works by emitting a magnetic field from the back of the vehicle when the heavy machinery is reversing.

When the system detects radio waves emitted by an RF tag on a worker's helmet within the magnetic field, it automatically operates the brakes to stop the vehicle. An advantage of this system is that RFID is not easily impacted by weather, visibility, temperature, or obstacles. Moreover, the system can readily be installed or removed, as it requires no alterations to the hydraulic piping or control equipment of the heavy machinery.

* Safety 2.0: A standard developed to promote widespread use of cooperative safety (Safety 2.0), which takes advantage of information and communication technology to achieve both a reduction in accidents due to lack of safety and an increase in productivity.



TOPICS ❶ Preventing Collisions between Heavy Machinery and People

Verification Trial at Saganoseki Smelter & Refinery, Pan Pacific Copper

Currently, the Group is setting standards for prevention of collisions between equipment such as heavy machinery and workers or other people. As a further measure for preventing such accidents, a pioneering verification trial was conducted at the Saganoseki Smelter & Refinery of Pan Pacific Copper to study the possibility of introducing a worker safety system employing RFID technology in large-scale heavy machinery on the manufacturing floor.

The trial tested the system's efficacy during heavy machinery work inside the hold of a copper carrier ship. The first step was to confirm the functioning of the sensor and its capability by verifying

the effects of magnetic field strength and obstacles on detection distance. Next, automatic braking was tested and confirmed.

While these tests showed some variability in braking distance due to conditions such as magnetic field strength, environmental factors such as obstacles, and the machinery operator's actions, the reliability and effectiveness of this system as a safety measure were confirmed. Based on the trial results, we are aiming for full introduction of the WS System in the Saganoseki Smelter & Refinery during fiscal 2018.



Magnetic field generator



Measurements being taken



Measuring effect of truck



Measuring effect of wall

VOICE Aiming to Prevent Collisions between Heavy Machinery and People



Toshihiro Hayashi
Senior Engineer,
Environment & Safety Dept.
Saganoseki Smelter &
Refinery
Pan Pacific Copper Co., Ltd.

At the Saganoseki Smelter & Refinery, we were quick to conduct trial introduction of a WS System aimed at preventing collisions between heavy machinery and people. The heavy machinery in which the system was installed for the trial was a wheel loader, used for scooping operations in the hold of a copper carrier ship. This is a workplace with a high risk of collisions, since the wheel loader gathering up copper concentrate operates alongside workers scraping off the copper concentrate, in a narrow space.

Since rules on separation of people and vehicles are strictly enforced in the hold, during the trial there were no cases of the vehicle stopping due to detection of a worker behind it. Near the bow of the ship or other narrow parts of the hold, however, workers must sometimes approach very close to the side of the heavy machinery, and there were cases where such movements were detected. When the heavy machinery stops because it detects someone in the vicinity, the brake will not be released until the person moves away. In this regard, it was confirmed to be a highly effective system.

To prevent collisions between heavy machinery and people, first and foremost it is necessary for the operator of the machinery to confirm that there are no people in the vicinity; but as an added precaution, we will be installing this system with the aim of preventing such collisions.



For the peace of mind of society

Material Issues



Assuring Product Quality and Safety

Use of AI and IoT is advancing throughout society, causing demands from the customers to whom we supply products to become ever more sophisticated, diverse, and stringent. As it becomes more important than ever to assure product quality and safety, the JX Nippon Mining & Metals Group is working to further enhance its quality management framework. Accordingly, the Quality Control Department has been established as an independent organization responsible for quality control operations for the entire Group. In addition, a Quality Control Committee that includes top management as members reviews the full range of quality control activities, resulting in a highly comprehensive and effective organizational structure.

Assuring Product Quality and Safety

As society's use of IoT and AI advances, customers have become more demanding than ever with regard to product safety and quality. In the JX Nippon Mining & Metals Group, we seek to raise quality performance and customer satisfaction by building and operating an organizational structure for the provision of high-quality products, including acquisition of ISO 9001 certification.

JX Nippon Mining & Metals Group Basic Quality Policy

The JX Nippon Mining & Metals Group hereby sets forth, and acts in observance of, this Basic Quality Policy in order to contribute to the development of a sustainable society while recognizing that its social mission is to stably supply nonferrous metals and materials.

- 1. Grasp the requirements of customers and society correctly in order to offer products and services that customers can trust and that satisfy their needs.
- 2. Improve and maintain quality in all processes from development, design, and production to delivery, while paying due attention to safety and environmental conservation.
- 3. Establish a quality management system, carry out continual improvements, and develop human resources.
- 4. Comply with all pertinent laws and regulations of Japan and other countries, and provide customers and society with accurate information on quality.

Note: The Group Basic Quality Policy has been formulated in line with the JX Nippon Mining & Metals Code of Conduct.

Establishment of Quality Management Systems and Their Implementation Based on the PDCA Cycle

The Group has developed quality management systems (QMS) that it implements as a means of putting the Basic Quality Policy into practice. The plan-do-check-act (PDCA) cycle is faithfully applied to QMS implementation, as continual improvements are made to achieve better quality. Both domestic and overseas operating sites have obtained ISO 9001 certification, the international standard for quality management systems.

The JX Nippon Mining & Metals Group is dedicated to being the best partner to its customers. Accordingly, we work to supply high-quality, safe products and to meet the quality improvement needs of customers with precision, thereby building relationships of trust with them.

Operating Sites That Have Obtained ISO 9001 Certification

Domestic	Hitachi Works (Copper Foil Dept.); Isohara Works; Kurami Works; JX Nippon Exploration and Development Co., Ltd.; Pan Pacific Copper Co., Ltd. (Hibi Smelter, Saganoseki Smelter & Refinery, Hitachi Refinery); Hibi Kyodo Smelting Co., Ltd.; Japan Copper Casting Co., Ltd.; JX Nippon Coil Center Co., Ltd.; JX Metals Trading Co., Ltd. (Takatsuki Plant); Ichinoseki Foil Manufacturing Co., Ltd.; JX Metals Precision Technology Co., Ltd. (Tatebayashi Works, Esashi Works, Nasu Works, Kakegawa Works); and Toho Titanium Co., Ltd. (Headquarters/Chigasaki Plant, Hitachi Plant, Yahata Plant, Wakamatsu Plant, Kurobe Plant)
Overseas	Nippon Mining & Metals (Suzhou) Co., Ltd.; Nikko Fuji Precision (Wuxi) Co., Ltd.; Nikko Metals Shanghai Co., Ltd.; Nikko Metals Taiwan Co., Ltd.; JX Nippon Mining & Metals Philippines, Inc.; Materials Service Complex Malaysia Sdn. Bhd.; JX Nippon Mining & Metals USA, Inc.; and JX Nippon Mining & Metals Korea Co., Ltd.

Enhancing Quality Auditing from a Third-Party Viewpoint

The Quality Control Department was established in January 2018 to plan, propose, and execute measures for maintaining and improving quality control throughout the Group, as we seek to enhance our quality management framework.

At the same time, a Quality Control Committee was formed to confirm that the quality management framework is functioning effectively and to share issues.

Quality Control Department

The Quality Control Department was set up within the Technology Group, where it performs Group-wide quality control, having taken over the quality management-related duties previously assigned to the Technology Group's Planning & Administration Department. Its specific roles include planning, proposal, promotion, and oversight of measures for enhancing quality management in the Company and Group, such as product liability risk analysis and preventive activities, quality control education, quality audits, and oversight of the implementation of international standards (ISO, etc.).

Quality Control Committee

The Company has established a Risk Management Council as an advisory body to the president. Besides the comprehensive identification of risks for the entire Group, the council selects material risks and deliberates ways of addressing them. The Quality Control Committee was formed as an organization under the Risk Management Council to draw up action plans for enhancing quality management in the Group and to review the activities undertaken.

The Quality Control Department performs quality audits of all operating sites from a standpoint independent of the business to confirm whether quality management is being carried out effectively. In fiscal 2017, there were no cases of liability for damages incurred under the Product Liability Act due to personal or property damage caused by defects in the Group's products.

Development of Human Resources to Provide High-Quality Products and Services

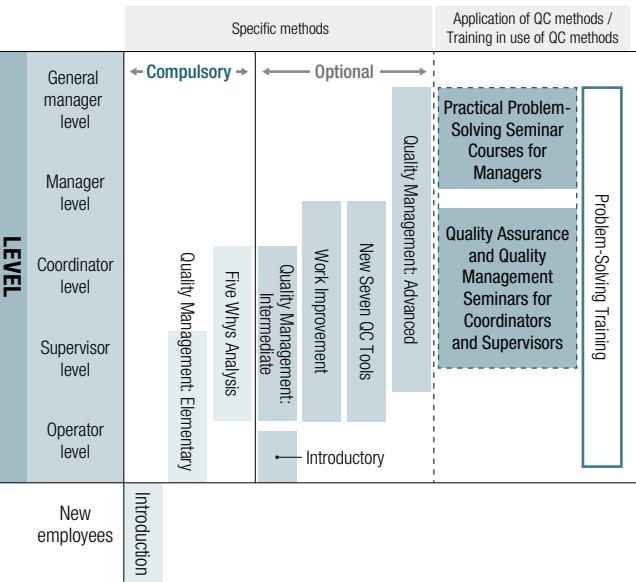
The Group undertakes human resource development to make all employees aware of the need to focus on customers and to encourage employees' active participation in continual improvement activities.

We believe that quality is the responsibility of all employees, not only in departments that contribute directly to profitability, but in back-office departments as well. We therefore have a dedicated department that provides quality control education based on original training manuals throughout the year for all employees, from new hires to senior management.

Features of Quality Control Education

- An education system enabling training programs to be selected according to employees' work roles
- Content specially designed to enable use of the quality control methods in actual workplaces
- Employees learn how to determine the true causes of quality problems by logical thinking and take the lead in solving them

Quality Control Education System



Sharing of Quality-Related Information across Operating Sites

Recognizing the high importance of internal communication in implementing the quality management system, we provide opportunities for information sharing among different employee levels and divisions. Information sharing among divisions takes place in twice-yearly quality assurance managers' meetings, bringing together the people in charge of quality at each operating site. At these meetings, quality assurance managers report on quality-related losses and complaints that have occurred, and describe quality improvement efforts at their sites, enabling this information to be shared throughout the Group.



Quality assurance managers' meeting

Assuring Product Quality and Safety

Quality Management of Electronic Materials Products to Ensure High Quality and Reliability



Awards Received from Our Customers

Each year, we receive awards from customers in recognition of our stable supply of high-quality products, promotion of business continuity planning, and other efforts. In fiscal 2017, we received the following four awards.

From Samsung Electronics, South Korea:	Best Contribution Award
From ON Semiconductor, USA:	Platinum Perfect Quality Award
From STMicroelectronics, Switzerland:	Best Supplier Award 2016
From Global Foundries Fab, Germany:	Appreciation Award



Receiving the Best Contribution Award

VOICE▶ Becoming a Trusted Quality Control Department



Kazuaki Yoshioka
General Manager,
Quality Control Department,
Technology Group
JX Nippon Mining &
Metals Corporation

At a time of heightening awareness of quality control among corporations, the Quality Control Department was formed in the Technology Group with the aim of enhancing the Group's organizational structure for quality management. The role of the new department is to collaborate and cooperate with related parties in promoting initiatives for solving important quality issues common to the entire Group. To assure customers of quality, we need to ensure that customer demands are being met at each operating site. The Quality Control Department therefore periodically monitors, analyzes, and evaluates the situation at each site, formulating and implementing improvement policies as necessary. To this end, I believe it is important to confirm whether the quality management system at a site is being implemented effectively by actually observing operations and checking records. Whenever possible, I plan for us to visit each site for frank and open talks with local managers and workers on their vision of ideal quality control, aiming to earn trust as a Quality Control Department.

Developing Human Resources

It is essential for the JX Nippon Mining & Metals Group to develop and utilize the employees involved in day-to-day operations if it is to maximize its corporate value. By creating personnel systems that value the diversity of employees working in Japan and abroad, and by enhancing education programs, we are providing a foundation enabling employees to make the most of their abilities.



Strengthening Initiatives for Developing the Next Generation

The JX Nippon Mining & Metals Group believes it is essential to develop human resources who can ensure the future stable acquisition and supply of indispensable nonferrous metal resources and materials. We have therefore begun directing strong efforts at engaging the young, of high school age and below, who will be responsible for carrying on with this mission. A few examples of these efforts are introduced here.

Summer STEM Challenge 2017

During the summer break, the Isohara Works, the Hitachi Works, the Kurami Works, and Pan Pacific Copper's Saganoseki Smelter & Refinery and Hibi Smelter held plant tours and experimentation sessions for junior high school students. Engineers active in these factories gave enjoyable presentations to the students about the fascination of copper, a metal without which today's society would not exist, and about the appeal of science and technology-related occupations.



Hitachi Works (measuring pH of solutions)



Isohara Works (instant freezing of flowers using liquid nitrogen)



Note: These events are part of the STEM Challenge, a Japanese Cabinet Office program to help female junior high and high school students imagine what it would be like to work in science and technology as they choose their career paths. The Group encourages participation by both male and female students.

Nikkei Education Challenge

Sponsor: Nikkei Inc.

The Company participated in this event, in which businesspeople from various industries provided real-world lessons for high school students so that they could learn about the current state of Japan's economy and technology, and experience the dynamism of society. The Company was represented by an instructor from rolled copper foil marketing, who talked on the topic of rolled copper foil, describing the activities of B-to-B companies and the fascination of B-to-B marketing. He conveyed with enthusiasm how sharing the satisfaction of achieving goals with colleagues is the best part of his work.



Presentation in progress

Power of Innovation 2018

Sponsor: Educa & Quest Inc.

Power of Innovation is a three-day training camp-style project for students from junior high and high schools, and colleges of technology. This year's event took place from March 21 to 23, 2018, offering a chance for participants to devise solutions to actual problems in society with the cooperation of businesspeople. Participants heard talks on real society, took part in team workshops where they

tackled issues for society assigned as their "missions" by cosponsoring companies, and gave final presentations. The mission assigned by the Company was to solve social issues making use of the power of copper in any way they wished. It was a good opportunity to help the many participants better understand and think about the importance of copper as a nonferrous metal resource.



Lecture (introduction of mission)



Lecture (explaining the advantages of copper)

Phase 2 Initiatives of the Endowed Unit for Nonferrous Metal Resource Recovery Engineering (JX Metals Endowed Unit)

In Phase 2 of the JX Metals Endowed Unit, which began in January 2017, public relations efforts touting the appeal of the nonferrous metals field are being directed at the general public, especially young people of high school age and below. (See page 76 for details.)

Copper PR by JX Nippon Mining & Metals Mascot Character "Copper the Kappa"

Copper is a material essential to the convenient life we enjoy today. Yet it receives little attention, as it is generally covered or used inside devices and is therefore not directly visible. In an attempt to make copper more familiar to the younger generation, we conduct PR using the mascot character Copper the Kappa via pamphlets and a special website. The pamphlets are made available at the Nippon Mining Museum and at the Science Museum in Tokyo's Kitanomaru Park, as well as being distributed at various events. The website is designed to help young people learn about copper.

Website for young people: "Learn about Copper with Copper the Kappa"

<http://www.nmm.jx-group.co.jp/copper/> (in Japanese only)



Copper the Kappa



Pamphlet: "Easy Introduction to Copper"

Promoting Development of Human Resources

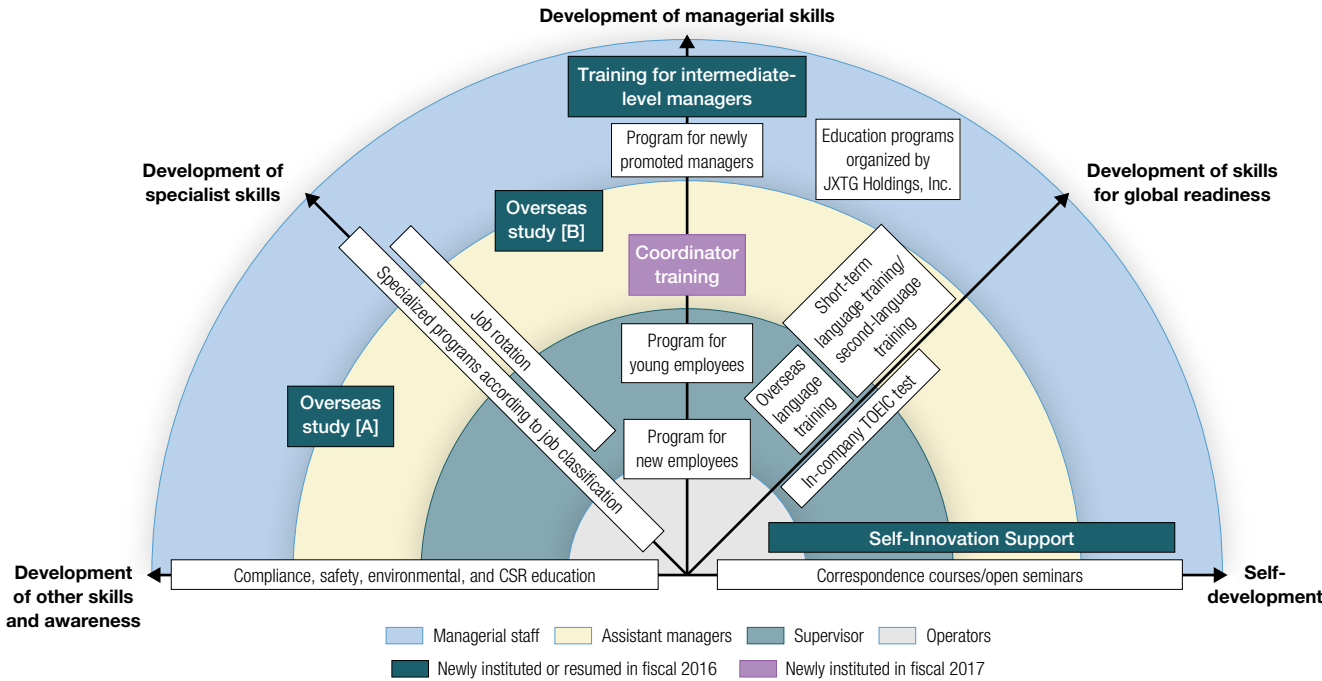
The Company takes a proactive approach to developing its employees, who are important stakeholders. We endeavor to provide a wide-ranging education to our personnel, offering a variety of educational programs that address five key areas of development: managerial skills, specialist skills, skills for global readiness, self-development, and other skills and awareness.

Strengthening the Education System to Support the Energizing of Individuals and Organizations

After examining the existing education system to identify areas that needed supplementing, in the 2016 and 2017 fiscal years we launched a new system and new training programs, aimed at transforming the mind-set and improving the skills of employees as the business climate continues to undergo constant change. These include (1) boosting managerial skills by providing new training for intermediate-level managers (targeting the general

manager class); (2) adding new coordinator training to expand opportunities for boosting managerial skills; (3) facilitating overseas study to boost specialist skills and managerial skills (either to earn a master's or doctoral degree at an overseas graduate school [A], or to obtain an MBA [B]); and (4) launching Self-Innovation Support, a new scheme for the Company to assist with self-development.

Our Education System



Training Programs Implemented in Fiscal 2017

	Managerial staff			General employees			All staff and employees		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Total hours of programs (annual)	6,975	52	7,027	64,653	8,069	72,722	71,629	8,120	79,749
Per employee	13	13	13	33	32	33	29	31	29

Survey scope: Employees of the Company and employees being seconded from the Company to JX Nippon Environmental Services and Pan Pacific Copper (Saganoseki Smelter & Refinery, Hitachi Refinery)

Examples of Education Programs Implemented in Fiscal 2017
(Training for Young Employees Who Completed University or Graduate School)

Program for new employees	1 Understanding the Company's organization, current business conditions, and management issues. 2 Acquiring basic skills requisite to a businessperson, including business manners and financial accounting. 3 Fostering a sense of cooperation and camaraderie among employees who entered the Company at the same time.
First-year follow-up program	1 Looking back at personal progress since entering the Company and confirming one's current situation and expected role. 2 Determining issues with one's own way of working (using the goal-plan-do-check-act cycle) and defining future challenges to growth. 3 Comprehending one's own thinking style, and understanding and using stress to cultivate strength in adversity, making it possible to rise to a challenge even in difficult circumstances.
Third-year program	1 Deepening understanding of the current business conditions and management issues of the Company. 2 Acquiring leadership and mentoring skills necessary in the workplace. 3 Acquiring communication skills necessary to gain the cooperation of coworkers while performing one's work (logical thinking and presentation skills). 4 Understanding role expectations and enhancing motivation.
Fourth-year program (Corporate DNA training)	1 Deepening understanding of the Company's social responsibility in relation to operational management, and of its CSR initiatives through activities including a study tour of the Toyoha Mine, a closed mine that represents one example of such initiatives. 2 Deepening understanding of the Company's corporate philosophy (its management approach), and at the same time encouraging trainees to feel committed as employees of the Company by considering how their own work and the work of their business relates to the corporate philosophy.
Fifth-year program	1 Deepening understanding of the current conditions and issues facing the Company. 2 Developing a vision for one's own career to shed new light on one's approach to work. 3 Cultivating problem-solving skills by learning the problem-solving process and taking action to deal with issues in one's own work. 4 Using the program to identify current deficiencies in one's skills or approach, and acknowledging those deficiencies to facilitate future personal growth.



Visit to the Toyoha Mine as part of the fourth-year program (Corporate DNA training)



Program for new employees (team-building)

Enhancing Education Programs for Global Readiness

The Company has prepared various educational programs for global readiness aimed at developing human resources who can advance its global operations and making the Company more globally minded.

Overview of the Educational Programs for Global Readiness at JX Nippon Mining & Metals

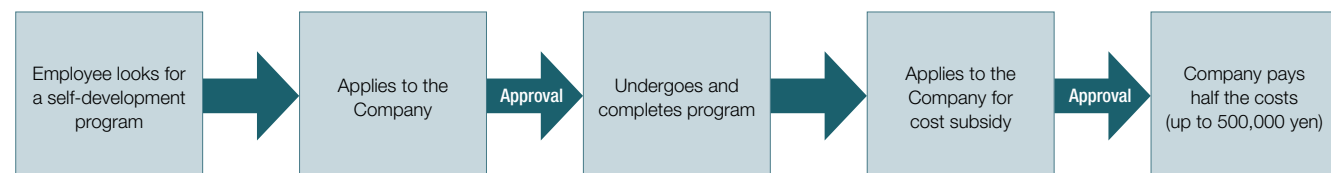
Program	Target employee group	Details
First-year language training	Those interested among graduates of university or graduate school in their first year with the Company	About five months of study through language correspondence courses matched to foreign-language level (TOEIC score) for self-development purposes. A language other than English may be chosen as needed.
Second-year overseas training	All graduates of university or graduate school in their second year with the Company	Eight weeks of study at overseas language schools, etc., matched to foreign-language level (TOEIC score): university-level classes in Europe or the U.S., or training in Chinese, Korean, or Spanish at overseas language schools.
Short-term study-abroad language program	Persons requiring a certain level of language competence for their work	Four to 12 weeks of study in English, Chinese, Korean, or Spanish at overseas language schools, etc.
Second-language training	Persons requiring a certain level of language competence for their work	Language training outside work hours for persons desiring to study Chinese, Korean, Spanish, or another language for self-development who have received approval from their manager (two-hour weekly classes, tuition paid by the Company).
In-company TOEIC testing	Those interested (mandatory for graduates of university or graduate school up to their 10th year of employment)	TOEIC tests administered annually.
Study abroad (resumed in fiscal 2017)	Those recommended by supervisors for each job category and selected by the Council for Utilization of Human Resources	Study at a university or graduate school—in principle, outside Japan—for enhancing work-related knowledge, learning technology and skills, and fostering insight. The courses are divided broadly into the following two types. A courses: Aim for a master's or doctoral degree to strengthen expertise B courses: Aim for an MBA degree to strengthen managerial skills

Promoting Development of Human Resources

Self-Innovation Support

To address the desire of employees for further self-growth, the Company reviewed its existing self-development system and established the Self-Innovation Support scheme, which offers broad latitude in terms of costs and program content.

