COMPANY NEWSLETTER OF GRUPO MÉXICO - MINING, INFRASTRUCTURE AND TRANSPORTATION

APRIL / JUNE 2016

GRUPOMEXICO

Ingenia 02

TRAIN TUNNEL MODERNIZATION

FULL STEAM AHEAD

THE IMPROVEMENT WILL ALLOW DOUBLE-STACK TRAINS TO RUN ON THE PACIFIC LINE.

PÁG. 22

Elegimos crecer juntos

Invertimos 404 millones de pesos en el nuevo Parque Tamosura, un punto de encuentro regional en donde la gente de Cananea puede gozar del fomento al deporte, la salud, cultura y entretenimiento.

- 335 personas de la comunidad trabajaron para dar vida al proyecto.
- 22 hectáreas mide la superficie en la que se construyó el parque.
- 10 edificios se incluyeron en esta primera fase.
- El agua proveniente del sistema de drenaje de todos los servicios del parque es tratada por una planta para ser utilizada en el riego de áreas verdes.

Parque Tamosura cuenta con:

- Super del Norte
- Acuática Nelson Vargas Family Fitness
- Despachos, oficinas y consultorios
- Locales comerciales
- Hotel City Express
- Boliche, restaurante bar y terraza
- Salón de eventos
- Cinemex

Juntos escribimos grandes historias

GRUPOMEXICO

Ingenia 02
NEWSLETTER
GRUPOMEXICO

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April-june 2016 | Year 01

Moving the agricultural industry

The Transportation Division guarantees the supply of raw materials to a variety of productive sectors with our rail network.

Editorial

A Tangible Commitment

Our history, experience and track record have prepared us to meet the challenge posed by the cycles inherent to our industry and the volatility of the markets. In this environment of low metals prices, we have continued to strengthen our company so it is more cost competitive, which will allow us to take advantage of markets in the long term, as well as to maintain our commitment to continue with our investment programs in our various Divisions.

We are very proud of the fact that we are beginning to see the results of these large investments, as all of our businesses have surpassed their goals. It is worth noting that the Mining Division achieved record copper production during the first half of this year, which will position Grupo México as the third largest copper producer in the world. For their part, the Infrastructure and Transportation Divisions are continuing their trend toward greater growth and operational and financial efficiency, also achieving record numbers.

Our success must be measured in ways that go beyond operational performance.

Thus, Grupo México is also dedicated to creating value in social, community and environmental terms, taking into account the expectations of our employees and stakeholders and with the objective of making our businesses sustainable so that we can continue building a better world.

I would like to acknowledge each of the more than 30,000 team members for your hard work and dedication, because you have made a significant contribution to our progress and you will continue to be a key factor in our future achievements.

Germán Larrea

GRUPO MÉXICO

WHAT ARE ITS COMPONENTS?

MINING
Southern Copper Corporation (México y Perú)

ASARCO (EUA)

INFRASTRUCTURE
Grupo México Oil and Gas Drilling

Grupo México Engineering and Construction

Grupo México Energy

TRANSPORTATION
Ferromex

Ferrosur

Intermodal México

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12,000 copies

Mining

APRIL - JUNE 2016

METALLURGICAL COMPLEX CELEBRATES 30 YEARS OF OPERATIONS

In commemoration of its three decades of operations, the Division held a flag-raising ceremony with the participation of military personnel. In addition, Grupo México executives offered words of thanks and encouragement for team members. The Metallurgical Complex was inaugurated in 1986.

GM WILL MAINTAIN INVESTMENTS IN SONORA

600
million pesos allocated

The meeting of the Board of Directors of the Mining Cluster, chaired by Ing. Xavier García de Quevedo, emphasized the fact that mining activity has exploded in the state with the resources allocated through the Mining Fund—in excess of 600 million pesos. In addition, the new Mining Council of the State of Sonora was sworn in. The objective of the Council is to promote the growth and development of sustainable mining.

SEA TERMINAL RECERTIFICATION

Our Division in Guaymas, Sonora, obtained recertification of its Safety Management System, under the OHSAS 18001 standard, an international standard that defines and evaluates the health and safety requirements for an organization to control risks and improve performance.

SEMARNAT AND PROFEPA CERTIFY GM

The Secretary of the Environment and Natural Resources, as well as the Federal Bureau of Environmental Protection recognized several Grupo México divisions for implementing environmentally friendly practices, maintaining their dedication to environmental protection and for sustainable operations.

