Our R&D Division consists of the R&D Center and the Intellectual Property Department. It conducts R&D activities in collaboration with the business divisions and group companies to enhance corporate value. Through these activities the division balances the deepening and broadening of existing businesses with the exploration of business areas that have significant growth potential such as mineral resources, the environment, international business and ceramics and electronics. In recent years we have also been vigorously developing technologies that contribute to the recovery and reconstruction of the areas affected by the 2011 earthquake.

In the cement segment, while working to maintain broad market recognition of the quality of Taiheiyo Cement products, we are involved in R&D activities across the various facets of our business such as advancing our innovative quality predictive system, lowering costs, protecting the environment, saving energy and reducing CO₂ emissions in the production of cement, and developing domestic and overseas markets.

In the mineral resources segment our efforts have been directed at technology R&D, such as for a technology that adds value to the limestone and silica resources of our group companies as well as a method for treating contaminated soil.

In the environmental segment we not only develop technologies for recycling a variety of waste but also water-related technologies such as for wastewater purification, phosphorus recovery and the removal of cesium. We are also developing technologies for recycling waste into useful resources in China.

In the construction materials segment we promote the R&D of ultra high strength concrete and ultra high performance ductile concrete and are cultivating the market for these new products. We also launched R&D activities toward next-generation infrastructure.

In the ceramics and electronics segment we are developing new products in areas such as ceramic components for semiconductor manufacturing equipment, products with piezoelectric technology and metal matrix composites.

### Development of TQPS (Taiheiyo Cement Quality Predictive System)

We are currently developing the TQPS to improve the level of accuracy in quality control for cement by analyzing the relationship between various production conditions, and characteristics and properties of cement.

The system can be used for predicting the strength of cement over the long term and other quality-related features by analyzing process control data, including the results of XRD-Rietveld analysis, using a mathematical model called a neural network. For example, when we use waste and by-products for the first time at a plant as alternative raw materials and fuels for cement TQPS enables us to quickly predict changes in product quality, take immediate action and set the optimum operating conditions. It is therefore expected to promote the recycling of resources and lead to reduced production costs.
User Societies and Industry Associations

We founded and manage a variety of societies for users and industry associations to support users in strengthening their businesses and developing technological competitiveness.

Taiheiyo Cement Ready-mixed Concrete Society, the largest user organization, was founded to promote mutual development and connections among member companies through the exchange of information and opinions on corporate management, sales and technology, and the implementation of surveys and research activities. The society supports the co-existence and co-prosperity of member companies by strengthening their managerial and technological foundations. These societies are actively involved in a variety of activities. As part of their technical initiatives they are supporting and strengthening the educational activities of member companies, including organizing training seminars and distance learning programs, to boost the technological level of member companies and help their employees acquire certification. Seminars starting in fiscal 2011 to prepare individuals who are pursuing Concrete Maintenance Engineer certification were very successful: 46 people from member companies participated, with 20 passing the examination in fiscal 2012.

In addition to the Ready-mixed Concrete Society, we established the Taiheiyo Cement Association for Paving Block Industry, SPLITTON Association Japan, and the Shokusai Concrete Kogyokai to proactively deliver technical support for the mutual development of concrete companies. We will continue to support activities that benefit users.

Promotion of R&D Activities

Benefiting from the close cooperation between the research and technology development divisions, along with other operational entities, the scope of our R&D encompasses peripheral fields such as mineral resources, the environment, building materials, architecture and civil engineering, ceramics and electronics, and cement and concrete.

(For additional information, see page 11.)

Using RFID Technology to Inspect Structures

Maintenance and management technologies, including appropriate inspections, are becoming increasingly vital given the ongoing deterioration of major portions of the infrastructure constructed during Japan’s high economic growth period. We have commercialized and are actively marketing RFID (radio frequency identification) structure inspection technology which uses the wireless function incorporated into electronic money. We expect to see the widespread deployment of this efficient, nondestructive inspection technology whereby a reader receives radio waves sent from sensors embedded in the structure while it moves over the structure surface and detects the condition of the sensors.

Research and Development of Nonelectric Explosion Prevention Systems Using Hydrogen Storage Material for Safer Nuclear Power Generation

In the accident at the Fukushima Daiichi Nuclear Power Station the reactor core was damaged due to a loss of electrical power, leading to an increased concentration of hydrogen in the nuclear reactor building that eventually caused explosions. We have teamed up with Hokkaido University, Hiroshima University and the Japan Atomic Energy Agency under a grant from the Ministry of Education, Culture, Sports, Science and Technology to improve the safety of nuclear power generation by preventing hydrogen explosions. In a joint effort with Hiroshima University, we developed high-performance magnesium that quickly absorbs and stores massive volumes of hydrogen. Systems using this magnesium have significant potential for preventing explosions even in the event of electrical power failures.