Application Process for Self-Innovation Support



Under this scheme, employees themselves apply for their preferred external self-development program, and take it with Company approval. When the program has been completed, the Company subsidizes half the costs, up to a limit of 500,000 yen per program. Unlike the prior self-development support system, this one offers broad latitude, so that employees will make effective use of the private time created by improving their work-life balance. Previously, employees chose from programs readied by the Company in

advance. Under this new scheme, so long as certain conditions are met, such as the relevance of the program to company operations and taking the program outside working hours, employees can choose from a broad range of programs including language study, qualifications, degrees, or development of various skills. In this way, the scheme is able to meet the desire of employees for self-development more effectively than before.

Applications made		Examples of programs applied for
1st round (Oct.–Dec. 2016)	14	English conversation, U.S. certified public accountant, patent attorney, small and medium-sized enterprise management consultant, university leadership program, courses at business school
2nd round (Mar.–May 2017)	8	
3rd round (Sep.–Nov. 2017)	9	

VOICE Comments by an Employee Who Received Self-Innovation Support



Ryota Kishimoto
Engineer,
2nd Production Section,
Production Department,
Kurami Works,
JX Nippon Mining &
Metals Corporation

At the Kurami Works, where I am assigned, we have constantly been working at full capacity in recent years because of the many orders for rolled copper products and other products used as materials in smartphones. What is more, the products we manufacture have changed greatly since around 2011, when I joined the company. These rapid changes in my environment made me acutely aware of the risk that I myself might lose sight of what I really needed to do because I was looking at the work in front of me from the narrow standpoint of my own workplace alone. That is why I decided to study at the BBT (Business Breakthrough) University to systematically learn about basic business administration, something I had not yet experienced in my career in science and technology.

BBT University is an online school, where classes and discussions with classmates all take place online. There is also a smartphone app that lets you take classes and carry on discussions from your phone. This means you can proceed with the studies at your own pace, wherever or whenever you like, which suits me perfectly.

Classes at the university are not limited to business administration, but cover a wide range including accounting, organizational theory, and liberal arts. Among these are RTOCS (Real Time Online Case Study) classes, where every week we consider what we would do about specific issues if we were the president of an existing company. Thanks to these classes, I am now able to think about my work from the higher perspective of what I would do as a manager or general manager, rather than from my current position, broadening the scope of my thinking as I engage in my work.

Next, I plan to work on my thesis in preparation for my graduation. After graduation, I would also like to study the next technology trends such as AI and machine learning. In the longer term, since the environment is likely to change even further, I am thinking about studying business administration again to acquire an MBA.

TOPICS 2 Overseas Study Programs

Each year, the Company sends a few assistant manager-level engineering staff to overseas graduate schools to enhance their expertise. We also send a few assistant manager-level or manager-level engineering staff and administrative staff to overseas graduate schools to obtain an MBA, aiming to strengthen their managerial

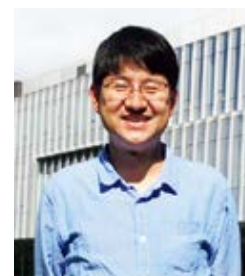
skills. With the business environment expected to change, we plan on continuing to send employees abroad for such training, in the hope that this will further deepen the engineering expertise or managerial skills of those responsible for management of the Company in the next generation.

Fiscal year sent	Course	Destination
FY2017	Enhancing Engineering Expertise ^{*1}	Colorado School of Mines
		University of British Columbia
	Strengthening Managerial Skills (MBA) ^{*2}	University of Southern California
FY2018	Enhancing Engineering Expertise ^{*1}	University of Washington
		Carnegie Mellon University
	Strengthening Managerial Skills (MBA) ^{*2}	University of Washington

*1 Enhancing Engineering Expertise course
Earning a degree (master's or doctorate) at an overseas
graduate school (sent for two years in principle)
Eligibility: Assistant managers

2. Strengthening Managerial Skills (MBA) course
Earning an MBA degree at an overseas graduate school
(sent for one year in principle)
Eligibility: Junior managers, assistant managers

VOICE Comments by a Participant in Overseas Study



Kenji Koike
JX Nippon Mining &
Metals Corporation

Currently studying at Colorado School of Mines (joined the Company in fiscal 2004, sent abroad in fiscal 2017)

At the graduate school in the U.S. I am now attending, I am in the Metallurgical and Materials Engineering Program, learning about methods for metal material processing and strengthening. I plan to write a graduate thesis on the topic of developing stronger copper alloys, and am now spending my days conducting related experiments and writing papers.

Before I came abroad to study, my job at the Kurami Works included improving the copper alloy production processes, developing new copper alloys, and dealing with customers. Then I transferred to the Market Development Department in the Functional Materials Division of the Electronic Materials Group at Head Office, making use of my experience at the Kurami Works to expand sales of copper alloys from an engineering standpoint. Maintaining close communication with domestic and overseas customers and with our manufacturing people, I sought to determine the technical issues faced by customers and made various proposals, helping to resolve the issues. In the course of those efforts, I was keenly aware that customers' demands in terms of copper alloy performance were becoming more advanced and complex, and that they required a faster pace of development. I was therefore extremely grateful for the opportunity afforded me by this overseas study program: it inspired me to want to improve my problem-solving ability and advance my skills as an engineer through deeper and more systematic study of materials engineering and become an engineer who can play a role on the global stage.

My overseas study period is two years, of which the first year comprises mainly coursework. Classes start at 8:00 a.m. each weekday morning. In between classes, there is preparation and review, homework, and studying for tests. In preparation for writing my graduate thesis, I am also busy drawing up a research plan, reading related academic papers, and readying test samples, as I devote all my time to improving my capabilities.

When I graduate and return to the Company, I want to make the most of the systematic knowledge of materials engineering I acquired in the program, as well as my cross-cultural communication abilities, to work with customers in Japan and overseas on timely development of innovative new products.

Providing a Rewarding Work Experience

The JX Nippon Mining & Metals Group endeavors to provide a workplace where employees are able to make the most of their abilities—a workplace full of the vitality that comes from maintaining physical and mental health, which we recognize as a strong advantage for ensuring the Company's sustainable growth.

Along with implementing appropriate personnel evaluation systems, we seek to improve these systems so as to allow diverse human resources to choose a variety of work styles.

Initiatives for Providing a Rewarding Work Experience

Personnel Systems

The Company has designed personnel evaluation systems consisting mainly of Competency Evaluation, Performance Evaluation, and Self-Statement systems.

Creating Appropriate Personnel Evaluation Systems

The Company has introduced a Competency Evaluation System based on competency models and a Performance Evaluation System centered on management of missions and goals.

In Competency Evaluation, employees are interviewed by their supervisors based on competency items determined by the nature of their work and job grade. The resulting assessment of whether they have the necessary competency is used in deciding promotions.

For Performance Evaluation, employees meet with their supervisors to discuss the extent to which they attained missions and goals agreed on with the supervisor at the beginning of the fiscal year, and the degree of challenge presented by the goals. Their performance is then evaluated, and the results of these evaluations are reflected in employee bonuses. The competency model and performance evaluation items for managerial staff have been

restructured so that 50% of the items evaluated relate to personnel management.

By implementing these personnel evaluation systems properly, we seek to improve fairness in the treatment of employees and in the development of their abilities.

Self-Statement System

A Self-Statement System was introduced to help the Company understand the aspirations of individual employees and reflect them in personnel development and elsewhere. Under this system, employees submit this statement on the specified form once a year, looking back on their work and indicating their ambitions, as well as other matters of relevance, such as any reason why they cannot accept job transfers that would involve moving residence and how long that will remain the case.

Initiatives Promoting Diversity

The Group values diversity in both human resources and work style. In compliance with relevant laws and regulations in Japan and overseas, the Group is pursuing initiatives including the continued employment of workers aged 60 and older, hiring of persons with disabilities, and promotion of active participation in the workplace by women. By creating programs enabling childcare and family care leave, and time off for international volunteering, we provide an environment that supports various work styles.

Compliance with the Act on Promotion of Women's Participation

Targets

- 1 Steadily increase the number of female employees, and ensure that at least 30% of newly hired university graduates are women, to cultivate female managers early on.
- 2 Improve working environments to create workplaces in which all employees including women can do fulfilling work.

In accordance with Japan's Act on Promotion of Women's Participation and Advancement in the Workplace, JX Nippon Mining & Metals drew up a plan for the five-year period to fiscal 2020, to develop environments in which even more female employees can take on significant roles and to provide all employees with the motivation to perform to the best of their abilities.

Specific Initiatives

- (1) We are seeking to increase the number of women applying for employment at the Company by making use of the corporate website and other means to actively offer information about work opportunities for women. In addition, by offering workplace tours and similar opportunities for female students, we are seeking to secure personnel to work in technical positions, where the rate of female participation is particularly low. In this way, the Company is helping to nurture female specialists in science and technology, whose numbers are currently insufficient throughout Japan. In fiscal 2017, women made up 28% of newly hired university graduates in the Company.

- (2) We have introduced new and revised systems aimed at creating workplace environments in which a diverse range of personnel can do fulfilling work, so that all employees including women have the opportunity to perform to the best of their abilities. These include a new system for returning to work following life-event leave, revision of childcare and family care leave systems, and introduction of telecommuting.

Workplaces Where Women Play Significant Roles

As of March 31, 2018, a total of 1,168 female employees were working in the Group worldwide. Of these, approximately 29% occupy managerial positions (supervisor class and above). JX Nippon Mining & Metals employs 259 female employees (including part-time employees), of whom approximately 25% are in managerial roles. There are no gender differences in base pay.



Initiatives for Providing a Rewarding Work Experience

VOICE Comments by an Employee Who Took Childcare Leave



Koichi Ode
Facilities Maintenance
Section, Facilities
Engineering Department
Kurami Works
JX Nippon Mining &
Metals Corporation

Taking eight months of childcare leave with the understanding of colleagues

As my parents were busy caring for their own parents, I was in a situation where I could not obtain adequate help with childcare from them. I also felt it was important to spend time with our child in the initial period after birth. So I obtained eight months of childcare leave. Every day went by quickly during the leave period, filled with bottle-feeding, diaper-changing, bathing duties, reading picture books, and caring for our child in other ways, as well as doing housework. It took a while to get over the initial nervousness in dealing with an infant, but after about six months I became used to the life of caring for a child, and my wife was also able to relax a bit both physically and mentally. Based on this experience, for people like me who cannot obtain support from their family, I recommend taking at least six months of childcare leave. When you spend time looking after your child, there are many things that don't go as planned. I believe the experience helps you develop patience and endurance, while learning how to multitask, all of which come in handy at work as well.

When obtaining childcare leave, I consulted with my supervisor at an early stage. To ensure that my work would continue to be carried out smoothly after I went, I drew up a list of points to explain about the facilities I was in charge of maintaining and passed this on to the person substituting for me. Having obtained the understanding and cooperation of my colleagues, I was able to embark on childcare leave free of worries. I am truly grateful for this.

Data Relating to Diversity (JX Nippon Mining & Metals)☑

Use of childcare leave program in fiscal 2017

	No. of employees using program in fiscal 2017	No. of employees eligible to use program*	Usage rate (%)
Male	5	92	5
Female	5	5	100
Total	10	97	10

* Male: Employees with a child born within the fiscal year
Female: Employees whose post-childbirth time off ended during the fiscal year and who can take childcare leave

Rate of return from childcare leave (Percentage of employees who took leave and then returned to their jobs)

	No. of employees returning to work in fiscal 2017	No. of employees planning to return	Return rate (%)
Male	7	7	100
Female	9	9	100
Total	16	16	100

Maintaining Good Labor-Management Relations

Labor unions have been formed at nearly all Group companies in Japan.

At each Group company, good relations built on mutual trust are maintained between management and employees. At regular meetings between representatives of management and the labor union, management discloses details of the company's business; while at the Health and Safety Committee meetings, causes of accidents and incidents are analyzed thoroughly. In such ways, labor unions play an important role as partners with management, including by conveying information and gathering views within the

Membership in labor unions (as of March 31, 2018)☑

	Male	Female	Total	Age 29 or younger	Age 30 to 49	Age 50 or older	Total
No. of union members	4,974	584	5,558	1,171	3,544	843	5,558
Membership rate	62%	50%	60%	71%	64%	40%	60%

Retention rate after return from childcare leave (Percentage of those still employed 12 months after return from leave)

	No. of employees returning to work in fiscal 2016	No. of employees still employed 12 months later	Retention rate (%)
Male	1	1	100
Female	2	1	50
Total	3	2	66

Status of rehiring efforts in fiscal 2017

No. of age-limit retirees	No. of reemployed	Reemployment rate (%)
12	9	75

Persons with disabilities as a percentage of the workforce in fiscal 2017

Percentage of employees with disabilities
2.08% (the legal requirement is 2.0%)

organization. Recognizing health and safety as a particularly important theme to be confirmed between management and labor, 90% of Group companies with labor unions include matters relating to health and safety in their labor agreements.

When changes are made in the company organization or business activities, adequate time is given to preliminary explanations and discussions before conducting the necessary procedures, in accordance with the labor agreement.

In fiscal 2017, there were no strikes or lockouts in the Group.

TOPICS③ Initiatives for Energizing Individuals and Organizations

Enhancing Childcare and Family Care Systems

At JX Nippon Mining & Metals, we are working to energize individuals and organizations, with the aim of strengthening business while adapting to changes in the business climate and making major strides toward the future. Since fiscal 2016, we have revised various personnel systems and taken measures to change awareness, from the two standpoints of strengthening personnel management and development, and creating environments in which a diverse range of personnel can do fulfilling work. We will continue

monitoring and studying these systems, making further changes as necessary, and rolling them out flexibly.

One aspect of initiatives for creating environments in which a diverse range of personnel can do fulfilling work is making the working environment one where even employees with commitments such as childcare or family care can make the most of their abilities. To this end, we introduced new or revised systems as described here.

Overview of Childcare and Family Care Systems

	Pregnancy/childbirth	Childcare/parenting	Family care
Work style support	Pre- and post-childbirth time off	Time off to care for an ill child	Family care time off
	Special measures for mothers during pregnancy and within one year after childbirth	Childcare leave (length can be shortened, ^{REV} and leave period can be changed more than once)	Family care leave
	Maternity time off	Exemption from overtime work exceeding limit	
		Exemption from late-night work	
		Shorter workday (expanded applicability, enabled use along with flextime) ^{REV}	
		Flextime (revised core time, enabled use along with shorter workday) ^{REV}	
		Exemption from overtime work	
		Childcare time	
		Cumulative annual paid time off (added "childcare" to conditions for use) ^{REV}	
		Telecommuting ^{NEW}	
Financial support, etc.	Onetime maternity/childcare benefit, additional onetime maternity/childcare benefit (health insurance)	Childcare/family care subsidies ^{NEW}	
	Maternity allowance, additional maternity allowance (health insurance)	Return-to-work grant ^{NEW}	Family care leave allowance ^{NEW}
	Exemption from paying social insurance premiums (health insurance and employees' pension) during pre- and post-childbirth leave, childcare leave, etc.	Childcare leave benefit (employment insurance)	Family care leave benefit (employment insurance)
		Childcare concierge service ^{NEW}	
		Support for babysitter use ^{NEW}	
		Return-to-work system ^{NEW}	

■ Support from social insurance and employment insurance ■ New or revised in fiscal 2017 ■ New or revised in fiscal 2016

Note: Telecommuting is also available for reasons other than childcare or family care.

VOICE Comments by an Employee Using the Childcare Support Programs



Kenta Abe
Accounting & Finance
Department
JX Nippon Mining &
Metals Corporation

Since the time my daughter entered kindergarten, I have been enthusiastic about using the Company's childcare support programs.

In our household, both of us work, so when regular kindergarten hours are over, our daughter stays in the daycare service offered by the kindergarten, and during summer or other times when the kindergarten is closed, she stays in a privately run temporary daycare center. Every month, we make use of the childcare subsidies program to cover part of the cost of these daycare services. This is especially helpful for the temporary daycare service, which is quite a burden because it costs more than regular daycare. Thanks to such subsidies offered by the Company, a couple like us have the additional option, besides daycare, of sending our child to kindergarten.

To find a daycare center offering temporary daycare, we took advantage of the childcare concierge service. After contacting the service and exchanging information by email, we received suggestions for a number of daycare centers that met our wishes. Although we did the follow-up inquiries and applications ourselves, our burden as a working couple with little free time between us was eased considerably by having the search for a daycare center with temporary daycare performed on our behalf. We are now using temporary daycare at one of the daycare centers first suggested to us by the childcare concierge.

As time passes and our daughter grows older, there will no doubt be various new concerns and uncertainties, but by making effective use of the childcare support programs offered by the Company, we as a couple hope to continue balancing our parenting responsibilities with our work.

TOPICS Initiatives for Energizing Individuals and Organizations

VOICE Comments from Poppins Corporation, a Provider of Nursery and Early Child Education Services



Yuran Sato
Assistant Manager
(JX Nippon Mining & Metals
Account Representative)
Nursery Service Department
Poppins Corporation

JX Nippon Mining & Metals has had a corporate contract with us since the last fiscal year, enabling its employees to make use of our nanny (educational babysitter) services at low rates. I am happy that our nannies are able to help the Company's employees balance the needs of work and parenting when, for example, they are going to be late picking up their child at the daycare service, or the child comes down with a sudden fever. In addition to handling these unexpected situations, our nannies at times act as home tutors or fix meals for the children.

We also provide the childcare concierge service, for help in finding a daycare center or for consultations on childcare in general. The key to getting into a daycare center is, above all, being quick to act and gathering plenty of information. Since it is hard to search for a daycare center while busy with work and parental responsibilities, our childcare concierge provides services personalized to each individual, making suggestions and taking care of scheduling. We also offer consultations on various concerns about childcare after returning to the workplace, such as crying at night, the "terrible twos," entrance exams, kindergarten, and after-school care. I hope that all employees, whether male or female, will feel free to make use of this service.

Lately, the number of working women is on the increase, and thanks in part to the Act on Promotion of Women's Participation, the number of companies offering support for work-life balance is gradually increasing as well. Balancing work and parenting is not only an issue for women, but also an issue of great relevance to males as their partners, and to their wider families. We at Poppins are ready to do all we can to further support the needs of the Company's employees, with services closely attuned to their concerns.

Introduction of Telecommuting

In January 2018, we began offering the option of telecommuting, as an initiative for creating environments in which a diverse range of personnel can do fulfilling work.

By making use of this program, employees can cut their commuting time and reduce the physical burden of commuting, while acquiring more time for childcare or family care, for themselves, or to spend with their families. The program is also expected to raise productivity by, for example, enabling telecommuters to concentrate undisturbed on such tasks as creating documents, and by standardizing tasks in the workplace and promoting paperless office work.

In addition, telecommuting demands the ability to pre-plan work and exercise self-management more effectively than ever before. In administering this program, both telecommuters and their

colleagues in each workplace are required to understand the importance of making sufficient advance arrangements with colleagues, and of ensuring proper communication through contact and reporting during the use of the program.

Program Overview

Eligibility	Employees and others with at least one year of service, who have obtained the approval of their supervisor
Hours	Employees can work from home for up to two days a week, with the same starting and ending times as for regular work at the workplace
Telecommuting method	Remote operation of the employee's workplace PC from a home PC

VOICE Comments from a User of the Telecommuting Program



Mitsuhiro Okubo
Senior Engineer
Intellectual Property
Department,
Technology Group
JX Nippon Mining &
Metals Corporation

As we have a child in elementary school and both my wife and I work, our child normally goes to a private after-school care service when regular school hours are over. Unlike a daycare service, however, after-school care service hours are short, especially during summer or other long breaks, even though children in the lower grades cannot be left alone at home.

Just when we were fretting about what to do during these long breaks, the telecommuting program started up. Thinking I would be able to work without leaving our child alone at home, I obtained the understanding of my workplace supervisor and colleagues, and began using the telecommuting program.

While I was initially concerned about whether I could get work done at home, when I actually tried it out, remotely operating my office PC, I was surprised at how smoothly things went. My concentration also improved, and I felt I was making progress in my work. Moreover, by eliminating the two-hour round-trip commute, I had time to take our younger child to and from daycare, spending time with our children that I would not otherwise be able to, and easing my wife's burden as well.

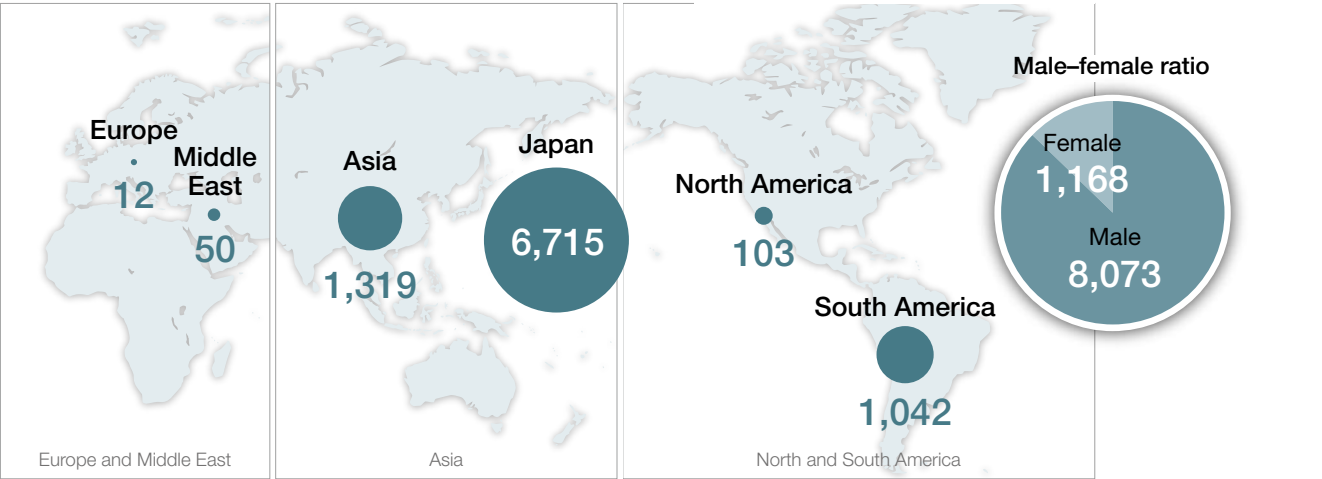
With the current telecommuting program, you have to get your supervisor's approval ahead of time. Personally, I feel it would be even more useful if we could use it for special emergencies, such as when your child's class is called off due to the flu (even though your own child does not have it).

Employees Active in Japan and Overseas

Survey scope: Companies in which JX Nippon Mining & Metals has 50% or greater voting rights directly or indirectly
Counting of seconded employees: Includes employees being seconded to and from the companies subject to this survey

1. No. of employees

No. of employees (by region; as of March 31, 2018)



No. of employees (by employment status and employment contract type; as of March 31, 2018)

	Open-ended contract	Full-time Fixed-term contract	Subtotal	Open-ended contract	Part-time Fixed-term contract	Subtotal	Total	Temporary staff	Total workforce
Male	7,271	705	7,976	51	46	97	8,073	161	8,234
Female	987	138	1,125	4	39	43	1,168	111	1,279
Total	8,258	843	9,101	55	85	140	9,241	272	9,513

	Open-ended contract	Full-time Fixed-term contract	Subtotal	Open-ended contract	Part-time Fixed-term contract	Subtotal	Total
Japan	6,012	566	6,578	54	83	137	6,715
North America	101	2	103	0	0	0	103
South America	896	144	1,040	0	2	2	1,042
Asia	1,188	131	1,319	0	0	0	1,319
Europe	11	0	11	1	0	1	12
Middle East	50	0	50	0	0	0	50
Total	8,258	843	9,101	55	85	140	9,241

No. of employees (by region; as of March 31, 2018)

	Japan	North America	South America	Asia	Europe	Middle East	Total
Male	6,034	81	955	947	6	50	8,073
Female	681	22	87	372	6	0	1,168
Subtotal	6,715	103	1,042	1,319	12	50	9,241
Temporary staff	254	8	0	10	0	0	272
Total workforce	6,969	111	1,042	1,329	12	50	9,513

2. No. of newly hired employees (April 1, 2017 to March 31, 2018)

	Male	Female	Total	Age 29 or younger	Age 30 to 49	Age 50 or older	Total	Japan	North America	South America	Asia	Europe	Middle East	Total
New hires	949	129	1,078	370	575	133	1,078	434	17	450	177	0	0	1,078
Percentage of total number employed as of March 31, 2018	12%	11%	12%	23%	10%	6%	12%	6%	17%	43%	13%	0%	0%	12%

3. No. of employees ending employment (April 1, 2017 to March 31, 2018)

	Male	Female	Total	Age 29 or younger	Age 30 to 49	Age 50 or older	Total	Japan	North America	South America	Asia	Europe	Middle East	Total
Departing employees	546	79	625	194	259	172	625	257	10	113	174	0	71	625
Percentage of total number employed as of March 31, 2018	7%	7%	7%	12%	5%	8%	7%	4%	10%	11%	13%	0%	142%	7%

Promoting Community Involvement and Development

Since the inception of the business at the Hitachi Mine, the JX Nippon Mining & Metals Group has emphasized the spirit of maintaining good relations with local communities in performing its business operations. Keeping alive that spirit today, Group companies actively carry out social contribution activities in accordance with the Code of Conduct, seeking coexistence and coprosperity with society as good corporate citizens. Through corporate citizenship activities rooted in the local community and effective communication with local residents at each of our operating sites in Japan and overseas, we endeavor to forge relationships of trust with the societies in which we conduct our business.