DIVISION	CLEAN INDUSTRY CERTIFICATION	ENVIRONMENTAL QUALITY RECOGNITION
Metallurgical Complex	Electrolytic Copper Refinery Plant Rod Plant	Central Smelter Maintenance Shop Smelter Auxiliary Services
Nacozari Mine Operator	Mine Concentrator Services Molybdenum Plant Concentrator Plant Hydrometallurgy Plant Lime Plant	Maintenance Supply Shop

GM AND NELSON VARGAS UNITED FOR CANANEANS

A series of activities were held on June 9 and 10 to inaugurate the Nelson Vargas Family Fitness Center, located in Tamosura Park in Cananea, Sonora. The three top athletes from NV's locations gave a swimming demonstration, and Ana Gabriela Guevara, 2003 world champion track and field athlete, ran on the park's jogging track in order to motivate children and youth.

HELPING OUR NEIGHBORS

On June 18, Grupo México supported the provision of potable water to 10 locations in Nueva Rosita, Coahuila, after a failure in the general supply lines. The company dispatched water supply units to a number of subdivisions and municipalities, as well as government Labor, Social Security and Health offices.

CHARCAS: NEW SAFETY RECORD

In the month of July, this Division completed 842,000 man-hours with no accidents, thanks to the commitment of all of its team members, who perform their work safely and in accordance with procedures. The main activities that led to the achievement of this record were compliance with the Workplace Health and Safety Self-management Program (PASST), proper implementation of the ongoing ZERO campaign, as well as education and training programs.

BVC: CERTIFIED OPERATORS

400
hours of training provided

A total of 15 team members from Buenavista Copper were certified by the National Labor Competency Normalization and Certification Council, which certifies that operators have the necessary knowledge, skills and abilities to perform their jobs at a high level of performance. Full attendance at work and satisfactory completion of 400 hours of training, which includes simulator sessions, as well as theoretical and practical exams, were some of the requirements evaluated.

V DRILLING AND MINING EXPLORATION SEMINAR

This specialized event, held in Hermosillo, Sonora, brings together mining companies and state suppliers to share information about projects and services related to the industry. Grupo México participated with a booth, while Ing. Víctor del Castillo and Lic. Olga Briseño, the Director and Assistant Director of Environment and Ecology, respectively, made presentations.

RECOGNITION FOR GM'S SOCIAL PERFORMANCE

During the report back of the FORDECYT Sustainable Mining project organized by the Autonomous University of San Luis Potosí, our Casa Grande social intervention model, under the direction of the Community Development department, was recognized as an proactive model distinguished by its people-centered human development focus.


SANTA E

ULALIA

COMBINED EFFORTS

The San Antonio mine is characterized by being a complex and challenging operation. However, the experience and ingenuity of our team members has made it, once again, an example of tenacity, creativity and teamwork.

SANTA EULALIA UNIT

- **Location:** 25 km from the city of Chihuahua, México
- **Production:** zinc concentrates with silver content
- **Infrastructure:** two underground mines and a production plant
- The San Antonio mine has 15 levels and two shafts (San Antonio and La Esperanza)

The San Antonio mine reaches a depth of 687 meters. Since it is located in an aquifer, it normally receives abundant water from underground rivers and rainfall, and water that enters through geological faults.

Although the presence of water is a challenge for exploitation, the ore extracted at San Antonio is highly rich: other mines must produce 6,000 mill tons to equal the quality produced here with only 1,000. That is why this mine operates with special safety measures, pumping stations and ongoing fault prospecting.

Despite preventive measures, the behavior of the aquifer and the geological fracturing is complex and unpredictable and over its long history, the mine has been flooded several times. The last flood took place two years ago, but fortunately, as on previous occasions, it was successfully recovered, thanks to the teamwork of the Santa Eulalia team and Grupo México's General Office of Engineering and Construction, which also implemented an important prevention plan.

RECOVERY

On May 14, 2014, after 16:00 hours, a water breach was detected in level 11 of the San Antonio mine: the rock floor had eroded and the water pressure broke through the rock. Safety protocols were activated immediately and all of the team members were able to get out without incident.

> The water flow, calculated at 20,000 to 22,000 gallons per minute, was gradually flooding the mine, from bottom to top, which made it possible to remove most of the equipment.

By May 28, the water stabilized at the level of the water table, which corresponds to level 8 of the mine, and the following actions were then taken to recover the mine:

The San Antonio mine has pumping stations in levels 8 and 13.