Social Contribution Activities

For fiscal 2017, the Group adopted a corporate citizenship policy of carrying out social contribution activities geared to the nature of the Group's businesses, undertaking social contribution activities and interchanges rooted in the local community at each of our operating sites in Japan and overseas. These activities are planned and assessed by the Citizenship Committee, an organization under the CSR Committee, in meetings every six months.

Social Contribution Activities in Japan

All the Group operating sites in Japan actively engage in social contribution activities in their respective communities.

Cleanup Campaigns



JX Nippon Tsuruga Recycle

Participating in Cleanup in the Company Vicinity and in Local Volunteer Activities

In support of the Operation Cleanup Fukui initiative promoted throughout Fukui Prefecture, the company engages in cleanup activities in the area around the company premises.

It also plays an active role in local volunteer activities, such as the cleanup campaign at the Kehi no Matsubara beach, a nationally designated place of scenic beauty (June: beach cleaning, November: clearing fallen leaves in the pine grove); cleanups at Mikata Goko lakes (twice during the year); and waterway management at the Nakaikemi Wetlands (once during the year).



Kehi no Matsubara Cleanup Campaign



Operation Cleanup Fukui (cleaning Fukagawa river, which crosses company premises)



Cleanup activities at Mikata Goko lakes

Isohara Works

Improving the Appearance of the Environment around the Plant

The Isohara Works organizes after-hours cleanup sessions around the plant as part of its regular activities to improve the appearance of the local environment. A total of 250 persons from each of the departments participated during fiscal 2017, conducting cleanup activities along nearby sidewalks and around the Kitaibaraki civic baseball field, among other places.



Kurami Works

Participation in Sagami River Cleanup Campaign

The town of Samukawa (in Kouza-gun, Kanagawa Prefecture) organized a Sagami River Cleanup Campaign aimed at furthering understanding of community contributions and environmental issues. The Kurami Works provided 104 participants, including employees and their family members, helping to promote communication between the company and the local community.



Educational Activities and Plant Tours



Hitachi Works

Exhibit at the 2017 Kogakusai Festival in Hitachi Campus

At this event, held on the Hitachi Campus of the College of Engineering of Ibaraki University, the HMC Department of the Hitachi Works presented a booth display on the recycling and environmental services business. Along with the exhibits, a quiz called the "Doctor Copper Aptitude Test" was provided, enabling many visitors to have fun as they learned about recycling and copper.



JX Nippon Exploration and Development

Cooperation with Outside Institution for Learning and Training

In July 2017, the company cooperated in offering the Fiscal 2017 Training Course on Mining Development sponsored by the International Institute for Mining Technology. Held for the 10th time, this course seeks to foster and improve capabilities for comprehensively promoting mineral resources development. Undergoing the training this time were 27 young employees of nonferrous metals companies and trading companies. The company was responsible for teaching about the role of boring in metal resource exploration. The classroom session was followed up by a visit to the company's Odate site to see actual boring equipment.



Fiscal 2017 Training Course on Mining Development

Then in September, the company cooperated in practical training at the Odate site of 25 students from the Faculty of International Resource Sciences of Akita University. The site general manager explained the company's business, the workings of a boring machine, and how rock core samples are mined using the wireline method, among other topics, while giving the participants hands-on experience at the facility.

JX Nippon Mikkaichi Recycle

Cooperation in Student Training at a Smelting and Refining Site

In October 2017, the company cooperated in this training session as an event sponsored by the Kansai Branch of the Mining and Materials Processing Institute of Japan. A group of 36 persons, mainly professors and students from Kyoto University, visited the company, where they observed the processes for recycling automobile shredder dust in a gasification melting furnace. They also listened to presentations by young engineering staff on the company's involvement in recycling and environmental services.



Social Contribution Activities

Events

Hitachi Works, Kurami Works, Isohara Works, Saganoseki Smelter & Refinery of Pan Pacific Copper, and Toho Titanium

Summer Festivals

Each year the Group plans and puts on summer festivals, inviting families of employees as well as residents of surrounding communities.

The festivities are enlivened by refreshment stands run by employees, lotteries, and local children playing instruments and dancing. Some of the festivals include traditional arts and fireworks shows. For the local residents, these events have become a much-anticipated summer tradition.



Hitachi Works Sanjinsai festival (July)



Summer festival put on by Saganoseki Smelter & Refinery, Pan Pacific Copper (August)



Kurami Works Hazukisai festival (August)



Isohara Works summer festival (August)



Toho Titanium summer festival (August)

JX Nippon Tsuruga Recycle

Firefly Watching Event

Firefly watching is an annual event the company has been offering for more than a decade. In 2017, the scope of this activity was greatly expanded, with cosponsorship by the city of Mito in Ibaraki Prefecture, a sister city of Tsuruga in Fukui Prefecture, and new participation by Tsuruga Kehi Junior High School. In addition to the actual firefly viewing, the school's students gave presentations, a craft workshop was held, and the habitat distribution of fireflies in the Tsuruga area was explained, with large attendance at each of the events. At the firefly viewing, many fireflies could be seen, enabling local children to experience the wonder of the natural environment.



Commemorative photos with Tsuruga's official mascot character and Mito's firefly character

Sports Promotion

Hibi Smelter of Pan Pacific Copper

Baseball Classes at Kindergartens and Nursery Schools

Since fiscal 2015, the Hibi Smelter's baseball team has been holding baseball classes at local kindergartens and nursery schools as one of its volunteer activities. In fiscal 2017, having received requests from seven schools, more than in other years, the team hosted classes in which the participants experienced the fun of baseball through ball throwing practice and intramural games.



Kurami Works

Sponsorship of Youth Baseball Tournaments: the "JX Nippon Mining & Metals Cup"

In fiscal 2017, as a corporate citizenship activity and also to support the sound development of youth, the Kurami Works participated as sponsoring corporation in two baseball tournaments in the town of Samukawa, where the plant is located. Held in the spring by the schoolchildren's division of the Samukawa Baseball Association, the tournaments were dubbed the "JX Nippon Mining & Metals Cup."



A player making a pledge for fair play

Donations to Local Communities

The Group donates to local communities for many different causes, including reforestation around closed mines, academic assistance to universities and other research institutions, and funding for events put on by local organizations. The total donations of the Group in fiscal 2017 were ¥0.3 billion* (¥0.11 billion in Japan and ¥0.19 billion outside of Japan).

* The amount of donations by overseas Group companies is converted to yen using the exchange rates at the end of fiscal 2017.

Social Contribution Activities outside Japan

Activities at the Caserones Copper Mine

Introduced here are initiatives by SCM Minera Lumina Copper Chile (MLCC), operator of the Caserones Copper Mine in the Republic of Chile.

Assistance with Improving Crop Irrigation Techniques

MLCC took part in a project to help farmers in the Copiapó Valley improve their irrigation techniques for securing precious water resources, and provided funding assistance. This project, which began in 2013, has been a major success, helping to reduce water resource use by 10% while maintaining crop quality and not impacting yields.

Support for Acquiring Specialized Skills

In January 2018, MLCC provided on-site training aimed at developing industrial machinery maintenance technicians to 20 Los Loros High School students at the Caserones Copper Mine, and issued completion certificates to the trainees taking part. MLCC cooperates in this and other programs that will help young people living around the city of Tierra Amarilla find employment in large mines or agricultural companies locally.



Assistance to Surrounding Regions Suffering Damage from Torrential Rains and Heavy Snowfall

In May 2017, MLCC provided assistance in the form of drinking water, food, charcoal, blankets, and other items to residents in the area near the mine who suffered damage from heavy rain and snow. The company also provided container houses and a shared storage facility to five households in the Hornitos district who lost their homes to flooding of the Copiapó River.



Support for Temporary Citizen Registration Office in the Caserones Vicinity

MLCC worked with the citizen registration office in setting up a temporary local office to cooperate in distribution of identification cards to residents of the area around the Caserones Copper Mine. This initiative targeted residents of the Tierra Amarilla district and surrounding areas who face difficulty in traveling all the way to central Copiapó City for the registration procedure. Identification cards were created and distributed to more than 500 persons free of charge.



Provision of Artifacts for a New Exhibit Space in the Regional Museum of Atacama

In January 2018, MLCC donated 164 artifacts to the Regional Museum of Atacama. These artifacts had been unearthed in developing the Caserones Copper Mine. The items donated by MLCC make up around 20% of a newly built exhibit space, playing an important role in informing people about the history of the Atacama region.

Respect for the Life of Local Residents and Protection of their Human Rights

MLCC applies a basic three-point policy for supporting local communities: respect for life, respect for the community and environment, and respect for current law. In keeping with this policy, from the project launch in 2007, the company began holding explanatory meetings and engaging in dialog with the Collas, the indigenous people living in the area around the mine site, endeavoring to build up trust and protect their rights. There have been no cases since that time of violations of the rights of local residents.



Explanatory meeting for local residents

Other Activities

Company	Activities
JX Nippon Mining & Metals Philippines, Inc. (Philippines)	Participation in Biñan City's project to plant mangroves around the Laguna de Bay lake Participation in Project Angel Tree by the Department of Labor and Employment aimed at preventing child labor and providing materials needed for education, along with educational opportunities
JX Nippon Mining & Metals Korea Co., Ltd. (South Korea)	Support for volunteer activities conducted by a group of Samsung Electronics subcontractors, including providing kimchi to low-income households, and visiting orphanages and shelters
Nippon Mining & Metals (Suzhou) Co., Ltd. (China)	Donations to nearby elementary schools (supporting children in low-income families with living and education expenses)
Pan Pacific Copper Exploration Peru, S.A.C. Compania Minera Quechua S.A. (Peru)	Donations to areas affected by torrential rain and mudflows in Peru

Commitment to Our Suppliers

The Group is committed to fulfilling its corporate social responsibilities throughout the entire supply chain. Based on the JX Nippon Mining & Metals Group Basic Procurement Policy, we strive to build relationships of cooperation and trust with suppliers by conducting transparent and fair transactions with them.

Partnering with Suppliers

Based on the JXTG Group Philosophy and our Code of Conduct, we engage in procurement activities based on the below policy as part of our CSR initiatives.

JX Nippon Mining & Metals Group Basic Procurement Policy

- 1 Comply with laws, regulations, and rules and engage in fair transactions.**
 - Respect the letter and spirit of relevant laws and social norms in executing business operations.
 - Conduct purchasing activities based on fair evaluations.
 - Maintain appropriate relationships with business partners based on the highest ethical values.
- 2 Protect intellectual property rights.**
 - Strictly control personal information obtained in the course of procurement activities.
 - Do not illegally obtain or illegally use intellectual property, including the patents, utility models, designs, and trademarks of third parties, and do not infringe such rights.
- 3 Build relationships with business partners based on mutual understanding and trust.**
 - Provide business partners with high reliability and satisfaction through accurate, fast, and highly transparent activities.
 - Endeavor to achieve robust communication with business partners and consistently promote creativity and innovation through advanced ideas.
 - Contribute to the development of a sustainable society by promoting the purchase of environmentally friendly materials and machinery.
- 4 Follow the below principles regarding conflict minerals.**
 - Do not engage in raw materials procurement that contributes to illegal activities in conflict-affected regions or to human rights infringements through such illegal activities.
 - Respect the guidance of the Organisation for Economic Co-operation and Development related to raw materials procurement from conflict-affected areas, and control supply chains in an appropriate manner.

Promotion of Green Purchasing

The JX Nippon Mining & Metals Group has drawn up the Green Purchasing Policy, which dictates that the reduction of environmental and social impact is taken into account when making decisions on purchasing materials and equipment necessary to its business operations. Based on this policy, we have also drawn up Green Purchasing Guidelines setting out specific requirements for choosing suppliers.

In addition, the Group periodically conducts green purchasing surveys of suppliers, which include items regarding their use of banned substances in the manufacturing process, the presence of banned substances in supplied products, and procurement from companies with human rights problems. In fiscal 2017, the surveys were conducted from January to December 2017, covering 449 suppliers that account for 95% of the value of the items purchased

and accepted by the Company, as well as JX Nippon Environmental Services and Pan Pacific Copper. Responses were received from 435 suppliers, for a response rate of 96.88%. Survey results are reflected in supplier reviews as applicable.

Green Purchasing Policy

We pursue green purchasing initiatives to contribute to the formation of a recycling-oriented society, prevention of global warming, and promotion of a “reduce, reuse, and recycle” approach.

This policy applies to all materials and equipment to be purchased. When items have similar functions, prices, and delivery dates, we evaluate their potential to reduce environmental impact based on mandatory and voluntary conditions, and purchase the item with superior environmental performance.

Confronting the Problem of Conflict Minerals

The Group's Basic Procurement Policy includes a clause on avoidance of conflict minerals, and we have established and operate management systems to appropriately address this issue.

What Are Conflict Minerals?

“Conflict minerals” is the general term for minerals that are mined (illegally, in most cases) in conflict-affected regions, providing a source of funds for local armed groups. The use of these minerals may lead to the prolonging of conflicts and the expansion of human rights abuses and dehumanizing acts.

Global Moves to Impose Trade Restrictions

Global moves to restrict trade of conflict minerals began in the late 1990s, and today various organizations have devised rules and programs. In 2011, the Organisation for Economic Co-operation and Development established the Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, advising corporations and others to manage their own operations so as to avoid involvement in the trade of conflict minerals. In the United States, from 2013 the Dodd–Frank Wall Street Reform and Consumer Protection Act obligated companies listed on the U.S. stock exchanges to submit reports on their usage of specific conflict minerals (tin, tantalum, tungsten, and gold) to the Securities and Exchange Commission. The aim of such measures is to stop companies from using conflict minerals through information disclosure and social pressure. The European Union and other organizations are moving to introduce a conflict minerals management and certification system.

Group Response to the Issue

In line with these global trends, industry organizations relevant to the Group (including the LBMA^{*1} and RBA) have established monitoring programs for eliminating conflict minerals. These programs request that companies cooperate with surveys and undergo external audits by an independent organization. Pan Pacific Copper, a producer of gold bullion, has established and operates a management system for supply chain due diligence that calls for the following actions to be taken:

- 1** Performing supply chain due diligence before purchasing mineral raw materials (confirming the place of origin of the materials, assessing risks, confirming materials after delivery, confirming distribution route, preserving relevant documents, etc.).
- 2** Notifying suppliers of the policy on exclusion of conflict minerals.
- 3** Conducting in-house education on supply chain due diligence and its background.
- 4** Conducting internal audits and undergoing external audits.

The implementation status of supply chain due diligence is audited by an independent organization specified by the LBMA, and the results are reported to the LBMA. As a result of following these procedures, the gold bullion produced at Pan Pacific Copper's Saganoseki Smelter & Refinery is included on the LBMA's Good Delivery List. At the same time, the Saganoseki Smelter & Refinery has been included on the RMAP Conformant Smelters list compiled by the RBA and GeSI^{*2}—recognition that it is taking proper measures to exclude conflict minerals. More recently, in September 2017, the LBMA announced its Responsible Silver Guidance, asking for proper due diligence in the silver supply chain. In response, the JX Nippon Mining & Metals Group has determined to follow this Guidance, setting rules and taking other steps to achieve conformance in fiscal 2018.

^{*1} LBMA: London Bullion Market Association. An industry association composed of financial institutions and others that deal in gold bullion. Inclusion on this association's Good Delivery List is viewed as a guarantee of high quality and reliability.

^{*2} GeSI: Global e-Sustainability Initiative (a trade association of the information and communications technology industry in Europe).

The RBA and GeSI together created the Responsible Minerals Assurance Process (RMAP) certification program, based on their relationship with the electronic and communications equipment industries, where the risk of conflict mineral use is especially high.



Certificate from the LBMA

Basic Environmental Policy

As a comprehensive manufacturer of nonferrous metal resources and materials, the JX Nippon Mining & Metals Group is carrying out the following initiatives aimed at contributing to environmental conservation on a global scale through innovation in the productivity of resources and materials.



Note on numerical data in this section

Due to rounding, numbers presented here may not add up precisely to the totals provided.

Action Plan for Environmental Protection

We have drawn up an Action Plan for Environmental Protection as outlined below, to implement the Basic Environmental Policy.

Approach to environmental protection	
1. Environmental protection organization	The general manager of the Company's Environment & Safety Department is in charge of coordinating and promoting environmental protection efforts in the Group. Recognizing that on-site personnel should be responsible for ensuring environmental protection, the top managers at each operating site serve as supervisory environmental managers. At the same time, we are aiming to enhance the effectiveness of the Environment Measures Committee and to advance mutual understanding between labor and management regarding environmental protection.
2. Environmental management systems	Through Groupwide commitment, from top management to frontline employees, and through appropriate implementation of ISO 14001-compliant environmental management systems, we are continuously strengthening environmental conservation measures and working to reduce environmental risks.
3. Environmental auditing	Supervisory environmental managers at each operating site review the results of internal audits to verify their site's environmental management and compliance with environmental regulations. Additionally, the Environment & Safety Department's environment and safety audit team conducts periodic environmental audits of each operating site, detects and identifies problems as well as areas requiring remediation from an environmental management perspective, and continuously strives to improve accident prevention and environmental conservation measures.
Measures to be taken	
We are committed to undertaking the measures indicated on the right to minimize the environmental impact of the Group's business activities.	■ Help prevent global warming ■ Manage chemical substances ■ Develop environmentally friendly technologies and products, and introduce new technologies ■ Conduct training, public relations initiatives, and social activities to communicate our Action Plan for Environmental Protection and raise awareness of our environmental protection measures ■ Promote resource efficiency and recycling ■ Maintain biodiversity ■ Promote green purchasing ■ Reduce waste materials ■ Provide recycling services
Environmental conservation at our overseas businesses	
1. Environmentally friendly operations in our overseas business activities	To ensure an effective approach to environmental conservation at overseas operating sites, we promote a thorough understanding of the need to be aware of our environmental impact and to observe environmental regulations.
2. Environmentally friendly importing and exporting	In addition to adhering to the Basel Convention, we take steps to ensure that our exporting and importing partners do not harm the environment.
Emergency response measures	
1. Emergency response manuals and drills	Reporting procedures are in place at the Groupwide level, along with those at the business-group and operating-site levels. Emergency response manuals are reviewed and updated to minimize the environmental impact of accidents, and regular emergency drills are carried out.
2. Response to environmental accidents	Should an environmental accident occur in business activities or due to a product defect, we will take steps to minimize the environmental impact of such an accident by acting in accordance with emergency response manuals and procedures.

Environmental Targets

Along with the management in the 4th Medium-Term Action Plan,* we are carrying out actions to meet the long-term targets for 2030.

* In response to the setting of new environmental targets in the JXTG Group, the term of the 4th Medium-Term Action Plan of the JX Nippon Mining & Metals Group has been extended by one year.

Long-term targets	
① CO₂ Reduction and Energy Conservation:	By fiscal 2030, reduction in CO ₂ emissions by 18% from fiscal 1990 levels (a target set after the Japanese government's new targets were incorporated in the Paris Agreement at COP21 in 2015)
② Ratio of Non-Value-Bearing Waste Volume:	By fiscal 2030, ratio of non-value-bearing waste volume of less than 0.5%

Results for the 4th Medium-Term Action Plan (fiscal 2016 to 2019)

Target area	Environmental targets	Performance in fiscal 2016	Performance in fiscal 2017	Summary
Energy and CO ₂	Cumulative allowable CO ₂ emissions in Japan of less than 4.07 million tons for the four years from fiscal 2016 to fiscal 2019 ¹	853 thousand tons (Target achieved)	858 thousand tons (Target achieved)	Due to energy-saving measures and other efforts, domestic CO ₂ emissions in fiscal 2017 were 858 thousand tons, 161 thousand tons less than the single-year target of 1,019 thousand tons, achieving the target.
Waste	Ratio of non-value-bearing waste volume ² of less than 0.7%	0.5% (Target achieved)	0.4% (Target achieved)	Due to thoroughgoing separation of waste materials and continuation of reuse and recycling efforts, the ratio of non-value-bearing waste volume in fiscal 2017 was 0.4%, achieving the target.
Environmental management	Compliance with revisions to ISO 14001 (Environmental Management Systems), and scheduled implementation of compliance inspections and environmental auditing	Comprehensive compliance inspections performed at nine operating sites, along with environmental and safety audits at 11 sites (Target achieved)	Compliance with revisions to ISO 14001 (Environmental Management Systems) completed by 10 operating sites, comprehensive compliance inspections performed at 12 operating sites, and environmental and safety audits at 12 sites (Target achieved)	Of the 16 operating sites ³ that have acquired ISO 14001 certification, transition to the 2015 version was completed by 10 sites in fiscal 2017. The remaining six sites will complete the transition during 2018. In addition, fiscal 2017 comprehensive compliance inspections and environmental and safety audits were implemented as planned.

In the 4th Medium-Term Action Plan, data on energy, CO₂, and waste is collected for the below-listed operating sites, where energy consumption is at or above the level of Type 2 Designated Energy Management Factories under the Act on Rationalizing Energy Use.

Domestic	Hitachi Works (HMC Dept., Copper Foil Dept.); Isohara Works; Kurami Works; Pan Pacific Copper Co., Ltd. (Saganoseki Smelter & Refinery, Hitachi Refinery); Hibi Kyodo Smelting Co., Ltd. (Tamano Smelter); Japan Copper Casting Co., Ltd.; JX Nippon Environmental Services Co., Ltd.; JX Nippon Tomakomai Chemical Co., Ltd.; JX Nippon Mikkaichi Recycle Co., Ltd.; JX Nippon Tsuruga Recycle Co., Ltd.; JX Metals Precision Technology Co., Ltd. (Esashi Works, Tatebayashi Works, Kakegawa Works); and Toho Titanium Co., Ltd. (Headquarters & Chigasaki Plant, Yahata Plant, Wakamatsu Plant, Kurobe Plant)
Overseas	Changzhou Jinyuan Copper Co., Ltd.; JX Nippon Mining & Metals Philippines, Inc.; and Nippon Mining & Metals (Suzhou) Co., Ltd.

¹ We are working to reduce annual allowable emissions from the above-listed domestic operating sites in stages year by year, starting with the 13.1% reduction from the fiscal 1990 level in fiscal 2015 that was targeted in the 3rd Medium-Term Action Plan, and aiming for an 18% reduction from the fiscal 1990 level by fiscal 2030. Emission reduction targets were accordingly set for a four-year period. Emissions from fuel usage are calculated using the coefficients stipulated by the Act on Promotion of Global Warming Countermeasures. Emissions from electricity usage are calculated using the coefficient of 0.417 tons of CO₂ per megawatt-hour (the actual figure for fiscal 1990 as given in the Environmental Action Plan of the Federation of Electric Power Companies of Japan) to reflect the efforts made by individual operating sites.

² Ratio of non-value-bearing waste volume = (Volume incinerated + Volume of final disposal) / Total volume of waste and sellable materials generated

³ The operating sites covered are the 16 domestic sites listed on page 61.

Environmental Management Systems

The JX Nippon Mining & Metals Group has established environmental management systems in line with ISO 14001 standards for ensuring achievement of the Action Plan for Environmental Protection, which was drawn up reflecting the Basic Environmental Policy. A multi-level organizational structure has been created, including various committees and subcommittees, in which everyone, from senior management headed by the president to employees at operating sites and affiliated companies, is working together to promote environmental conservation and avoid environmental risk.

Operating Sites That Have Obtained ISO 14001 Certification

Domestic	Hitachi Works (including Hitachi Refinery of Pan Pacific Copper Co., Ltd. and JX Nippon Environmental Services Co., Ltd.); Copper Foil Dept. of Hitachi Works (including Ichinoseki Foil Manufacturing Co., Ltd.); Isohara Works; Kurami Works (including the Kurami Office of JX Nippon Coil Center Co., Ltd.); Saganoseki Smelter & Refinery of Pan Pacific Copper Co., Ltd. (including Japan Copper Casting Co., Ltd., and Nissho Kou-un Co., Ltd.); Hibi Smelter of Pan Pacific Copper Co., Ltd. (including Hibi Kyodo Smelting Co., Ltd. and Hibi Smelting Logistics Co., Ltd.); JX Nippon Tomakomai Chemical Co., Ltd.; JX Nippon Tsuruga Recycle Co., Ltd.; JX Nippon Mikkaichi Recycle Co., Ltd.; Headquarters & Chigasaki Plant of Toho Titanium Co., Ltd. (including its Kurobe Plant and Wakamatsu Plant); JX Metals Precision Technology Co., Ltd. (Esashi Works, Tatebayashi Works, Nasu Works, and Kakegawa Works); JX Metals Trading Co., Ltd.; and Shirakawa Plant of JX Nippon Takasho Co., Ltd.
Overseas	JX Nippon Mining & Metals Philippines, Inc.; JX Nippon Mining & Metals USA, Inc.; Materials Service Complex Malaysia Sdn. Bhd.; JX Nippon Mining & Metals Korea Co., Ltd.; Nikko Fuji Precision (Wuxi) Co., Ltd.; Longtan Works of Nikko Metals Taiwan Co., Ltd.; Nippon Mining & Metals (Suzhou) Co., Ltd.; and JX Nippon Mining & Metals (Dongguan) Co., Ltd.

Compliance with Environmental Laws and Regulations

Through the effective operation of environmental management systems at operating sites and affiliated companies, the Group is ensuring compliance with environmental laws and regulations. The Environment & Safety Department in the Head Office monitors and supervises the state of compliance and reports to the CSR Committee through the Safety and Environment Committee. The Group seeks to strengthen its compliance systems by such means as environmental manager meetings, held each year to share information on legal and regulatory trends and to hear compliance status reports from operating sites.

Environmental and Safety Auditing

Individual operating sites implement internal environmental audits at least once a year. In addition, they periodically undergo environmental and safety audits by the Environment & Safety Departments of the Head Office and of Pan Pacific Copper Co., Ltd. Audits were conducted at 12 sites in fiscal 2017.

Environmental Education

Periodic education, training, and drills are conducted for each employee level at the Head Office and individual operating sites, to spread awareness regarding the Basic Environmental Policy, the Action Plan for Environmental Protection, and applicable laws and regulations.

Transition to ISO 14001:2015

Of the 16 domestic operating sites that have acquired ISO 14001 certification, transition to the 2015 version was completed by 10 sites in fiscal 2017. The remaining six sites will complete the transition during 2018.

Environmental Accidents

In fiscal 2017, there was one environmental accident, as indicated below. Necessary measures have been taken to address this accident and to make sure there is no recurrence.

Date	Place	Description
April 2017	Hitachi Works	Water leaked from a crack in a drainage thickener in the Daioin area, resulting in the flow of alkaline drainage water into the river system.

Environmental Assessment of Suppliers

The Group promotes environmental conservation in the entire supply chain including suppliers. Based on the Group's Green Purchasing Guidelines, suppliers are asked to create an environmental management system to reduce their environmental impact.

Additionally, green purchasing surveys are conducted periodically to confirm implementation by major suppliers. (See page 58 for details.)

Role of the Safety and Environment Committee

Activities in the areas of health and safety, and environmental protection, are planned, promoted, and reviewed by the Safety and Environment Committee, an organization under the CSR Committee. The Safety and Environment Committee meets once every six months.

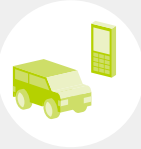
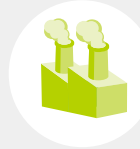
Our Business Activities and the Environment[☑]

The JX Nippon Mining & Metals Group monitors and analyzes the impacts of its business activities on the environment and endeavors to reduce these impacts. An overview of our efforts in this area is given here.

Mass Balance Table for the Group (Fiscal 2017)

INPUT				
				
Raw materials (1,000 tons)	Energy (terajoules)	Water resources (million cubic meters)		
Primary raw materials	Fuel	Freshwater		
Domestic operating sites	Domestic operating sites	Domestic operating sites	2,174	20.6
Overseas operating sites	Overseas operating sites	Overseas operating sites	232	7.0
Total	Total	Total	2,407	27.6
Recycled raw materials	Electricity*	Seawater		
Domestic operating sites	Domestic operating sites	Domestic operating sites	249	99.9
Overseas operating sites	Overseas operating sites	Overseas operating sites	3	—
Total	Total	Total	252	99.9
			* Includes thermal energy (steam, hot water, cold water) supplied by third parties	

JX Nippon Mining & Metals Group

OUTPUT				
				
Principal products	Emissions			
Copper concentrate*	CO₂ (1,000 tons)	SO_x (1,000 tons)	NO_x (1,000 tons)	
Refined copper	Total of domestic operating sites	Domestic operating sites	Domestic operating sites	0.6
Gold	Scope 1	4.1	Overseas operating sites	0.2
Silver	Scope 2	0.2	Overseas operating sites	0.2
Platinum	Total of overseas operating sites	Total	Total	0.8
Palladium	Scope 1	4.3		
Other metals (selenium, tellurium)	Scope 2			
Electro-deposited and treated rolled copper foil	Total			
Copper alloy, special steel strips, etc.	1,602	Chemical substances (release and transfer) (1,000 tons)	Final disposal of waste materials (1,000 tons)	Wastewater (million cubic meters)
Titanium sponge		Total of domestic operating sites (domestic only)	Domestic operating sites	Domestic operating sites
Sulfuric acid (by-product)		0.47	1.4	156.4
			Overseas operating sites	Overseas operating sites
			4.3	1.0
			Total	Total
			5.7	157.4

* Not including the Group's equity share

Environmental Risk Management

Fundamental Policy

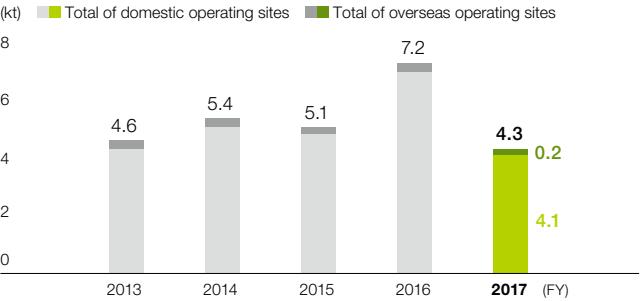
Air and water systems are key influencers of human health and living environments. In carrying out its business operations, the JX Nippon Mining & Metals Group gives top priority to protecting the environment relating to these two systems. In addition to abiding by all relevant laws, regulations, ordinances, and agreements, we have set and monitor our own voluntary standards to reduce environmental impact. At the same time, we implement the plan-do-check-act cycle to reduce environmental risks.

Activity Results in Fiscal 2017

Preventing Air Pollution

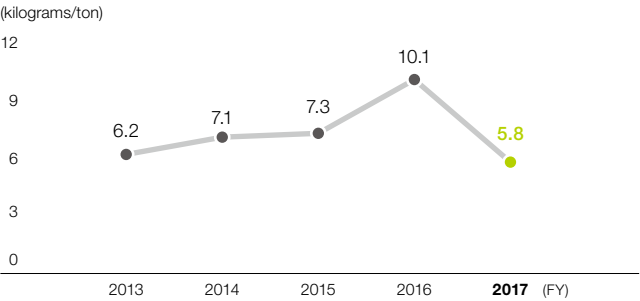
The Group monitors waste gas emissions at all operating sites in compliance with laws, regulations, ordinances, agreements, and voluntary standards. In fiscal 2017, emissions of both sulfur oxides (SOx) and nitrogen oxides (NOx) in the Group decreased from fiscal 2016 levels. Principal reasons for the decline in SOx emissions were the reduced number of operating days at the Saganoseki Smelter & Refinery of Pan Pacific Copper due to regular maintenance, and the improvement in desulfurization rate at the sulfuric acid plant of Hibi Kyodo Smelting. The latter is the reason for the reduction in SOx emission intensity.

SOx Emissions*



* Totals are for operating sites subject to emissions regulations.

SOx Emission Intensity at Smelters and Refineries (kilograms of SOx per ton of refined copper produced)



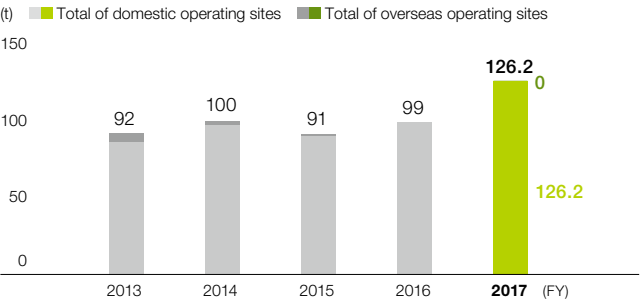
Preventing Water Pollution

The Group monitors water discharge at all operating sites in compliance with laws, regulations, ordinances, agreements, and voluntary standards. The COD^{*1} and BOD^{*2} levels are shown below.

*1 Chemical oxygen demand: An index of water quality indicating the amount of oxygen needed to oxidize substances in water. This is a representative indicator for measuring contamination by organic substances in oceans and lakes.

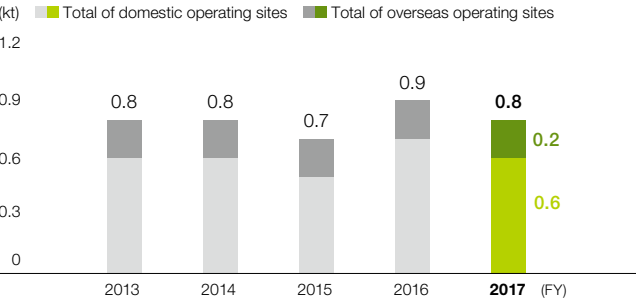
*2 Biochemical oxygen demand: An index indicating the amount of oxygen needed for organic matter in water to be broken down by microorganisms. This is a representative indicator for measuring contamination by organic substances in rivers and streams.

COD^{*3}

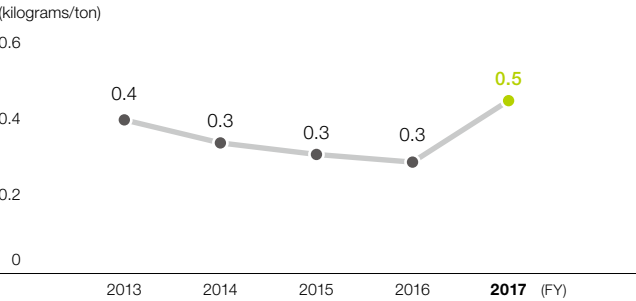


*3 Totals are for operating sites subject to legal requirements (sites that discharge water into the ocean or lakes).

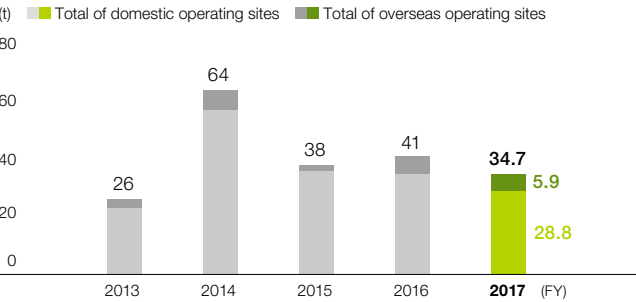
NOx Emissions*



NOx Emission Intensity at Smelters and Refineries (kilograms of NOx per ton of refined copper produced)



BOD^{*4}

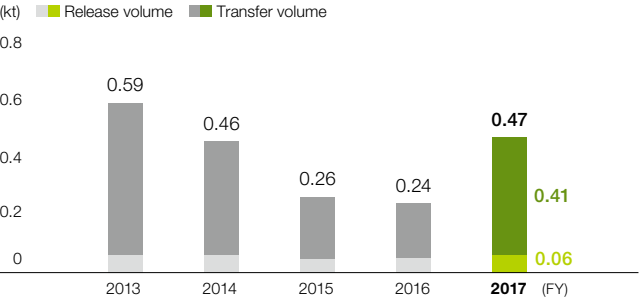


*4 Totals are for operating sites subject to legal requirements (sites that discharge water into rivers or streams).

Chemical Management

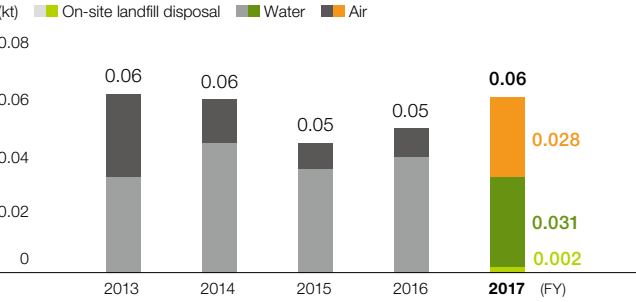
At operating sites with significant release and transfer of chemicals, the Group strictly adheres to the Act on Confirmation, Etc., of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (PRTR Act). Also, as part of our environmental management activities, we are working to reduce our environmental impact by setting targets for decreasing the release and transfer volumes of applicable chemical substances.

Volumes of Release and Transfer of PRTR Substances



Regarding the Group's total release and transfer volumes of chemical substances to be reported in compliance with the PRTR Act, the volume released into the air in fiscal 2017 increased by 17 tons from the previous fiscal year. This was due mainly to an increase in toluene release by Toho Titanium. Meanwhile, transfer volume increased by approximately 214 tons. The chief reason was that toluene, which until recently had been a substance of value, came to be treated as a waste material by Toho Titanium.

Breakdown of Release Volumes of PRTR Substances



Volumes of Release and Transfer of Major PRTR Substances in Fiscal 2017

No.	Cabinet order no.	Chemical substances	Release volume			Transfer volume	
			Air	Water	On-site land-fill disposal	Sewage system	Waste
1	1	Zinc compounds (water soluble)	0.1	6.5	0.0	0.0	0.0
2	31	Antimony and its compounds	0.1	1.9	0.0	0.0	14
3	75	Cadmium and its compounds	0.1	0.3	0.1	0.0	36
4	132	Cobalt and its compounds	0.0	0.3	0.0	0.0	7.9
5	272	Copper salts (water soluble)	0.4	6.3	0.6	0.0	0.0
6	300	Toluene	19	0.0	0.0	0.5	290
7	305	Lead compounds	0.6	0.4	0.0	0.0	22
8	332	Arsenic and its inorganic compounds	0.3	1.3	0.7	0.0	19
9	354	Dibutyl phthalate	0.0	0.0	0.0	0.0	7.2
10	384	1-bromopropane	5.9	0.0	0.0	0.0	0.0
11	405	Boron compounds	0.0	6.7	0.0	0.0	1.0
(grams of toxic equivalents)							
12	243	Dioxins	0.08	0.01	0.0	0.0	3.6

Notes: 1. The values given are totals for companies with operating sites subject to reporting requirements under the PRTR Act (JX Metals Trading, Kasuga Mines, and the domestic companies defined on page 1 as companies subject to reporting with regard to the Boundary of the Report [Environment]).

2. Of the 56 chemical substances subject to reporting, those totaling at least 5.0 tons in any category, and dioxins, are listed here.

3. There were no cases of chemical substances released into the soil.

Detoxification of PCB-Containing Equipment

The Group carries out disposal of equipment containing high concentrations of PCBs, using the services of Japan Environmental Storage & Safety Corporation. Disposal is expected to be completed during 2018, with the exception of operating sites in Tokyo and Kanagawa where treatment is behind schedule.

We have also been detoxifying equipment containing low concentrations of PCBs by entrusting a private-sector facility under a systematic program that began in fiscal 2012. In March 2014, JX Nippon Tomakomai Chemical received certification from the Minister of the Environment to provide a low-concentration PCB waste treatment service, and carries out detoxification of Group equipment containing low concentrations of PCBs.

Compliance with the REACH Regulation

The European Union's Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH Regulation) came into effect in June 2007. Based on precautionary principles, the purpose of this regulation is to standardize the management and identification of chemicals that are distributed within the EU, and to monitor their risks and clarify their environmental impact. The Group respects the intent of the REACH Regulation, and has completed preliminary registration of products that are subject to the regulation.

Management of Closed Mines

From its founding in 1905, the JX Nippon Mining & Metals Group was engaged in mining operations across Japan. By ensuring a steady supply of nonferrous metals and other resources, we contributed to Japan’s economic growth. Today, however, nearly all the mining operations have been stopped* due to the depletion of mineral resources. Currently, the Group is working to maintain and restore the natural environment in and around the closed mines. One such effort is the treatment of acid mine drainage (AMD).

* Currently, the Kasuga Mine in Kagoshima Prefecture is the only Group mine in Japan still operating.

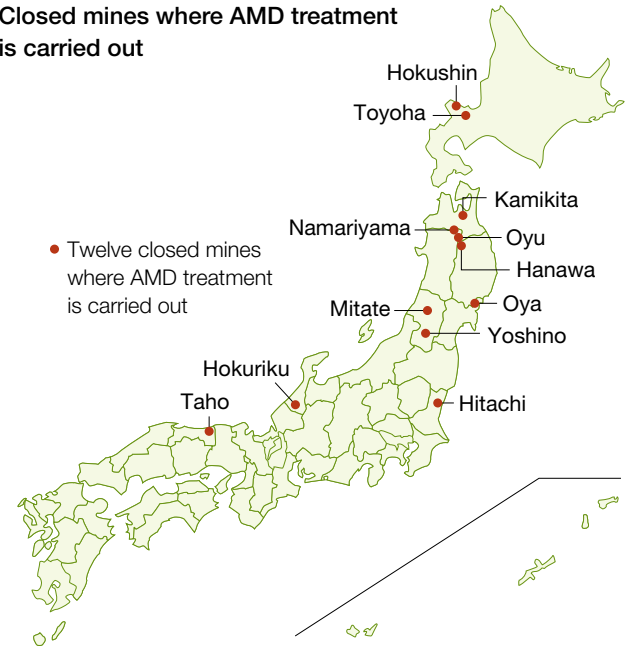
Management Work at Closed Mines

Of the 39 closed mines managed by the Company, AMD treatment is an ongoing obligation at 12 mines pursuant to the Mine Safety Act. JX Nippon Mining Ecomanagement is responsible for the work at these mining sites, including AMD treatment and the management of tailings dams.

The work mainly consists of treating the highly acidic mine drainage generated from the mines and tailings dams, which contain heavy metals, and maintaining and preserving the tailings dams and galleries of the mining sites.

The operation of treatment facilities has to be kept up 365 days a year, since AMD is generated continuously after a mine is closed. This is a result of the chemical reaction of rainwater and other water with ores remaining in the mine and tailings in the dams.

Closed mines where AMD treatment is carried out

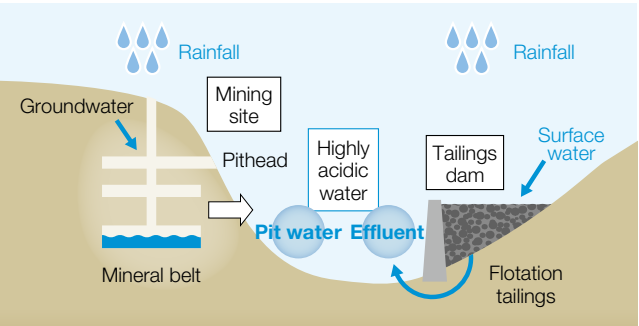


How AMD Occurs

AMD from closed mines consists of pit water rising up from inside the mine and effluent discharged from tailings dams or other mine facilities. It occurs as a result of rainwater and other water coming into contact with materials such as ores remaining after the mine is closed, the nearby altered rock, and flotation tailings that have accumulated in the dams. These ores and altered rock contain iron, zinc, manganese, and other metals in the form of sulfide minerals, as a result of bonding with sulfur. These sulfide minerals are oxidized in the presence of oxygen and dissolve in water in the form of metal ions, hydrogen ions, or sulfuric acid ions, causing the drainage water to become highly acidic.



Motoyama AMD treatment facility at Toyoha Mine



Gallery inspection at Hanawa Mine

Construction Work to Protect Tailings Dams from Earthquakes and Torrential Rain

After the Great East Japan Earthquake, starting in fiscal 2012 we began conducting voluntary risk assessments of all tailings dams under management of the Group relative to a Level 2 earthquake (seismic motion of the maximum intensity conceivable for the particular area both now and in the future). At the same time, we assessed their stability in localized torrential rain of the kind that has become increasingly common in recent years, as well as the possible downstream impact of the outflow of tailings from the dams.

After determining the risks by means of these voluntary inspections, we set priorities for those tailings dams identified as requiring further measures and began the necessary construction work starting in fiscal 2013.

The construction work includes soil stabilization to ensure earthquake resistance and building new drains to obtain sufficient drainage capacity during torrential rain.



Earthquake countermeasures at Hanawa Mine, Nakanosawa Tailings Dam

1. Locations of Countermeasures Implemented in Fiscal 2017

Earthquake-related: two locations	Hanawa Mine, Nakanosawa Tailings Dam (downstream method)
	Namariyama Mine, Oyu 1st and 2nd Tailings Dams (upstream method)
Torrential rain-related: one location	Tada Mine, Shiroishi Tailings Dam (downstream method)

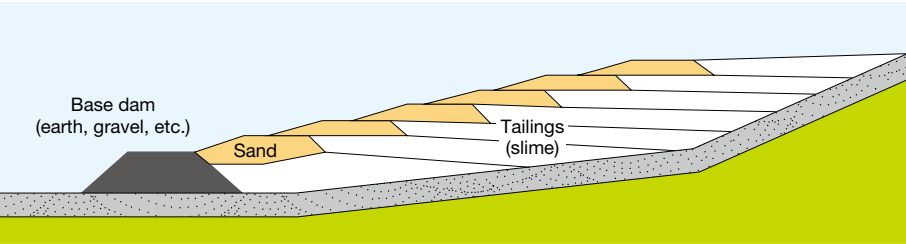
2. Locations of Countermeasures Planned for Fiscal 2018

Earthquake-related: two locations	Namariyama Mine, waste rock storage facility (ongoing)
	Mitate Mine, Sangosawa Tailings Dam (upstream method)
Torrential rain-related: two locations	Kawazu Mine, Horinouchi Tailings Dam (upstream method)
	Kawayama Mine, 2nd Tailings Dam (downstream method)

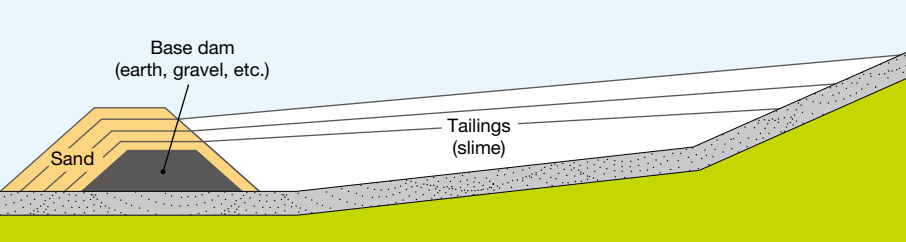


Earthquake countermeasures at Namariyama Mine, Oyu 1st and 2nd Tailings Dams

Upstream Method (raising embankment height)



Downstream Method



Establishing a Low-Carbon Society

Since the Paris Agreement was adopted at the COP21 United Nations Conference on Climate Change, there have been increasing demands on corporations to become actively involved in reducing emissions of greenhouse gases through such means as setting long-term reduction targets.

The JX Nippon Mining & Metals Group seeks to reduce the environmental burden of its business pursuits as much as possible. Our Basic Environmental Policy goes beyond compliance with environmental regulations, calling for development of energy-saving technology to help prevent global warming. We make clear our management of environmental targets in our Medium-Term Action Plan and elsewhere, endeavoring to reduce our environmental burden each fiscal year.

Energy Conservation

Fundamental Policy

Global warming is bringing about frequent abnormal weather, rising sea levels due to changing climate patterns, and other impacts. Furthermore, it is feared that the significant impact on ecosystems may undermine the sustainable development of society as a whole. The JX Nippon Mining & Metals Group has defined long-term targets for reducing emissions of CO₂ and other greenhouse gases, which we are pursuing by promoting energy conservation and expanding the use of renewable energy. (See page 60 for details.)

Activity Results in Fiscal 2017

Energy Consumption and Energy Consumption Intensity in Manufacturing Activities

In fiscal 2017, the Group's overall energy consumption in terms of its calorific value was 28,950 terajoules,* compared with 28,778 terajoules in fiscal 2016. The further rise in the Caserones Copper Mine operating rate was one of the major factors resulting in an increase of 172 terajoules. Around 48% of the Group's total energy consumption at operating sites in Japan is accounted for by energy consumed at smelters and refineries, where energy consumption intensity in fiscal 2017 remained at around the same level as in the previous fiscal year. The Group will continue to take active measures for reducing energy use and improving efficiency. As an example of such measures, at the Tamano Smelter of Hibi Kyodo Smelting, the oxygen production systems were upgraded to a single system adopting the latest technology. The resulting improved energy efficiency led to a reduction in electricity usage by a total annual calorific value of 275 terajoules. At the Saganoseki Smelter & Refinery of Pan Pacific Copper, steam loss was reduced by a total annual calorific value of 33 terajoules, by making sure steam traps were regularly inspected and replacing defective traps.

At our overseas operating sites as well, we are taking steps to reduce energy consumption, such as optimizing the number of cooling towers in operation, installing pump-inverter control equipment, introducing high-efficiency air conditioners, and carrying out phased replacement of conventional lighting with LED lamps. We will continue to pursue additional reductions in energy use and improve waste heat recovery by installing energy-efficient equipment.

* Energy consumption is calculated using coefficients in accordance with the Act on Rationalizing Energy Use, for both domestic and overseas operating sites. A breakdown of energy consumption is shown below (terajoules).

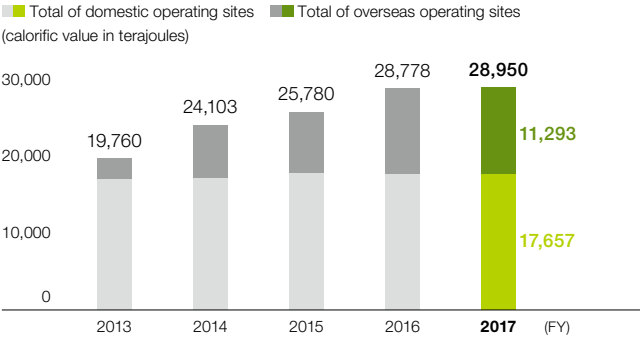
Fiscal 2017: Electricity (indirect): Domestic 13,592 Overseas 8,675
Electricity (indirect) includes thermal energy (steam, hot water, cold water) supplied by third parties.
Fuel (direct): Domestic 4,066 Overseas 2,617

Note: A terajoule is one trillion joules, a unit of energy.

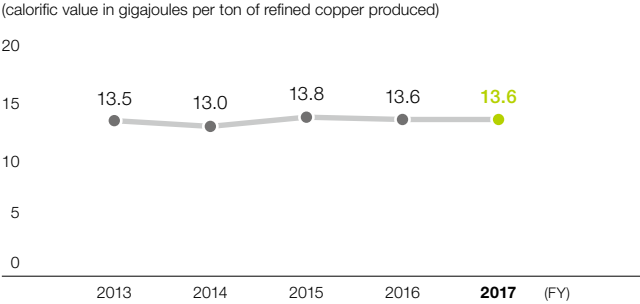


Oxygen production system at Tamano Smelter, Hibi Kyodo Smelting

Energy Consumption (Domestic and Overseas Operating Sites)[※]



Energy Consumption Intensity at Smelters and Refineries (Fuel and Electricity)[※]



Breakdown by Fuel Type

	Domestic	Overseas
Kerosene (kl)	1,982	—
Light oil (kl)	2,645	47,362
Class A heavy oil (kl)	9,253	591
Class B and C heavy oil (kl)	43,502	9,625
Reclaimed oil (kl)	1,941	—
LPG/butane (t)	5,133	6
LNG (t)	4,919	—
Coke (t)	9,074	—
Petroleum coke (t)	2,977	—
City gas (1,000 m³)	16,467	9,307

Energy Conservation

CO₂ Emissions from Energy Consumption for Manufacturing Activities*

In fiscal 2017, the Group's total CO₂ emissions from energy consumption in Japan and overseas were 1,602 thousand tons of CO₂.

There was a slight rise in CO₂ emissions from energy consumption over fiscal 2016, resulting from a higher operating rate at the Caserones Copper Mine.

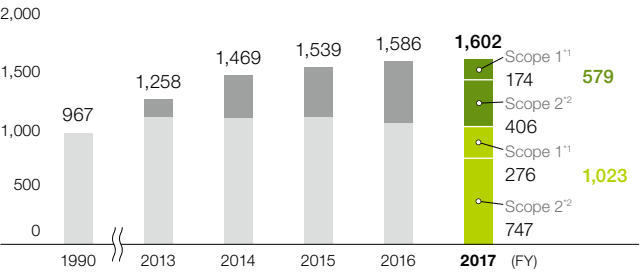
Approximately 48% of the Group's total energy consumption in Japan is accounted for by energy consumed at smelters and

refineries. Through the consolidation of facilities, improved production efficiency, and other measures, the Group reduced CO₂ emission intensity at these sites to 0.86 in fiscal 2017, down approximately 40% from 1.34 in fiscal 1990.

* Emissions are calculated using emission coefficients in accordance with the Act on Promotion of Global Warming Countermeasures. Actual coefficients that individual power companies made public and statistical data released by the International Energy Agency are used to calculate amounts of emissions from electricity consumption at domestic and overseas operating sites, respectively.

CO₂ Emissions from Energy Consumption[☑]

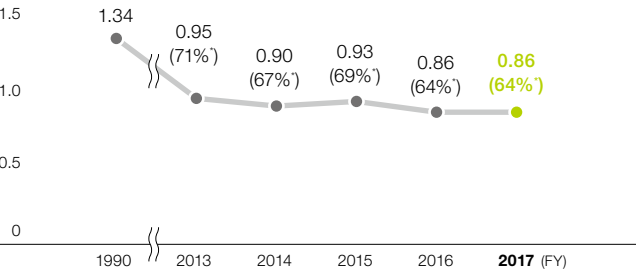
(1,000 tons of CO₂) ■ Total of domestic operating sites ■ Total of overseas operating sites



*1 Emissions from fuel consumption are converted to equivalent CO₂.
*2 Emissions from electricity consumption are converted to equivalent CO₂. Emissions from electricity include those from thermal energy (steam, hot water, cold water) supplied by third parties.

CO₂ Emission Intensity at Smelters and Refineries[☑]

(tons of CO₂ per ton of refined copper produced)



* In relation to fiscal 1990 level
Note: Emissions covered include Scope 1 and Scope 2.

Expansion of Renewable Energy Usage

Hydroelectric power generation in the Group traces back to 1907, when its predecessor Kuhara Mining operated. Today, we carry out power generation operations at the Kakinosawa Hydroelectric Power Plant and sell the electricity generated to specified-scale electricity utilities. From October 2014 to June 2015, the facilities of the Kakinosawa Hydroelectric Power Plant were upgraded to enable more effective use of valuable water resources. The plant is now operating stably with increased power generation capacity thanks to upgraded facilities such as turbines, generators, and power receiving and transforming equipment. A photovoltaic power generation facility with capacity of 240 kilowatts went into operation in April 2013 at the Kakegawa Works of JX Metals Precision Technology. At Shimoda Hot Springs, a binary power generation system making use of heat from hot springs was installed, going into operation in March 2018. Photovoltaic power generation is also carried out at the Hibi Smelter of Pan Pacific Copper.

Results in Fiscal 2017	(megawatt-hours)	
	Total generated electricity	Generated electricity sold
Hydroelectric power (Kakinosawa Power Plant)	26,686	26,638
Photovoltaic power (Kakegawa Works)	684	674



Solar panels at Kakegawa Works, JX Metals Precision Technology

CO₂ Emissions Other than from Energy Consumption, and Other Greenhouse Gas Emissions from Manufacturing Activities*[☑]

Three operating sites in the recycling and environmental services business submit reports on the emissions of CO₂ from sources other than energy consumption as well as the emissions of other greenhouse gases. In fiscal 2016, such emissions totaled approximately 57 thousand tons of CO₂. In fiscal 2017, this amount grew by 37 thousand tons to around 94 thousand tons of CO₂ (consisting entirely of CO₂ emissions from sources other than energy consumption).

* Emissions are calculated using emission coefficients in accordance with the Act on Promotion of Global Warming Countermeasures. CO₂ emissions other than from energy consumption result from treatment of waste oil, waste plastic, sludge, and wood waste. In fiscal 2017, the emissions of greenhouse gases excluding CO₂ from sources other than energy consumption were below the reporting threshold or there were no such emissions.

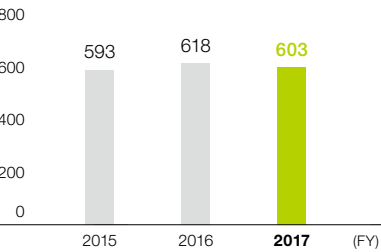
Energy Consumption and CO₂ Emissions in the Logistics Stage[☑]

In fiscal 2017, energy consumption in the logistics stage of applicable Group companies in Japan* was 603 terajoules and CO₂ emissions in that stage were 42.5 thousand tons of CO₂.

* Specified consigners as defined by the Act on Rationalizing Energy Use. This applies to the following three companies in the Group: JX Nippon Mining & Metals, Kasuga Mines, and Pan Pacific Copper.

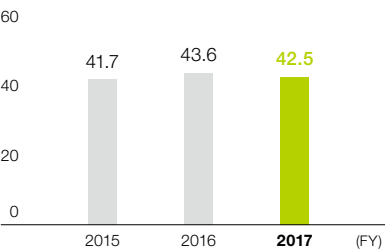
Energy Consumption: Domestic

(calorific value in terajoules)



CO₂ Emissions: Domestic

(1,000 tons of CO₂)



Establishing a Recycling-Oriented Society

The JX Nippon Mining & Metals Group seeks to reduce the environmental burden of its business pursuits as much as possible. Our Basic Environmental Policy calls for conserving resources, promoting recycling, and reducing waste materials. We therefore take steps to use recycled resources as raw materials, utilize by-products, and reduce the volume of final disposal by recycling waste materials.

Initiatives for Effective Resource and By-Product Use and Waste Reduction

Fundamental Policy

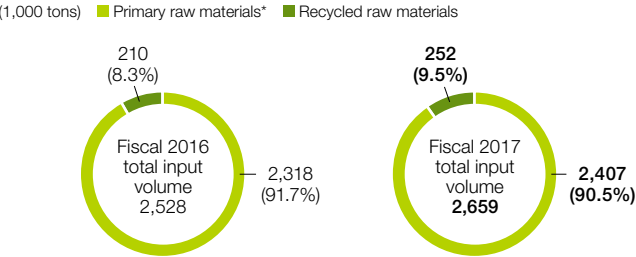
The JX Nippon Mining & Metals Group is committed to helping prevent the depletion of natural resources and reducing the discharge of waste materials. We therefore strive to make effective use of water resources, use recycled resources as raw materials, utilize by-products, and reduce the volume of final disposal by recycling waste materials.

Activity Results in Fiscal 2017

Usage of Recycled Resources as Raw Materials

The ores and other natural resources extracted from nature are finite and must be preserved for future generations. The Group is expanding usage of recycled resources as raw materials.

Material Input

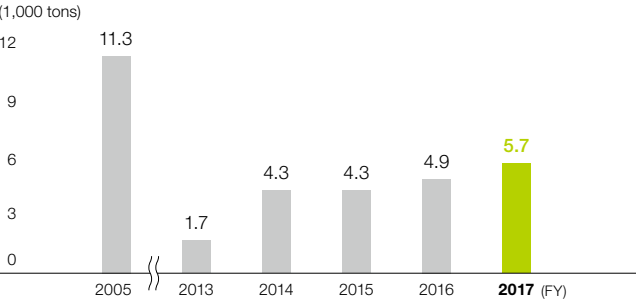


* For fiscal 2016, the Group's equity share of the copper concentrate produced at the Caserones Copper Mine is not included. For fiscal 2017, however, the method of counting material input was changed so that the figures for fiscal 2017 include the Group's equity share.

Reuse and Reduction of Waste Materials

Of the total volume of waste and sellable materials the Group generated in fiscal 2017, 84% was reused internally. Of the final total volume of waste materials discharged, the volume of final disposal, excluding the volume recycled externally or otherwise used, was 5.7 thousand tons, an increase of 800 tons from the previous fiscal year. The main cause of this increase was the rise in volume of final disposal at the Caserones Copper Mine.

Volume of Final Disposal of Waste Materials^{*1, *2}



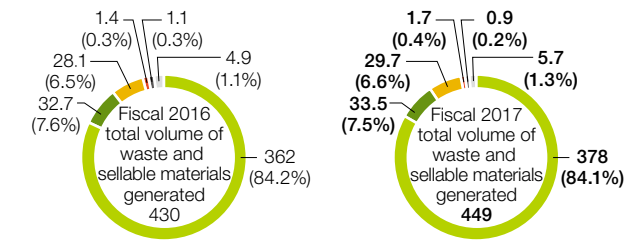
*1 These figures do not include the approximately 6.9 thousand tons disposed of in offshore landfills by Toho Titanium.

*2 These figures do not include the approximately 26.1 million tons of slag from the Caserones Copper Mine.

Total Volume of Waste and Sellable Materials Generated

(1,000 tons)

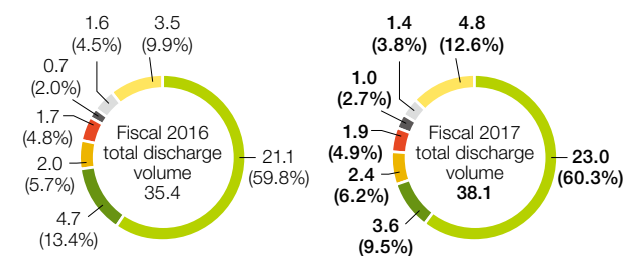
Volume recycled within the Group Recycling (sales of value-bearing waste) Recycling (waste) Heat recovery Incineration Final disposal



Total Discharge Volume by Type of Waste Materials

(1,000 tons)

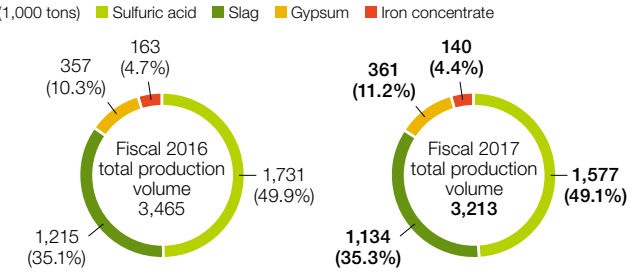
Sludge Cinders Waste plastics Waste oil Acid/alkaline waste Slag Other



Use of By-Products

In fiscal 2017, the Group produced 3,213 thousand tons of by-products. Slag is utilized as a sandblasting material, a cement material, a caisson filler, or as an aggregate for wave-dissipating blocks. Iron concentrate and gypsum are used in cement.

By-Product Production



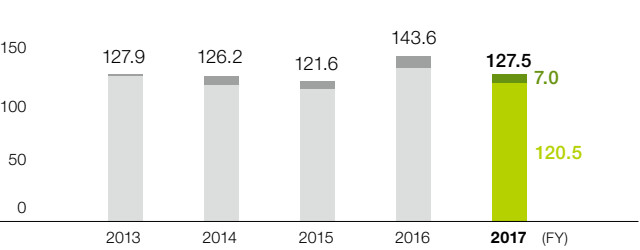
Effective Use of Water Resources

Of the Group's water usage in fiscal 2017, seawater accounted for 78% of the total. Of the volume of water discharged, 90% was discharged into the sea. Water usage at domestic operating sites in fiscal 2017 decreased 10% year on year. Overseas, water usage decreased 30% year on year.

Water Usage^{*1}

(million cubic meters)

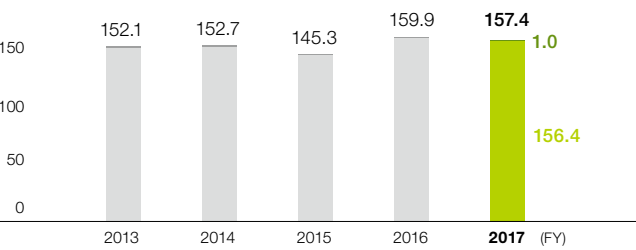
Total of domestic operating sites Total of overseas operating sites



Water Discharge Volume^{*2}

(million cubic meters)

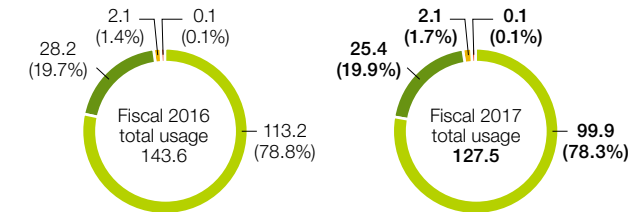
Total of domestic operating sites Total of overseas operating sites



Water Usage^{*1}

(million cubic meters)

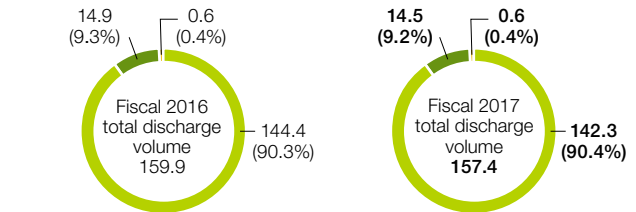
Seawater Groundwater/industrial water Tap water Rainwater



Water Discharge Volume^{*2}

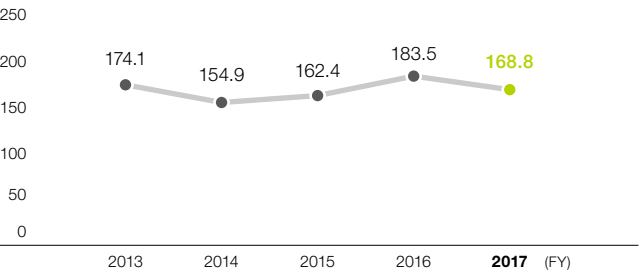
(million cubic meters)

Oceans Rivers Sewage system



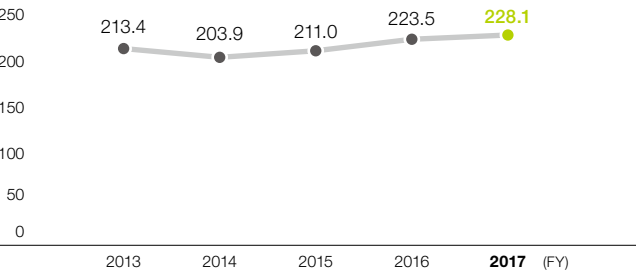
Water Usage Intensity at Smelters and Refineries

(cubic meters per ton of refined copper produced)



Water Discharge Intensity at Smelters and Refineries

(cubic meters per ton of refined copper produced)



*1 Seawater usage at the Saganoseki Smelter & Refinery of Pan Pacific Copper is calculated based on pumping capacity. Groundwater usage at JX Nippon Mikkaichi Recycle up to fiscal 2016 was calculated by multiplying water discharge volume by a fixed rate. Freshwater usage at the Saganoseki Smelter & Refinery of Pan Pacific Copper and water usage at the other operating sites are based on flowmeter readings or on invoices from the water company.

*2 The volume of water discharged into public waters (oceans and rivers) at each operating site represents the following: an amount calculated based on drainage weirs (Hitachi Works, Isohara Works, Saganoseki Smelter & Refinery of Pan Pacific Copper, JX Nippon Tomakomai Chemical, and JX Nippon Mikkaichi Recycle); an amount obtained by multiplying groundwater usage by a fixed rate (Kurami Works, Headquarters & Chigasaki Plant of Toho Titanium); an amount otherwise calculated (Yahata Plant of Toho Titanium); or an amount based on flowmeter readings (the other operating sites). The volume of water discharged into the sewage system is as measured by a water treatment company in the case of Changzhou Jinyuan Copper, and is based on flowmeter readings or on invoices from the sewage company for the other operating sites.

TOPICS ❶ Participation in the Tokyo 2020 Medal Project

JX Nippon Mining & Metals is taking part in the Tokyo 2020 medal project conducted by the Tokyo Organising Committee of the Olympic and Paralympic Games, through NTT Docomo, Inc. and the Japan Environmental Sanitation Center (JESC), which are co-operating in the project. The Group, having long directed its business

activities at building a recycling-oriented society, supports the purpose of this project to help build a sustainable society. It is hoped that this project will be an occasion for the general public to become aware of the importance of recycling nonferrous metals, and that it will give impetus to worldwide efforts to recycle resources.

About the Tokyo 2020 Medal Project

The Tokyo Organising Committee of the Olympic and Paralympic Games is conducting the Tokyo 2020 medal project to manufacture the medals for use at Tokyo 2020 from small electronic devices such as discarded mobile phones. Through this project, the committee plans to have approximately 5,000 gold, silver, and bronze medals made for the Olympic and Paralympic Games.

Role of the Group

- 1. The JX Nippon Mining & Metals Group is using its smelting, refining, and metal processing technologies to produce silver and bronze as medal materials from the recycled materials provided by NTT Docomo and the JESC.

Smelting, Refining, and Processing of Bronze Medal Material

Red brass, a copper and zinc alloy used as the material for bronze medals, is manufactured in sheet form. After the recycled material has undergone smelting and refining to produce refined copper at the Saganoseki Smelter & Refinery and Hitachi Refinery of Pan Pacific Copper, the copper is mixed with zinc and alloyed at the Kurami Works, where it is also put through hot rolling and other processes.



Discarded mobile phones provided by NTT Docomo



Discarded mobile phones are put into a converter furnace



Anode casting (image for illustration purposes)



Completed refined copper



Refined copper ingots cut for alloying



Cut copper put in melting furnace along with zinc for forming into red-brass ingots



Hot rolling of red brass (image for illustration purposes)

- 2. JX Metals Trading and JX Nippon Tsuruga Recycle have been contracted by the JESC to collect small electronic devices for this project as accredited recyclers under the Act on Promotion of Recycling of Small Waste Electrical and Electronic Equipment.
- 3. We are cooperating in the collection efforts by placing boxes throughout Japan for collecting mobile phones and small appliances.



For protecting the environment

Material Issues

Using Nonferrous Metal Resources Effectively

Nonferrous metals such as copper, used in electrical wires and electronic materials, are essential resources on which the abundant life enjoyed by modern society depends, yet their reserves are finite.

As stated in our Code of Conduct, the JX Nippon Mining & Metals Group promotes recycling to achieve zero emissions while continuing to pursue technical rationality and efficiency and to make improvements in product quality and properties. In such ways, we are continually targeting innovation in the productivity of resources and materials. Through ongoing product and technology development and outside collaboration, among other means, we seek the innovation that will ensure nonferrous metal resources can be used effectively and provide greater convenience.

At JX Nippon Mining & Metals, we have formed a Technology Council as an advisory body to the president. It discusses future possibilities for technology overall, including this topic, from the standpoint of business administration.

Developing Resources by the JX-Iodine Process

Reserves of copper and other nonferrous metals, while essential to the abundant life of contemporary society, are finite. Mines today are increasingly developed at higher elevations and in more remote locations, while the grade of ores is declining. Another problem is rising resource nationalism in various parts of the globe. As a result, even greater importance than before is being attached to effective resource use. In our resources development business and smelting and refining business, the Group is pursuing the efficient mining, concentration, and refining of copper ores, seeking effective use of limited nonferrous metal resources.

Background

Over the years, the grade of copper ores available throughout the world has been declining. Much of the copper ore mined these days is low-grade ore of less than 1% copper content. Low-grade ores for which ordinary flotation processes are not economically feasible have therefore not been exploited as resources. Among these, primary copper sulfide ores have been considered particularly difficult ores from which to leach out the copper.

We developed the JX-iodine process as an original technology for efficiently leaching and recovering copper from these ores, and are moving closer to commercialization.

The JX-Iodine Process

This is a relatively simple process for oxidative leaching of copper from primary copper sulfide ores. Key features of the process are the addition of iodine as a catalyst and use of iodine recovery equipment along with the SX-EW equipment used for conventional heap leaching.* While taking advantage of the technological features, the process complies with various environmental regulations and is designed with due consideration for environmental protection.

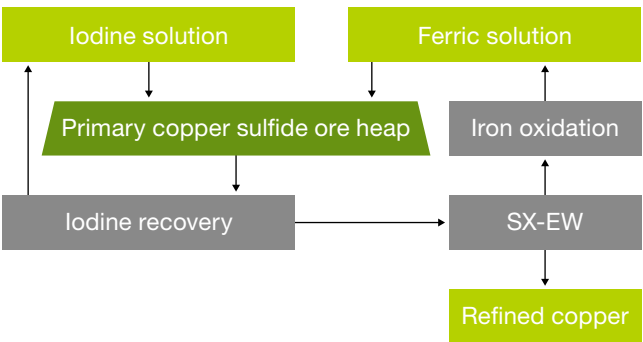
The JX-iodine process is original technology that will contribute to effective use of limited copper resources and their stable and efficient supply, while bringing a technological advantage to the resources development business of JX Nippon Mining & Metals.

* Heap leaching: A process of piling up ores that have been crushed in a heap and pouring dilute sulfuric acid on them to leach out the copper.
SX-EW: Solvent extraction and electrowinning. The process of adding a solvent to the copper leachate obtained by soaking in sulfuric acid, selectively extracting the copper ions (solvent extraction), and then producing refined copper from the liquid copper sulfate by electrowinning.

Current Assessment of Feasibility and Future Outlook

For approximately one year starting in 2014, we conducted heap-leaching experiments in Chile using the JX-iodine process, verifying its commercial feasibility and effectiveness in improving copper leaching performance. Currently, we are preparing for on-site verification tests at mines and with ores for which the technology promises to be most effective.

Recovering Copper by the JX-Iodine Process



Heap-leaching experiments in Chile to verify the JX-iodine process



Refined copper extracted in JX-iodine process heap-leaching experiment



Crude ores containing primary copper sulfide ore used in the experiments

Endowed Research Unit for Nonferrous Metal Resource Recovery Engineering (JX Metals Endowed Unit)

In recent years, the number of researchers and engineers in Japan working in fields related to smelting, refining, and recycling nonferrous metals has been continually decreasing. In response to this situation, JX Nippon Mining & Metals, in collaboration with the Institute of Industrial Science, the University of Tokyo, launched the Endowed Research Unit for Nonferrous Metal Resource Recovery Engineering (JX Metals Endowed Unit) with the aim of unifying the forces of industry, government, and academia toward energizing the industry and raising the level of its efforts. In the Endowed Unit, these unified forces have been carrying out various initiatives, from using and extending smelting and refining technologies to develop new environment-friendly recycling technologies for nonferrous base metals and rare metals, to developing the human resources in charge of the work in this field.



Press event at the start of Phase 2 (January 2017)

Phase 2 Project Professors



Toru H. Okabe
Project Professor

Deputy Director, Institute of Industrial Science, the University of Tokyo
Director and Professor, Integrated Research Center for Sustainable Energy and Materials, Institute of Industrial Science, the University of Tokyo

Principal research theme
Development of efficient recycling technologies for rare metals



Chiharu Tokoro
Project Professor

Professor, Faculty of Science and Engineering, Waseda University
Principal research theme
Development of separation and concentration technology to utilize waste/refractory ore as a "resource"



Takashi Nakamura
Project Professor

Director, Fukuoka Research Commercialization Center for Recycling Systems
Principal research theme
Metal recycling based on the new concept of "artificial deposit"

Note: Masafumi Maeda, who served as Project Professor from Phase 1, stepped down as of March 31, 2018, having reached retirement age.

Overview of Activities

A major focus of activities in Phase 1, which began in January 2012, was on providing various opportunities for learning about nonferrous metals. During the five-year period, symposiums and workshops were held nine times, attended by a total of 1,600 persons from industry, government, and academia. As a result of these activities, the Endowed Unit can now be seen as one of Japan's leading platforms built through industry-government-academia collaboration in the field of nonferrous metal smelting, refining, and recycling.

Phase 2, started in January 2017, continues the Phase 1 initiatives, while also emphasizing public relations to highlight the importance and future potential of the nonferrous metals field to the general public, especially young people of high school age and below. The aim is to secure the human resources who will lead the next generation and thereby contribute to the creation of a recycling-oriented society. In addition, the unit is actively engaging in new initiatives, including collaboration with other universities.

**Endowed Research Unit for Nonferrous Metal Resource Recovery Engineering
(JX Metals Endowed Unit)**

Examples of Activities in Fiscal 2017

Activities Aimed at High School Students

“Friday Special Lecture for High School Students”
(May 2017)

At this lecture, held by the College of Arts and Sciences of the University of Tokyo, Professor Okabe gave a presentation titled “Future Materials: Titanium and Rare Metals.” More than 150 persons were in attendance at the lecture, which was also streamed live on the Internet to 37 high schools throughout Japan. Professor Okabe went beyond talking about rare metals and other nonferrous metals, carefully explaining such matters as the difference between “science” and “engineering” in academic fields.



Lecture by Professor Okabe



Lecture by Professor Okabe

Extension Special Lecture for High School Students
(July 2017)

This lecture, organized by the Kanto Branch of the Society of Chemical Engineers, with the joint support of the Faculty of Science and Engineering, Waseda University, and the JX Metals Endowed Unit, was attended by more than 50 high school students. In Part 1, Professor Tokoro gave a presentation on separation technologies for extracting metal resources, and on applications of high school science to actual society. Part 2 started off with an experiment in which metal ions were identified in a solution prepared in advance. The participants tried to determine the metal using the reagent reaction as a clue. Students then toured the laboratories and facilities as they learned about the importance and appeal of this field of study.



Participants looking at reagent reaction



Participants looking at reagent reaction

Activities Aimed at Primary and Middle School Students

Exhibit at “UniLab” (August 2017)

At the UniLab (University Laboratory) event, an experimental science class for primary and middle school students held by the Faculty of Science and Engineering of Waseda University, a joint exhibit was presented by the research laboratory of Professor Tokoro and the JX Metals Endowed Unit, where third- and fourth-graders could experiment with gold-plating on copper sheets. The experiment piqued the interest of participants. They thought about the electrical conductivity of materials to choose the electrode for plating, and to affix seals on copper sheets to see the difference between plated and non-plated areas.



Plating experiment

Special Lecture in Higashimatsuyama, Saitama Prefecture
(November 2017)

At this lecture event put on by the Board of Education in Higashimatsuyama City, Professor Okabe spoke to an audience of around 700 of the city's second-grade middle school students on the theme, "Future Materials: Titanium and Rare Metals." His explanations covered examples of nonferrous metals used in familiar places, such as the titanium roof tiles of Tokyo's Sensoji temple, as he spoke passionately about the importance of rare metals and other nonferrous metals.



Lecture by Professor Okabe

Activities and Symposium for the General Public

Booth Display at the University of Tokyo's Komaba
Research Campus Open House (June 2017)

At the two-day Open House, the Company and the JX Metals Endowed Unit, collaborating with the university's Office for the Next Generation (ONG), presented an experiential booth display. Along with displays of copper ores, refined copper, and examples of copper use in automobiles, hands-on experiments provided an easy-to-understand introduction to the properties of copper such as its high thermal conductivity and effectiveness for electromagnetic wave shielding. Visitors were interested in the ores, which they saw for the first time, and enjoyed the experiments.



Booth staff explaining an experiment

Symposium on Minor Metals in Nonferrous Metal Smelting
(November 2017)

Nine lecturers from industry, academia, and government were invited to speak at the convention hall of the Institute of Industrial Science, the University of Tokyo. Around 160 persons attended the event, which featured distinguished talks and active discussions on the future vision and challenges of mining, production and recycling of minor metal resources, such as molybdenum, rhenium, and bismuth, which are by-products of non-ferrous metal smelting and refining processes.



Lecture in progress at the symposium

TOPICS 2 Roundtable Discussion on Phase 2 of the JX Metals Endowed Unit



Toward the Advancement of the Nonferrous Metals Industry

JX Nippon Mining & Metals established the Endowed Research Unit for Nonferrous Metal Resource Recovery Engineering (JX Metals Endowed Unit) in collaboration with the Institute of Industrial Science of the University of Tokyo. Phase 2 has been underway since January 2017. We held a roundtable discussion with Professor Chiharu Tokoro of Waseda University, newly appointed as Project Professor in Phase 2, for a roundtable discussion. (June 2018, in Tokyo)

Issues for the Nonferrous Metals Industry

Komatsuzaki To begin, I would like to ask you to talk about current issues for the nonferrous metals industry as seen from the corporate standpoint and from the university standpoint.

Yuki Six years since the start of the Endowed Unit, let me first of all take a look back at Phase 1. There were two objectives in starting the unit. The first was to help create a recycling-oriented society through surveys and research on the engineering for recycling metal materials essential to industry. The second was to contribute in the long term to human resource development in a wide range of related fields, not limiting the efforts to one university and one corporation, and to form a base for leading-edge research and industry-academia collaboration. Human resource development, not limited to one university and one corporation, was seen as an important issue from the start.

Among the major achievements of the five years of activities in Phase 1 were the symposiums we held, each time gathering more than 200 professionals from industry, government, and academia. I believe that even the students and young researchers who viewed these events up close could appreciate that they were extremely lively, but at the same time we were keenly aware of the limits to the role of symposiums.

As computers have progressed in recent years, electronic parts and devices have taken on highly advanced functions. And

the development and supply of the leading-edge materials used in these parts and devices relies on high-purity, high-quality nonferrous metals. Even so, young people show little interest in materials or the nonferrous metals industry, and the number of university researchers and courses related to nonferrous metals has been decreasing. From the corporate standpoint, we feel a strong sense of impending crisis: unless we break out of this situation, the supply of advanced functional materials will become hard to maintain.

Sustained growth of the materials industry requires securing human resources to support it. As I mentioned earlier, we have seen human resource development as an important issue. In order to develop human resources, however, you have to first secure human resources to develop. Thinking that approaching students at the university level may be too late, therefore, in Phase 2 our focus turned to helping primary, middle, and high school students, and their parents to understand the importance and appeal of the industry.

Tokoro I watched the Phase 1 activities from the sidelines and felt that the high quality of the symposiums provided wonderful opportunities for networking and exchanges in our field.

It is also true that the university students were stimulated by these opportunities. The university is gradually becoming more successful at conveying the appeal of this field to students who

TOPICS ② Roundtable Discussion on Phase 2 of the JX Metals Endowed Unit



have already chosen it, and developing their abilities. Although we have a wide range of well-rounded programs for students once they have entered the university, however, we had nothing for the pre-university stages, so lately we have also begun approaching primary, middle, and high school students. Thanks to the Endowed Unit, such activities have little by little become more active, for which I am very happy. Before they decide on a university, students choose a field of interest by gathering quite a lot of different information, which means that we too must effectively convey to them the importance and appeal of this field.

One more thing lacking in human resource development, I feel, is education after students graduate from university, or even after they complete graduate school, to develop the elite who will lead this field forward. Various schemes are needed for nurturing the elite. To facilitate the advancement of people who have overall knowledge of this field and appreciate its appeal, for example, it will be important to get them involved in large projects or leading-edge research, and to provide opportunities for looking anew at the results through outreach activities.

Yuki From the corporate standpoint, securing and developing human resources does not necessarily mean only those people

who will enter the corporate world. The process could not exist without the educational environment for developing such people, as well as educators and researchers. As Professor Tokoro said, elite education is highly important for developing the next generation.

Initiatives for Developing the Next Generation of Human Resources

Komatsuzaki A focus of Phase 2 is communicating information about the nonferrous metals industry and the appeal of this field. It is also about creating a mechanism for helping young people, whether primary, middle, or high school students to feel this attraction and become interested in the field. The mechanism would, in due course, educate them and develop them further as members of the elite or professionals after they graduate from university. Then there is industry-academia collaboration as well. All this presents quite a big topic to address.

Next, looking back at the initiatives during the past 18 months of Phase 2, I would like to ask you what you see as the good points and points needing improvement. Let me ask you first about the topic of activities for developing the next generation.

Yuki As part of the activities at UniLab^{*1} (see page 77 for details), the highly unique mascot Coppy the Kappa made an appearance. This mascot also enlivened the University of Tokyo's Komaba Research Campus Open House^{*2} event, with young children hugging it and high schoolers calling it by name. Then in 2018, a science class was held for the first time, in which high school students enjoyed experimentation with copper smelting and refining. This was another big success.

A good result from the corporate standpoint is the fact that the importance of these kinds of events is increasingly

^{*1} An experimental science class for primary and middle school students put on by the Faculty of Science and Engineering of Waseda University. It was held for the 31st time in 2018.

^{*2} An event introducing the public to research institutions on the University of Tokyo's Komaba Research Campus, including the Research Center for Advanced Science and Technology, the Institute of Industrial Science, and the Komaba Open Laboratory.

recognized not just in the Head Office but throughout the Company, as demonstrated by the participation of young engineers from the Technology Development Center, for example.

The problem is, the results of developing the next generation become evident only in the future, making it very difficult to assess the results through observation. Yet, we feel a sense of impending crisis that, unless we do this now, the talent pool will continue to shrink. We believe what is important at this time is to continue with our effort.

Tokoro It has been an extremely fulfilling experience for me, as I and students from my lab took part in the extension class for high school students and in the UniLab events. I feel the students putting on the events also learned a lot. They were highly effective events for human resource development on both sides.

Since we are academics, we all tend to rely on logic to convey things correctly, but when it comes to young people in particular, the lower their age, the greater the need to appeal to intuition. In that sense, having a mascot with an intuitive appeal is extremely important.

The Spread of Industry-Academia Collaboration

Komatsuzaki What are your views on industry-academia collaboration?

Yuki Along with the new initiatives, symposiums for professionals are being continued in Phase 2, and the fact that these activities are increasingly gaining momentum is a plus in terms of establishing a firm base for the Endowed Unit.

As for collaboration, in April 2017, right after the start of Phase 2, an endowed class titled "Laboratory of Non-ferrous Extractive Metallurgy" was established by Mitsubishi Materials at Kyoto University. Then in April 2018, a joint research department was created with Sumitomo Metal Mining in the Institute of Multidisciplinary Research for Advanced Materials of Tohoku University. The first of these targets those who, after joining a company, decide to return to studying nonferrous metal smelting and refining. Our Company is also taking part in this,

as it looks set to become an activity of the industry as a whole. The latter, in addition to heightening basic knowledge of and interest in nonferrous metals through joint research, is creating opportunities for getting in touch with the world of manufacturing through factory tours and seminars. I believe it is important that both the Endowed Unit and endowed classes, each with their own characteristics, energize the nonferrous metals industry and help to secure and develop human resources. The notion of not limiting our efforts to one university and one corporation, which we had when Phase 1 began, is starting to become a reality now, after six years. A framework of collaboration and cooperation with the Mining and Materials Processing Institute of Japan will also become increasingly important going forward.

Tokoro The fact that the trend of endowed classes is spreading to other universities and corporations is evidence of how the Endowed Unit is putting out its message with major impact.

For a long time the university has experienced a "postdoc" problem" among young researchers, and the problem is not limited to this field. With so many researchers wanting to remain in the university but facing a lack of postdoctoral positions, a negative spiral often results in which students decide not to go on to pursue a doctorate because they feel they won't be able to remain in the university after they complete their studies. I have hopes for industry-academia collaboration as a way of giving these young people a place to be active in the research area and, through outreach activities, an opportunity to grow. It would be good if through industry-academia collaboration, programs could be created from a systematic and long-term perspective to enable young people to carry on research with peace of mind. As academic societies and associations would play a major role in such programs, I would like to ask them also to play coordinating and leadership roles.

^{*} Postdoc: Postdoctoral researcher. A researcher who is appointed to a fixed-term position after earning a doctoral degree

Discussion Participants



Chiharu Tokoro
Professor, Faculty of Science and Engineering, Waseda University
Project Professor, Endowed Research Unit for Nonferrous Metal Resource Recovery Engineering, the Institute of Industrial Science, the University of Tokyo



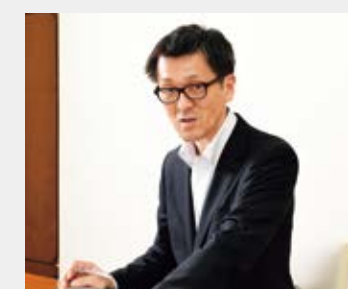
Norio Yuki
Executive Officer
Deputy General Manager, Technology Group
JX Nippon Mining & Metals Corporation



Kan Komatsuzaki
Executive Officer in charge of the Administration, Legal, and Public Relations & CSR Departments
General Manager, Administration Department
General Manager, Secretariat
JX Nippon Mining & Metals Corporation



Yuji Narazaki
General Manager, Public Relations & CSR Department
JX Nippon Mining & Metals Corporation



TOPICS ② Roundtable Discussion on Phase 2 of the JX Metals Endowed Unit



Komatsuzaki As Professor Tokoro noted, I feel that it is important to think from a wide perspective and to create a mechanism that facilitates the involvement of groups like the Japan Mining Industry Association and the Mining and Materials Processing Institute of Japan.

Tokoro Yes, it really has to be an all-Japan effort.

An All-Japan Effort to Aim for Industry Advancement

Komatsuzaki I would be interested in hearing any ideas you might have about making the activities of the Endowed Unit even better.

Yuki I would definitely like to advance collaboration with the Mining and Materials Processing Institute of Japan. But rather than leaving things up to academic societies, the corporate side will also need to participate proactively. We need to step up cooperation further with academic societies and associations so that not only the Mining and Materials Processing Institute but also the metals and chemical engineering fields handling leading-edge materials can strongly advocate the importance of these materials and draw the attention of young people in these fields. The keyword, once again, is all-Japan.

Also, for the Endowed Unit, “university students” basically means University of Tokyo students. If we are going to make the effort to put on a symposium, it would be even better to have undergraduate and graduate students from all over Japan take part in some capacity or other, seeing it as collaboration among the various students.

And what I would like to have young people think about is media strategy—how to drum up interest by, for example, making use of a mascot.

Tokoro As we have been doing outreach, one thing we have gradually come to understand is that it’s no good just to say what you want to say. We mustn’t forget that outreach is really about communication, and needs to be a two-way process. In other words, we have to understand what the other side is thinking, and understand what they want, and from there we need to learn, and take what we learn back home with us. We have an enormous amount to gain by doing this, so I would like to have all kinds of people involved in the process.

Furthermore, use of media is exceedingly important in terms of extending information about our field from the simple facts to a connected narrative, and from there to the full picture. And it is at the extension class for high school students that we are taking it even further, to the “movie” level. Right now, we are taking various simple factual elements as our initial focal points, aiming first to move on to the narrative stage, and then to the full picture.

Narazaki Since the activities of the Endowed Unit are mainly carried out in direct contact with primary and middle school students, we benefit from being able to directly observe their reactions and what interests them. Aiming for the next target—the general public—involves appealing to them via the Internet and images, but with this approach it can be difficult to see the reaction of the audience. Fundamental to thinking about this is the feedback received at events we participate in, so being sure to get the views of people at these events will lead to more effective activities.

Komatsuzaki As we further build up industry-academia collaboration, we need to strengthen ties between this Endowed Unit and other units, taking a truly all-Japan approach toward advancing the entire nonferrous metals industry. Thank you all very much.

TOPICS ③ The Current State of Lithium-Ion Battery Recycling

At the Tsuruga Plant* of JX Nippon Mining & Metals, commercial feasibility trials on lithium-ion battery recycling have been underway since April 2010.

* The Tsuruga Plant is on the premises of JX Nippon Tsuruga Recycle.

What Are Lithium-Ion Batteries?

Lithium-ion batteries are essential to our daily lives. When people think of lithium-ion batteries, the typical image that comes to mind is batteries in small, portable devices; yet they are also used in electric vehicles including hybrid cars, in buses, trucks, and trains, and as backup power sources in aircraft and artificial satellites.

An advantage of lithium-ion batteries is their rechargeability. Their high energy density results in large charging capacity despite their compact size. What is more, they can be recharged by repeated topping up.

While these batteries are today used in many different applications, the continued availability of their raw materials is in question.

Lithium-ion batteries are made from lithium along with nickel, cobalt, manganese, and other metals. These are all what are called rare metals, with relatively limited reserves worldwide. They are also difficult to separate as single metals, and costly to recover.

Cobalt, in particular, is produced not only in small amounts, but also in limited regions, raising concerns about future availability shortages.



Development of Lithium-Ion Battery Recycling Technology in the Company

With the aim of developing lithium-ion battery recycling technology, JX Nippon Mining & Metals built a commercial feasibility trial plant in 2010 in Tsuruga, Fukui Prefecture, where we have been carrying out technology development ever since.

When the plant first went into operation, testing began on using as a raw material the scrap generated in the process of manufacturing cathode materials (in which rare metals are used), one component of lithium-ion batteries.

Scrap generated in the product manufacturing process at factories or other facilities is called primary scrap, while secondary scrap is from products at the end of their life following use in our daily lives.

Compared to primary scrap, secondary scrap requires a more advanced level of recycling technology, since the routes for collection of discarded products are many and varied, and the kinds and percentages of metals contained in the products vary.

After carrying out technology development for recycling of primary scrap, we began developing technology for secondary scrap recycling in around 2014, testing the recycling of end-of-life lithium-ion batteries from laptops, cell phones, tablet PCs, and other devices.

As a result, in addition to the recovery of nickel and cobalt, we have succeeded for the first time anywhere in recovering lithium, for which recovery was believed particularly difficult, from end-of-life batteries.



Tsuruga Plant exterior



Inside the Tsuruga Plant

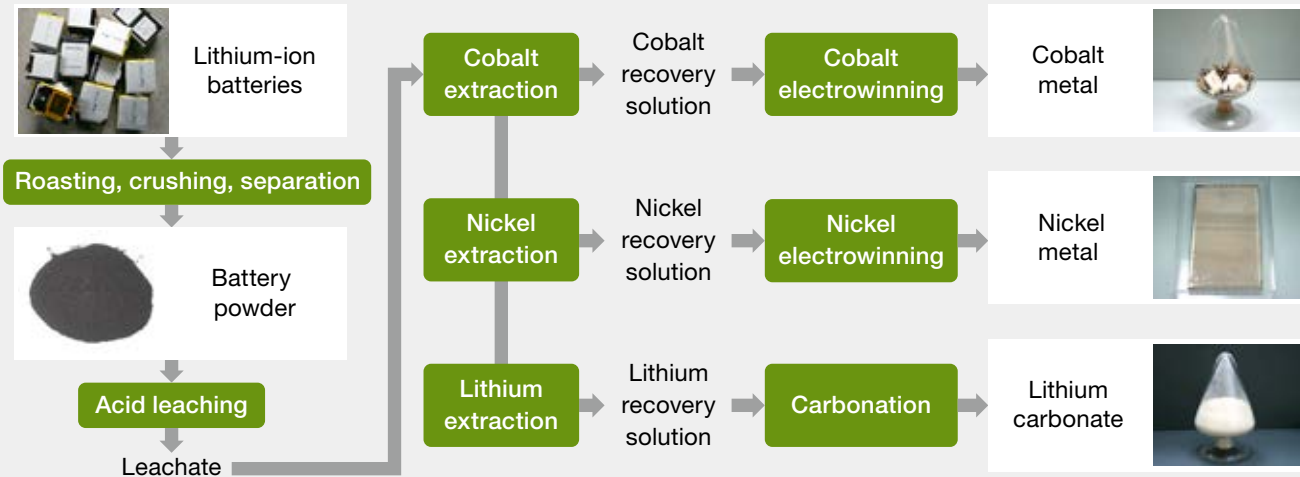
TOPICS The Current State of Lithium-Ion Battery Recycling

Process of Lithium-Ion Battery Recycling

To recover the metals cobalt, nickel, and lithium, the end-of-life lithium-ion batteries are first incinerated (roasted) and the battery casing and the organic materials used as electrolyte are removed. Next, crushing and separation are performed, and powder called battery powder is recovered. The battery powder contains cobalt, nickel, lithium, and other metals in concentrated form. The powder is dissolved in acid, resulting in a mixed metal solution. Technology called solvent extraction is used to separate and recover each of the metals mixed together in the solution. Solvent extraction is a

separation and recovery technique in which a solution and oil (organic solution) are mixed together, and metal ions in the solution are transferred from the solution into the oil. By using different types of oils and adjusting the pH of the solution, it is possible to transfer only the desired metal from the solution to the oil. It is also possible to return the desired metal from the oil to a solution. At the Tsuruga Plant, this technology is used to separate and recover each metal from a solution of mixed metals, successfully recovering cobalt, nickel, and lithium.

Process of Lithium-Ion Battery Recycling



Looking Ahead

Today the world of automotive vehicles is in the midst of major change. In China and Europe, there is a clear trend away from gasoline-powered to electric vehicles, with active entry into the market even by companies that are not traditional automakers. The batteries used in these vehicles are also lithium-ion batteries. Demand for the raw materials used in lithium-ion batteries will grow

increasingly, making them harder to obtain. Drawing on its technological advantages, JX Nippon Mining & Metals will advance lithium-ion battery recycling as a new source of this metal to continue its contributions to realization of a sustainable society.

VOICE For Promoting Technological Progress



Junichi Arakawa
Coordinator
ART Section
JX Nippon Tsuruga
Recycle Co., Ltd.

After engaging in the development of lithium-ion battery recycling technology at the Technology Development Center, I have been involved in the commercial feasibility trial at the Tsuruga Plant since 2012. We configured the process for recycling end-of-life lithium-ion batteries by combining the sales and marketing capacity to collect the raw material, the development capacity involved in process improvement, and the shop-floor capacity to operate the plant. I believe each of the people in charge of these various aspects carried out their roles with a sense of responsibility, resulting in a successful outcome. Since the Tsuruga Plant currently uses end-of-life lithium-ion battery scrap as raw material, measures to deal with impurity are essential. As the volume of scrap to be processed grows, the amount of impurity to be removed also increases, so we are constantly under pressure to develop impurity removing technology. Today, when electric vehicles are becoming more commonplace, I feel that the role of the Tsuruga Plant is spreading beyond Japan to the wider world. By continuing our efforts to promote effective use of resources, we would like to contribute to the sustainable growth of society.

Initiatives for Biodiversity Conservation

Initiatives for Biodiversity Conservation

Plans for Tree Planting and Biology Research at the Caserones Copper Mine

At the Caserones Copper Mine, plans are being carried out to plant 48,200 seedlings of 15 native flora species in an area spanning 143.51 hectares (1.43 square kilometers), for the purpose of protecting plants that may be impacted by the mine operations and conserving biodiversity. The areas being planted are those around Ramadilla on the mine site and the off-site areas around Maitencillo and Amolanas. The work is expected to be completed in 2019. Among the types of flora being planted are Amancay (*Balbisia peduncularis*), Carboncillo (*Cordia decandra*), and Retamo (*Bulnesia chilensis*). In addition to these, monitoring of native plants such as Acerillo (*Buddleja suaveolens*), Flor del minero (*Centaurea cachinalensis*), and Baylahuen (*Haplopappus baylahuen*) is being carried out to obtain information on their biological growth.

Research is also being conducted on the plant species Llareta (*Azorella monantha*). Since Llareta grow at altitudes between 3,000 and 3,900 meters, where the impact of the Caserones Copper Mine is greatest, these plants are of high importance as objects of study, which is aimed at learning such matters as their distribution in the Atacama region, how they propagate, and their phenology.



Reforestation Activities in Japan

The Group has been carrying out reforestation activities, especially at the sites of closed mines, with the cooperation of local communities. We will endeavor to conserve and improve biodiversity by continuing these activities.

Closed Oe Mine Site (Niki Town, Hokkaido)

Maintenance of this site has been ongoing since fiscal 2008, working with the local Yotei Forestry Cooperative. In fiscal 2017, based on a five-year plan that began in fiscal 2013, maintenance was performed to ensure sufficient forest road width (for a distance of approximately 8 kilometers), and underbrush was cleared in places that have been reforested (approximately 17 hectares).



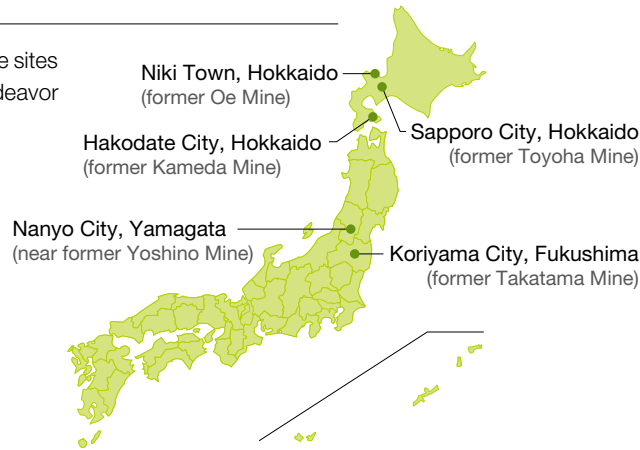
Closed Toyoha Mine Site (Sapporo City, Hokkaido)

Responding to requests from local community associations, the tailings dam site at the closed Toyoha Mine has been transformed into a scenic forest. Japanese white birch growing naturally on this site are being thinned and trees are being planted in the resulting spaces. To preserve and maintain the scenic appearance, in fiscal 2017 weeding was carried out across an area covering 1,400 square meters.



Closed Kameda Mine Site (Hakodate City, Hokkaido)

Reforestation of this site has continued since fiscal 2007, working with the local Hakodate Wide Area Forestry Cooperative to plant approximately 31,300 saplings in an area spanning some 15 hectares. Ongoing maintenance and restoration work in fiscal 2017 included clearing of underbrush around the planted saplings (approximately 6 hectares) and field mice extermination (approximately 15 hectares).



Closed Takatama Mine Site (Koriyama City, Fukushima)

Reforestation of this site and maintenance of previously improved areas have continued since fiscal 2005, working with the local Koriyama City Forestry Cooperative. In fiscal 2017, 2,400 saplings were planted in an area of about 1.2 hectares where the ground had been prepared in the previous fiscal year for tree planting. In addition, ongoing forest restoration work was carried out, such as further ground preparation, underbrush clearing in a previously reforested area of approximately 5 hectares, and the opening of a utility road.



Closed Yoshino Mine Site Vicinity (Nanyo City, Yamagata)

Since fiscal 2009, we have been cooperating with the city of Nanyo on a project to improve the scenic beauty of a section of the Ringo district. This Ryuju Satoyama Reforestation Project is also seen as a measure for revitalizing the local region. In fiscal 2017, underbrush was cleared in a previously reforested area of around 2.7 hectares, along with conducting surveys of sapling growth, as efforts focused on ensuring the health and vitality of the forest. Walking paths were also improved, steps were installed, and other measures were taken to make the forest more walkable.



Corporate Governance System

Board of Directors

The Company has established the Board of Directors to discuss matters stipulated in laws, regulations, and the Articles of Incorporation, as well as other important management issues. The Board is composed of the president and seven other directors (all male).^{*} Auditors also attend Board of Directors meetings and can offer their opinions.

^{*} All directors are internal directors and serve concurrently as executive officers.

Executive Meeting

The Company has established an Executive Meeting as an advisory body to the president. The Executive Meeting consults on matters important for the management of the Company. The status of operational execution and other issues are also reported and communicated to it. The Executive Meeting consists of the president and executive officers designated by the president. Full-time auditors also attend the Executive Meeting and can offer their opinions.

Auditors

Auditors attend Board of Directors meetings, Executive Meetings, and other important meetings, offering their views as necessary for raising the effectiveness of audits. They also review important documents and meet with officers and employees of JX Nippon Mining & Metals and each Group company, endeavoring to keep aware of the execution of duties by officers and employees.

In addition, auditors receive regular reports from the Internal Audit Department and independent auditors regarding auditing plans and their implementation status and results, while coordinating with these parties by exchanging views and information.

Compensation for Directors

The directors of JX Nippon Mining & Metals receive a monthly fixed compensation based on their role, and variable performance-based bonus payments. Bonus amounts are based on the consolidated business results of JX Nippon Mining & Metals as well as JXTG Holdings. We do not have a retirement benefit program for directors. In July 2017, a stock remuneration plan was introduced. A Board Incentive Plan (BIP) Trust is employed for this stock remuneration plan, whereby shares in JXTG Holdings acquired by the BIP Trust are granted to directors as part of their compensation, based on their executive position.

Management of Group Companies

Each Group company is placed under the jurisdiction of the appropriate operating or corporate department of the Company based on its business line, and the execution of its operations is managed and supervised by that department. Important matters pertaining to the management of individual Group companies are communicated to the Company via the supervising department, and these matters are referred and reported to Board of Directors meetings, the Executive Meetings, and other important meetings as necessary.

Internal Control System

The JX Nippon Mining & Metals Group has drawn up a basic policy for the establishment and operation of an internal control system, laying out rules on such matters as corporate governance, compliance, internal auditing, and risk management. Based on this policy, we have established an internal control system that ensures operations are carried out efficiently and properly.

Internal Control Council

To develop and operate the Group's internal control system, we set up the Internal Control Council as an advisory body to the president, with the role of monitoring the status of internal controls and holding discussions to address issues as necessary.

As a rule, the council meets once a year.

Internal Control Promotion Committee

The Internal Control Promotion Committee was set up for advising and assisting with the duties of the Internal Control Council. The committee's responsibilities include monitoring internal control activities.

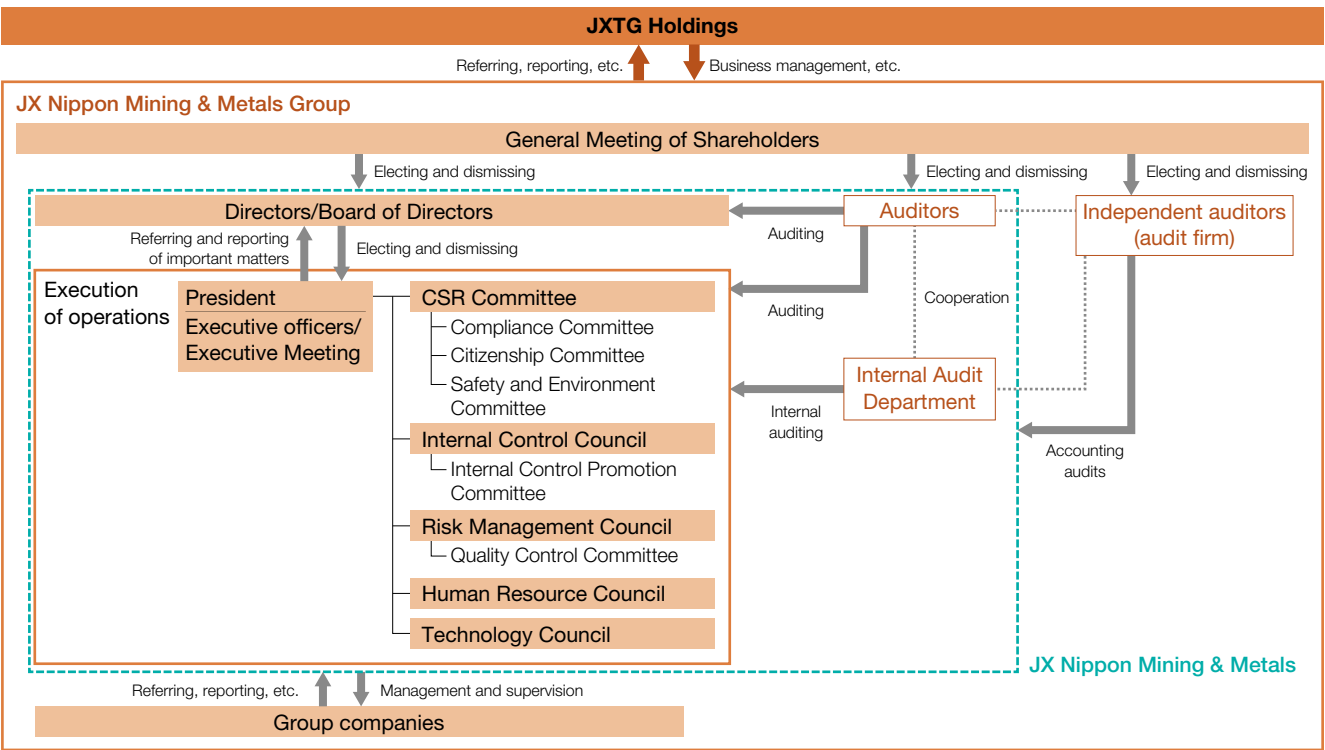
As a rule, the committee meets twice each fiscal year, once in the first half and once in the second half of the year.

Internal Auditing

Internal auditing is carried out across the entire JX Nippon Mining & Metals Group to investigate, study, and assess the status of business administration, operations, and assets preservation from the standpoints of their legality, efficiency, and effectiveness. The Internal Audit Department is responsible for these functions.

The Internal Audit Department draws up a medium-term policy at about three-year intervals and drafts auditing plans for each fiscal year, carrying out internal auditing systematically. Internal auditing of Group companies is conducted with the collaboration and cooperation of auditors sent from the Company to Group companies. Based on the results of the audits, improvements are recommended as needed, and implementation of the recommended measures is tracked. Auditing results and findings are reported to the relevant Group company and to the president of JX Nippon Mining & Metals, as well as being reported as necessary to the Executive Meeting.

Corporate Governance Structure of the JX Nippon Mining & Metals Group



Insisting on Full Compliance

The JX Nippon Mining & Metals Group recognizes that earning the trust of stakeholders is essential to carrying out its business, and it therefore endeavors to enhance the integrity and transparency of its management through corporate governance. To make sure those efforts are effective, we have established and implement an appropriate internal control system, carry out periodic checks, and are proactively engaged in ensuring compliance.

Compliance Initiatives

The JX Nippon Mining & Metals Group insists that officers and employees comply fully with laws, regulations, and other rules.

We are building an organizational structure for compliance, aimed at ensuring corporate activities are conducted fairly, and at increasing public trust in the Group. To those ends, we are implementing a multilayered system of checks, providing relevant rules and regulations, and enhancing education to raise awareness, among other initiatives. In fiscal 2017 as in previous years, there were no adverse dispositions from regulatory authorities (license revocation, orders for improvement, fines, etc.) for violations of laws and regulations with respect to those governing bribery and anti-competitive behavior.

Performance regarding Key Compliance Goals in Fiscal 2017

1. Provision of compliance rules and ensuring full compliance

(1) Checking and improving the implementation of compliance rules

We determined the extent to which compliance rules were being implemented at each Group company, and took steps to rectify organizational or operational issues that were identified.

(2) Taking steps to eliminate association with antisocial forces and implementing anti-bribery measures

Audits were conducted at the Company and at Group companies to confirm the extent to which measures for eliminating association with “antisocial forces” (the term used to refer to organized crime groups in Japan) and anti-bribery measures were in place and being followed.

(3) Program for ensuring compliance with laws for prevention of unfair competition

Given the growing trend in countries around the world to make competition laws more rigorous, the JX Nippon Mining & Metals Group established a program to ensure compliance with such laws. The program specifies checks that must be made prior to attending gatherings of competing firms or engaging in transactions that may violate competition laws, and mandates regular reporting by managers to the office in charge. Audits of the program’s implementation status during fiscal 2017 again verified that it is generally being carried out properly.

2. Effective response to matters identified in inspections of environmental and safety-related compliance and labor compliance

In fiscal 2017, we conducted inspections of environment- and safety-related compliance at 12 of the Group’s operating sites to confirm their compliance with laws and regulations relating to the environment and safety. Overall, laws and regulations on the environment and on occupational health and safety were well understood at these sites, and the inspections found no major deficiencies in comprehension. Appropriate measures were taken to address matters identified in the inspections.

Also in fiscal 2017, the Group conducted inspections at 17 operating sites to check legal compliance regarding human resources and labor, and verified that the relevant laws and regulations were being implemented appropriately for the most part.

3. Enhancing compliance knowledge and awareness among officers and employees

The Group seeks to educate officers and employees fully to increase their knowledge and awareness of compliance, so that they will act properly from a compliance standpoint in each of their work processes. In fiscal 2017, a total of 38 compliance education sessions were provided to approximately 770 persons. They included level-specific sessions targeting improvements in knowledge and awareness relating to particular work duties, and sessions on laws and legal affairs aimed at drawing attention to specific legal requirements. Questionnaires administered following the sessions showed that most of the attendees found the education useful.

(1) Level-specific compliance education

Compliance education was given for officers of the Company, management-level employees, and newly appointed managers, with content geared to their respective roles and responsibilities. A total of 25 sessions were provided for approximately 450 persons.

(2) Education on quality assurance

Education was begun at Group operating sites on responsibility for quality assurance. In fiscal 2017, two sessions were conducted at the Head Office for approximately 20 persons in charge of quality control. Similar sessions are being given at Group operating sites in fiscal 2018.

(3) Education on laws and legal affairs

At Group head offices and operating sites, 11 sessions were given for approximately 300 persons. Topics covered included internal control, security export control, and the Stamp Tax Act.

4. Implementation of compliance inspections and effective response to matters identified

Besides addressing matters identified in the compliance inspections conducted in fiscal 2016, we carried out inspections in fiscal 2017 aimed at determining the status of legal compliance in each department, operating site, and affiliated company. These included investigations, questionnaires, interviews, self-statements, environment and safety audits, reports of close calls, and the above-noted inspections of environment and safety-related compliance and labor compliance.

Measures related to compliance in the Group, including basic policy, priority issues for the fiscal year, and education, are determined at meetings of the Compliance Committee (held twice a year as a rule). The committee consists mainly of the JX Nippon Mining & Metals president and officers in charge of compliance at each department of the Company and at major Group companies in Japan and overseas. It receives reports on the status of compliance from each department of the Company and from Group companies. Based on these reports, the committee evaluates the risk of fraudulent acts, legal violations, and other misconduct related to business operations, and reflects its conclusions primarily in setting priority issues and formulating educational plans.



We have also taken a range of measures to spread awareness of the program throughout the Group, such as displaying posters to publicize the program at operating sites, handing out pocket

In fiscal 2017, multiple reports were confirmed. Necessary measures were carried out for all incidents in accordance with relevant rules and regulations, while taking due care to protect the whistleblowers.

We have drawn up the JX Nippon Mining & Metals Group Basic Policy on Confidential Information Management and taken other measures to manage information properly, geared to the situation at each Group company and the materiality of the information it handles.

We have drawn up the JX Nippon Mining & Metals Group Information Security Regulations and accompanying Information Security Guidelines, and we implement security measures governing the use of computers, networks, and USB memory devices in the Company.

Risk Management

A group of five men in suits are seated around a long, polished wooden conference table. They appear to be in a formal meeting or press conference setting. The room has wood-paneled walls. In the background, there is a small clock and a white vase on a shelf. The men are looking towards the left side of the frame, possibly towards a speaker or a camera.

As a rule, the council meets twice a year. In fiscal 2017, however, because of the nature of its activities, it met each quarter for a total of four meetings.



Sustainability Report 2018 90

Business Continuity Planning Initiatives

As part of its risk management, the JX Nippon Mining & Metals Group has drawn up a BCP^{*1} designed to ensure continuation of operations and early recovery in the event of a major earthquake.

By providing regular training, identifying and working to solve issues, and refining the basic plans for business continuity, we will aim for a transition from BCP to BCM^{*2} focused on continual improvement.

^{*1} BCP: Business Continuity Plan/Planning

^{*2} BCM: Business Continuity Management

Initial response to a major earthquake

The Company has introduced a safety confirmation system to promptly check on the safety of employees and their family members in the case of a major earthquake, as well as checking if employees' homes have been damaged.

Employees can use the system to report damage even when they are at home or otherwise away from Company premises, making use of their mobile phones, PCs, or other devices.

Business transceivers are provided in the homes of disaster response team members as a means of communication in case a major earthquake occurs in the Tokyo area at night or on a

holiday and a member is unable to make it to the Head Office. Managerial staff members are assigned an ID for remote access from their home PC to a company PC, enabling remote operation of in-Company systems.

As a measure to deal with employees who are unable to return home due to a disaster, a minimum of three days' worth of food, water, and other supplies for employees are stored at each operating site.



Disaster supplies stored at the Head Office

BCP Training

BCP training is conducted at the JX Nippon Mining & Metals Head Office, operating sites, and affiliated companies, assuming an earthquake with local seismic intensity at each site of 6+ on the Japanese scale of 1 to 7.

From the end of fiscal 2016 through fiscal 2017, training took place at the Head Office and main operating sites (Isohara Works, Hitachi Works, Kurami Works, and Pan Pacific Copper [Hibi Smelter

and Saganoseki Smelter & Refinery)), confirming response procedures in line with the basic plans, action plans, and other guidelines. The training brought to light unexpected situations as well as the need for provision of additional equipment and supplies. These issues are being addressed and the basic plans and other plans are being revised accordingly.



Confirming procedures in response to a major earthquake (Isohara Works)



Presentation on issues to be addressed (Hitachi Works)

Identifying issues and refining the basic plans

Progress with training and other activities was reported at each business group and operating site, and information was shared about remaining issues. It was decided to address these issues, refine the basic plans, and verify them in subsequent training, applying the plan-do-check-act cycle to the process.



For earning trust as a corporation

Material Issues



Respect for Human Rights

The JX Nippon Mining & Metals Group Code of Conduct states, “In international business operations, we aim to contribute to sustainable development by protecting the fundamental human rights of people in countries and areas where we operate, and by respecting their cultures and customs.”

For the Group, carrying out sound business practices, while respecting the human rights of local residents, employees, customers, business partners, and all others involved in the supply chain, is seen as a major premise for our continued operation.

We are holding explanatory meetings for local residents, interviewing employees and business partners, and taking other steps toward ensuring our business activities are conducted with all due consideration for human rights. Aiming to create a corporate climate where human rights are respected, we are also actively engaged in educational activities.

The JX Nippon Mining & Metals Group Code of Conduct states, “In international business operations, we aim to contribute to sustainable development by protecting the fundamental human rights of people in countries and areas where we operate, and by respecting their cultures and customs.” We are enacting initiatives to ensure respect for human rights, drawing on international norms such as the United Nations Global Compact, the International

For the Group, carrying out sound business practices, while respecting the human rights of local residents, employees, customers, business partners, and all others involved in the supply chain, is seen as a major premise for our continued operation.

JXTG Group

- 1 We shall not infringe on human rights through our business activities. We respect internationally accepted human rights standards and diversity, acknowledging differences pertaining to gender, age, nationality, race, ethnicity, skin color, culture, thought, religion, belief, political opinions, sexual orientation, and the presence or absence of disability.
- 2 We shall not engage in any type of discrimination or harassment.
- 3 We shall not engage in any forms of forced labor or child labor.
- 4 We shall not engage in business transactions which may lead to the prolongation of conflicts, human rights violations, or inhumane acts.

JX Metals Group Company and its Officers and Employees etc. shall not associate themselves directly with child-labour and/or forced-labour, and shall put efforts to contribute to solve such issues.

Hours of human rights education given in fiscal 2017
1,312 hours

Participation in Initiatives

Communicating Internationally

As a Member Company of the ICMM

The International Council on Mining and Metals (ICMM) is a global association of companies involved in mining and metal smelting and refining. Its aim is for nonferrous metals industries to help society grow sustainably. As an ICMM member, JX Nippon Mining & Metals has formulated its Code of Conduct in accordance with the ICMM 10 Principles for sustainable development, and works

to solve the issues described in these principles and the ICMM Position Statements that supplement them.

ICMM member companies are required to ensure transparency of reporting on their sustainability efforts. The Company prepares its sustainability reports and discloses its initiatives in accordance with the Core option defined in the GRI Standards.



ICMM 10 Principles

1. Apply ethical business practices and sound systems of corporate governance and transparency to support sustainable development.
2. Integrate sustainable development in corporate strategy and decision-making processes.
3. Respect human rights and the interests, cultures, customs and values of employees and communities affected by our activities.
4. Implement effective risk-management strategies and systems based on sound science and which account for stakeholder perceptions of risks.
5. Pursue continual improvement in health and safety performance with the ultimate goal of zero harm.
6. Pursue continual improvement in environmental performance issues, such as water stewardship, energy use and climate change.
7. Contribute to the conservation of biodiversity and integrated approaches to land-use planning.
8. Facilitate and support the knowledge-base and systems for responsible design, use, re-use, recycling and disposal of products containing metals and minerals.
9. Pursue continual improvement in social performance and contribute to the social, economic and institutional development of host countries and communities.
10. Proactively engage key stakeholders on sustainable development challenges and opportunities in an open and transparent manner. Effectively report and independently verify progress and performance.

ICMM Position Statements

- Mining and Protected Areas

■ Indigenous Peoples & Mining

■ Principles for Climate Change Policy Design
- Transparency of Mineral Revenues

■ Mining Partnerships for Development

■ Mercury Risk Management
- Tailings Governance

■ Water Stewardship

Endorsement of and Support for the EITI

The Extractive Industries Transparency Initiative (EITI) is a multinational cooperative framework that seeks greater transparency in the flows of funds from extractive industries, such as oil, natural gas, and metal mining, to the governments of resource-producing countries. The aim is to prevent corruption and conflicts, promoting

responsible resource development that will lead to poverty reduction and growth.

JX Nippon Mining & Metals, with its involvement in global resources development, endorses the EITI and actively supports its activities.

The EITI Principles

1. We share a belief that the prudent use of natural resource wealth should be an important engine for sustainable economic growth that contributes to sustainable development and poverty reduction, but if not managed properly, can create negative economic and social impacts.
2. We affirm that management of natural resource wealth for the benefit of a country's citizens is in the domain of sovereign governments to be exercised in the interest of their national development.
3. We recognise that the benefits of resource extraction occur as revenue streams over many years and can be highly price dependent.
4. We recognise that a public understanding of government revenues and expenditure over time could help public debate and inform choice of appropriate and realistic options for sustainable development.
5. We underline the importance of transparency by governments and companies in the extractive industries and the need to enhance public financial management and accountability.
6. We recognise that achievement of greater transparency must be set in the context of respect for contracts and laws.
7. We recognise the enhanced environment for domestic and foreign direct investment that financial transparency may bring.
8. We believe in the principle and practice of accountability by government to all citizens for the stewardship of revenue streams and public expenditure.
9. We are committed to encouraging high standards of transparency and accountability in public life, government operations, and in business.
10. We believe that a broadly consistent and workable approach to the disclosure of payments and revenues is required, which is simple to undertake and to use.
11. We believe that payments' disclosure in a given country should involve all extractive industry companies operating in that country.
12. In seeking solutions, we believe that all stakeholders have important and relevant contributions to make—including governments and their agencies, extractive industry companies, service companies, multilateral organisations, financial organisations, investors, and non-governmental organisations.

Participation in the United Nations Global Compact

JX Nippon Mining & Metals joined the United Nations Global Compact in August 2008. We support the Ten Principles on human rights, labor, the environment, and anti-corruption, and are committed to realizing these ideals.

Ten Principles of the United Nations Global Compact

Human Rights		
Businesses should support and respect the protection of internationally proclaimed human rights; and make sure that they are not complicit in human rights abuses.		Principle 1
		Principle 2
Labour		
Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining; the elimination of all forms of forced and compulsory labour; the effective abolition of child labour; and the elimination of discrimination in respect of employment and occupation.		Principle 3
		Principle 4
		Principle 5
		Principle 6
Environment		
Businesses should support a precautionary approach to environmental challenges; undertake initiatives to promote greater environmental responsibility; and encourage the development and diffusion of environmentally friendly technologies.		Principle 7
		Principle 8
		Principle 9
Anti-Corruption		
Businesses should work against corruption in all its forms, including extortion and bribery.		Principle 10

Communication with Industry Organizations

The JX Nippon Mining & Metals Group plays key roles in various industry organizations, making active use of the opportunities for communication with associated stakeholders.

Organization	Role within the organization	Overview and activities of the organization
Japan Mining Industry Association (JMIA)	Vice chairman, director, etc.	The JMIA represents companies engaged in the resource development and/or smelting and refining of nonferrous metals. With a view to the sound growth of the industry, it conducts surveys and other research on improving technologies, disseminates and publicizes knowledge, and proposes policies to government agencies, with respect to resource development, smelting and refining, and recycling. The JX Nippon Mining & Metals Group is a governing member, serves on various committees, and participates in running the association.
The Sulphuric Acid Association of Japan	Chairman	The association works toward the growth of the sulfuric acid industry and promotes friendly relations and mutual benefits for sulfuric acid manufacturers. The Company serves on the Operations Committee and the General Affairs Committee, is involved in surveys and reports on sulfuric acid supply and demand conditions, and takes part in governance of the association.
Japan Copper and Brass Association (JCBA)	Director	The JCBA is an industry association of companies manufacturing copper alloy products, namely plates, strips, pipes, and wires made by melting and rolling copper and copper alloys. By encouraging contacts and cooperation among members, it promotes the progress and growth of the rolled copper industry as a whole. The Group serves on the Road Map Committee, is involved in developing new demand and improving quality, and as a member of the Statistics Subcommittee, is involved in surveys and reports on market size.
Japan Society of Newer Metals	Director	The society focuses on new metals that are supporting the advance of high-tech industries. By conducting surveys and research, collecting and providing information, and promoting fellowship and cooperation among relevant organizations in Japan and overseas, it aims for the sound growth of the new metals industry and related industries. As a member of the Compound Semiconductors Subcommittee and the Target Subcommittee, the Company is involved mainly in market size surveys and reports and in making proposals to government agencies. The Company also works to improve health and safety as a member of the Safety Committee.
Japan Catalyst Recovering Association	Chairman	The association is made up of companies engaged in the reuse of catalysts and aims to promote the recycling of precious metals, rare metals, and other metal resources through the proper treatment of spent catalysts, etc. It conducts surveys and compiles statistics on recycling, and holds regular training sessions to improve technologies and promote friendship among members. The Company provides the chairman of the association, serves on the Public Relations Committee, and is involved in issuing survey reports and organizing general meetings.

As of June 2018

CSR Surveys

Surveys of employees were conducted as described below to determine the extent of employee awareness of CSR and involvement in its practice.

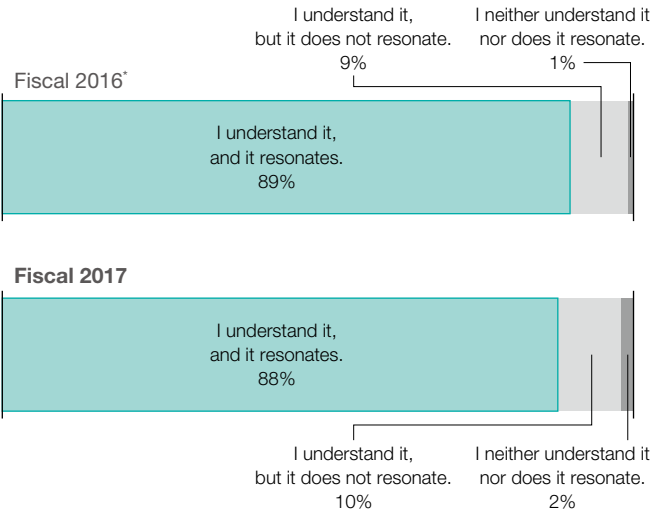
Method	Conducted by means of a questionnaire distributed with Sustainability Report 2017
Timing	October to December 2017
Respondents	5,517 employees at 31 domestic operating sites (93% of the 5,933 employees who received the questionnaire)

(1) Results relating to understanding, feeling of resonance with, and awareness of the JXTG Group Philosophy and JX Nippon Mining & Metals Code of Conduct

Understanding, resonance, and awareness all remained at a high level, similar to that for the fiscal 2016 survey.

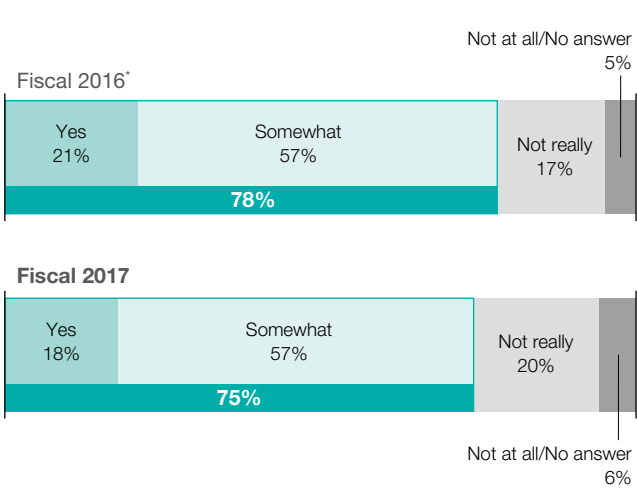
A. Understanding/resonance

(whether respondents felt that they understood the Code of Conduct and it resonated with them)



B. Employee awareness

(whether respondents felt that employees were aware of the Code of Conduct in their own organizations and workplaces)

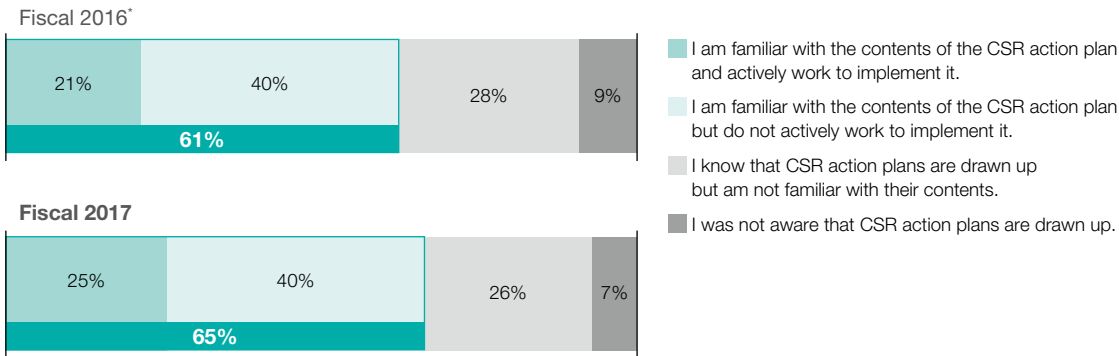


(2) Results relating to employee awareness of CSR action plans

Awareness of the CSR action plans showed improvement over the fiscal 2016 results.

The JX Nippon Mining & Metals Code of Conduct is implemented by drawing up CSR action plans.

Are you familiar with the CSR action plan in your own organization, and how are you putting it into practice?



* Respondents to the fiscal 2016 survey totaled 5,460 employees at 33 domestic operating sites (96% of the 5,689 employees who received the questionnaire). The survey was conducted from October to December 2016, and questionnaires were collected in the same way as in fiscal 2017.

(3) Requests and suggestions for Sustainability Report 2018

Each fiscal year when producing the sustainability report, the survey results on the previous year's report go into deciding the makeup. In the fiscal 2017 survey, more than 300 comments were received. Some of the most common requests and the responses implemented in Sustainability Report 2018 are introduced here.

Special features on timely topics would be welcome.

➡ In the Topics sections and elsewhere, we incorporated features on our engagement in IoT and AI, our quality management framework, and human resource development, all of which were popular requests.

The sheer comprehensiveness of the contents makes it quite a challenge to read it all. Could you improve this somehow, such as by liberal use of photos?

➡ We tried to make the contents easy to read through and conducive to repeated reading by, for instance, improving the layout using photos and diagrams, while maintaining the completeness of the reports. Also, we decided to publish the GRI content index on our website only for the reader's convenience.

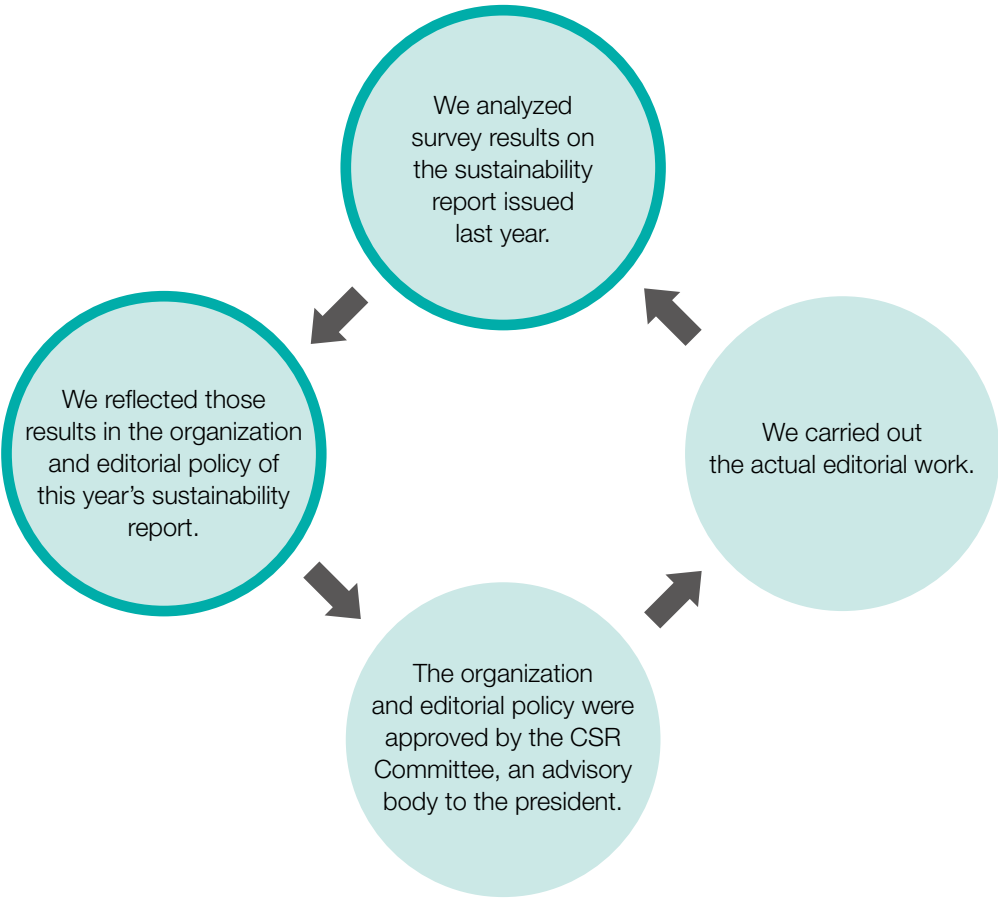
➡ The organization of the table of contents has undergone major changes compared to the fiscal 2017 version. Each of the material issues to be communicated has its own section, while we have tried hard to make the contents readable and easy to understand.

Including comments by employees helps the reader form a concrete image of the company and identify with it.

➡ We tried to include as many employee opinions as possible from various divisions.

➡ We had these employees talk about what they are thinking and feeling as they go about their regular work. Since the aim is to deepen the reader's understanding, we urge everyone to read these comments.

(4) How Sustainability Report 2018 was produced



CSR Glossary

Term	Meaning	Page(s)
Basel Convention	The official name is the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal. It is an international treaty setting conditions such as approval and advance notice when exporting hazardous wastes, and requirements such as reimporting in the case of improper export or disposal. (Source: Ministry of Economy, Trade and Industry)	P.60
Biodiversity	The variability among all living organisms, including diversity within species, between species, and of ecosystems. (Source: Convention on Biological Diversity)	P.24, 26, 60, 84, 95
Compliance	Observance of laws and regulations. Laws and regulations include the statutes, ordinances, rules, and conventions prescribed by public institutions, and also in-company rules such as articles of incorporation and various regulations, as well as contracts and agreements made with those outside the company.	P.4, 25, 27, 28, 43, 85, 86, 87, 88, 89, 93
Conflict minerals	Mineral resources mined in conflict-affected regions, mostly in Africa. The U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act defines these minerals as tantalum, gold, tin, and tungsten, as well as their derivatives, mined in the Democratic Republic of the Congo or surrounding countries. These minerals are believed to be a source of funding for conflicts in the regions.	P.57, 58, 94
CSR	Corporate social responsibility: the responsibility when conducting corporate affairs to make decisions that properly address the needs of all kinds of stakeholders, in awareness of how a company's activities impact society, rather than simply pursuing financial gain.	P.1, 2, 4, 6, 21, 22, 25, 26, 27, 28, 43, 54, 57, 61, 85, 94, 97, 98
Global Compact	A voluntary initiative officially launched at the United Nations Headquarters in New York in 2000, encouraging businesses to adopt certain principles of conduct. Participating corporations commit to putting into practice 10 globally established principles in the four areas of human rights, labor, the environment, and anti-corruption.	P.5, 93, 96
Governance	Corporate governance: a corporate management system for raising corporate value by improving competitiveness and preventing fraudulent acts.	P.1, 6, 85, 86, 87, 90, 95
Green purchasing	A form of CSR procurement. Giving priority in purchasing to products and services with the smallest possible environmental impact, and to suppliers who strive to reduce their environmental impact. (Source: Green Purchasing Network)	P.58, 61, 94
GRI	Global Reporting Initiative: an institution established in 1997 aimed at improving the quality, credibility, and comparability of sustainability reporting. It publishes guidelines on global standards of reporting. The GRI is a United Nations Environment Programme partner, and is headquartered in Amsterdam, the Netherlands.	P.1, 98
GRI Standards	The sustainability reporting standards issued by the GRI in October 2016.	P.1, 27, 95
Internal control	A system for establishing and implementing rules and controlling an organization to prevent in advance improper or illegal actions in the pursuit of business objectives.	P.6, 85, 86, 87, 88
Lockout	The temporary closing of a business establishment (offices, factories, etc.) by an employer in a labor dispute, refusing to allow employees to come to work and denying them payment of wages, to counter a strike or similar action by labor.	P.49
PDCA cycle	A management approach for maintaining and raising quality and promoting ongoing efforts to improve operations, by repeating the cycle of plan, do, check, and act.	P.37, 63, 91
PRTR Act	A legal system that governs chemicals with the potential of harming human health and ecosystems. Under the system, business operators keep track of and report to the government the amounts of these chemicals that are released from their operating sites to the environment (air, water, soil) and transferred as waste outside their operating sites. The government then compiles and makes public the amounts released and transferred, based on the reported data and estimates. (Source: Ministry of Economy, Trade and Industry)	P.64

CSR Glossary

Term	Meaning	Page(s)
REACH Regulation	The European Union's Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals. REACH applies to all chemical substances manufactured in or imported into the EU in quantities of one ton or more per year. It mandates that the manufacturers and importers of these substances evaluate their impact on human life and the global environment, and apply to the European Chemicals Agency for authorization and registration.	P.64
Resource nationalism	The policy of countries wanting to control and develop the natural resources within their borders on their own.	P.75
SDGs	Sustainable Development Goals: international development goals and targets adopted at the United Nations Sustainable Development Summit in September 2015. Consisting of 17 goals and 169 targets, the SDGs provide important guidelines for the international community to eradicate poverty and achieve a sustainable world by 2030, based on the concept "No one will be left behind."	P.4, 25, 26, 27, 28
SPC	Statistical process control: a technique for preventing defective products from being manufactured by monitoring the statistical stability of manufacturing processes and detecting trouble signs in the early stages.	P.39
Specified-scale electricity utilities	Of the businesses supplying electricity, those that supply electricity on a retail basis to customers in need of 50 kilowatts or more of high-voltage power.	P.69
SQC	Statistical quality control: a quality control technique using statistical methods that, rather than measuring the quality of individual products, measures the quality-based characteristics of the production process as a whole (materials, equipment and machinery, work, products), and controls quality by confirming their distribution (variability).	P.39
Stakeholders	All those affected, for better or worse, by corporate activities. Stakeholders are many and varied, including shareholders, investors, suppliers, customers, consumers, and employees.	P.1, 3, 6, 24, 25, 26, 27, 43, 59, 87, 94, 95, 96
Sustainability	The ability to last. For corporations striving for the sustainable growth of society and their own growth into the future, business administration must take account of economic, environmental, and social impact.	P.1, 5, 25, 26, 95, 97, 98
Type 2 Designated Energy Management Factory	As defined in the Act on Rationalizing Energy Use, a production plant consuming an amount of energy (heat and electricity) equivalent to a minimum of 1,500 kiloliters and a maximum of less than 3,000 kiloliters of crude oil per year.	P.1, 60
Urban mine	Nonferrous metals that are subject to recycling, after being extracted from natural ores, going through smelting and refining processes, and being used in various forms in human economic activities.	P.4, 8, 73
Work-life balance	Harmony between professional and personal life. Meeting work responsibilities and finding a sense of accomplishment and satisfaction in work, while also choosing and achieving a satisfying life in the home or community from among diverse possibilities, at each stage of life including child-rearing, middle age, and older age. (Source: Cabinet Office)	P.45
Zero emissions	A concept advocated by the United Nations University calling for full use of resources and reduction of waste to as close to zero as possible, with the aim of creating a sustainable recycling-oriented society. In this report, it is used chiefly to mean "discharging no secondary waste that is subject to landfill in a final disposal site."	P.17, 24, 74

Independent Assurance Report



Independent Assurance Report

To the President and CEO of JX Nippon Mining & Metals Corporation

We were engaged by JX Nippon Mining & Metals Corporation (the “Company”) to undertake a limited assurance engagement of the environmental and social performance indicators marked with ☒ for the period from April 1, 2017 to March 31, 2018 included in its Sustainability Report 2018 (the “Report”) for the fiscal year ended March 31, 2018, the Company’s self-declaration that the Report is prepared in accordance with the Global Sustainability Standards Board’s GRI Sustainability Reporting Standards (“GRI Standards”) at a core level, the alignment of the Company’s policies to the International Council on Mining and Metals (“ICMM”)’s 10 Sustainable Development (“SD”) Principles and the applicable mandatory requirements set out in ICMM position statements, the Company’s identification and prioritization of material issues, and the Company’s approach and management of its material issues.

The Company’s Responsibility

The Company is responsible for the preparation of the Indicators in accordance with its own reporting criteria (the “Company’s reporting criteria”), as described in the Report, self-declaring that the Report is prepared in accordance with the criteria stipulated in the GRI Standards, reporting on the alignment of the Company’s policies to the ICMM’s 10 SD Principles and the applicable mandatory requirements set out in ICMM position statements, reporting on the Company’s identification and prioritization of material issues, and reporting on the Company’s approach and management of its material issues.

Our Responsibility

Our responsibility is to express a limited assurance conclusion on the Indicators based on the procedures we have performed. We conducted our engagement in accordance with the ‘International Standard on Assurance Engagements (ISAE) 3000, Assurance Engagements other than Audits or Reviews of Historical Financial Information’ and the ‘ISAE 3410, Assurance Engagements on Greenhouse Gas Statements’ issued by the International Auditing and Assurance Standards Board. The limited assurance engagement consisted of making inquiries, primarily of persons responsible for the preparation of information presented in the Report, and applying analytical and other procedures, and the procedures performed vary in nature from, and are less in extent than for, a reasonable assurance engagement. The level of assurance provided is thus not as high as that provided by a reasonable assurance engagement. Our as-surance procedures included:

- Interviewing the Company’s responsible personnel to obtain an understanding of its policy for preparing the Report and reviewing the Company’s reporting criteria.
- Inquiring about the design of the systems and methods used to collect and process the Indicators.
- Performing analytical procedures on the Indicators.
- Examining, on a test basis, evidence supporting the generation, aggregation and reporting of the Indicators in conformity with the Company’s reporting criteria, and recalculating the Indicators.
- Visiting two of the Company’s domestic factories selected on the basis of a risk analysis.
- Evaluating the Company’s self-declaration that the Report is prepared in accordance with the GRI Standards at a core level against the criteria stipulated in the GRI Standards.
- Assessing the alignment of the Company’s policies to the ICMM’s 10 SD Principles and the applicable mandatory requirements set out in ICMM position statements through documentation reviews and interviews.
- Interviewing the Company’s responsible personnel and reviewing documents with respect to the Company’s process of identifying and prioritizing its material issues.
- Interviewing the Company’s responsible personnel and reviewing documents with respect to the Company’s approach to and management of its material issues.
- Evaluating the overall presentation of the Indicators.

Conclusion

Based on the procedures performed, as described above, nothing has come to our attention that causes us to believe that:

- the Indicators in the Report are not prepared, in all material respects, in accordance with the Company’s reporting criteria as described in the Report;
- the Company’s self-declaration that the Report is prepared in accordance with the GRI Standards at a core level does not conform to the criteria stipulated in the GRI Standards;
- the Company’s policies are not aligned to the ICMM’s 10 SD Principles and the applicable mandatory requirements set out in ICMM position statements as described on page 95;
- the Company has not identified and prioritized its material issues as described on pages 27-28; and
- the Company has not approached and managed its material issues as described on pages 11-19, 24-25, 29-30, 36-40, 43, 47-48, 53-54, 56, 59-61, 67, 70-71, 74, 87-89 and 92-94.

Our Independence and Quality Control

We have complied with the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants, which includes independence and other requirements founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior. In accordance with International Standard on Quality Control 1, we maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

KPMG AZSA Sustainability Co., Ltd.

KPMG AZSA Sustainability Co., Ltd.
Tokyo, Japan
December 18, 2018

We welcome your views and questions regarding *Sustainability Report 2018* as well as suggestions on how to make the next report even better.

Send your views on this report to:

Public Relations and CSR Department

JX Nippon Mining & Metals Corporation

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