THE RECOVERY IN NUMBERS

8
levels flooded and recovered

11
months of work

250
cubic meters of concrete

22
tons of steel reinforcement

3.2
tons of steel used to anchor the abutment

A. Cement was injected through six boreholes, which were drilled from level 8 to the area of the breach in level 11, in order to reduce the flow of water and reach the site of the breach. Nearly 16 tons of cement was injected into each borehole.

B. Vertical pumping systems were installed in the La Esperanza and San Antonio shafts and in some Robbins (retention areas).

C. The mine was drained below level 11 and a wall was built, made of concrete and steel reinforcement to seal the breach. Measurements: 15 meters long, variable height ranging from 8 to 9 meters, variable width ranging from 1 to 2.5 meters.

D. Water was extracted from levels 12 to 15. Subsequently, all the affected zones were cleaned and rehabilitated.

PREVENTION PLAN

Between levels 10 and 12 of the mine, in the southern zone, there is a fault that contains a water pocket that is approximately 300,000 m3 that filters into the lower levels. Although the water pocket had been contained by several walls between levels 8 and 12, there was a possibility that the pressure would break a pillar and cause another flood, so the Office of Engineering and Construction developed an impressive project to prevent it.

It was not an easy challenge: it would be necessary to control and divert the water that was coming from the fault in order to create a dry zone that would make it possible to build a contention wall. The contention wall would have to be built in such a way as to ensure maximum resistance, according to the characteristics of the pocket (size, pressure, infiltration, etcetera).

Different solutions were explored and a variety of specialists were consulted: in soil mechanics, rock mechanics, geophysics, hydraulics, hydrology and geology, as well as experts in underground water management. They all visited the site in order to reach their respective technical opinions. Finally, after three months, the action plan was finalized.

TIMELINE

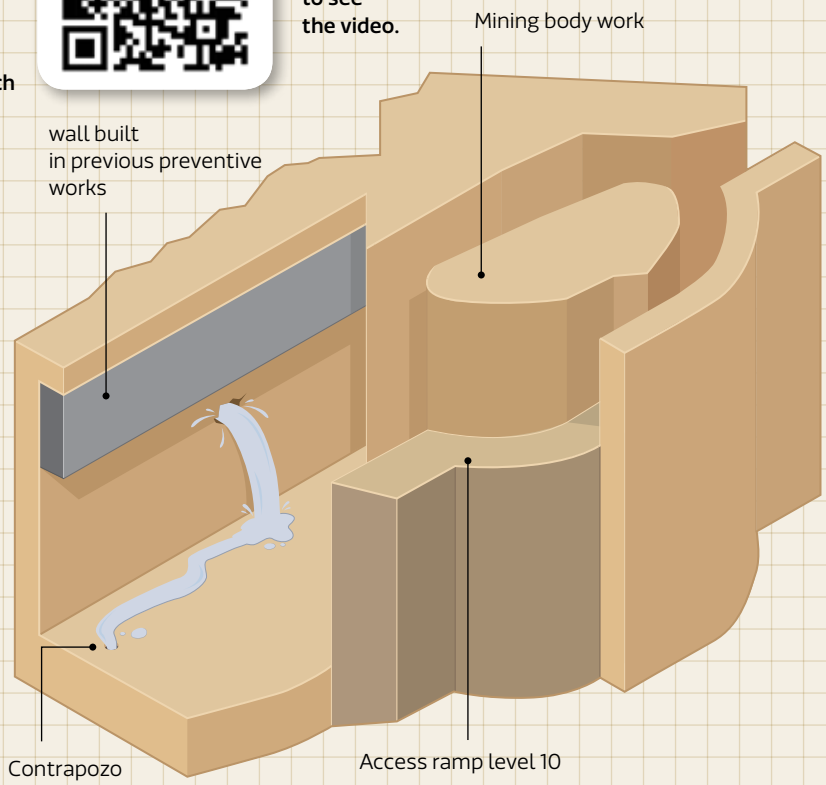
- **May 2014:** flood at level 11
- **April 2015:** mine recovery work completed
- **May 2015:** prevention work initiated at level 10
- **November 2015:** prevention work completed

PREVENTION PLAN

Learn about the process to contain the water breach located between levels 10 and 12 of the mine.

- The water breach is located at the juncture of three faults that run the length of an old stope, 20 meters from the floor.
- The cavern measures 40 meters high, 50 meters long and 20 meters wide.
- Dimensions of the breach: 1.5 m by 1.5 m.

Scan the qr code to see the video.



PHASE 1: CONTROLLING THE WATER TO CREATE A DRY ZONE

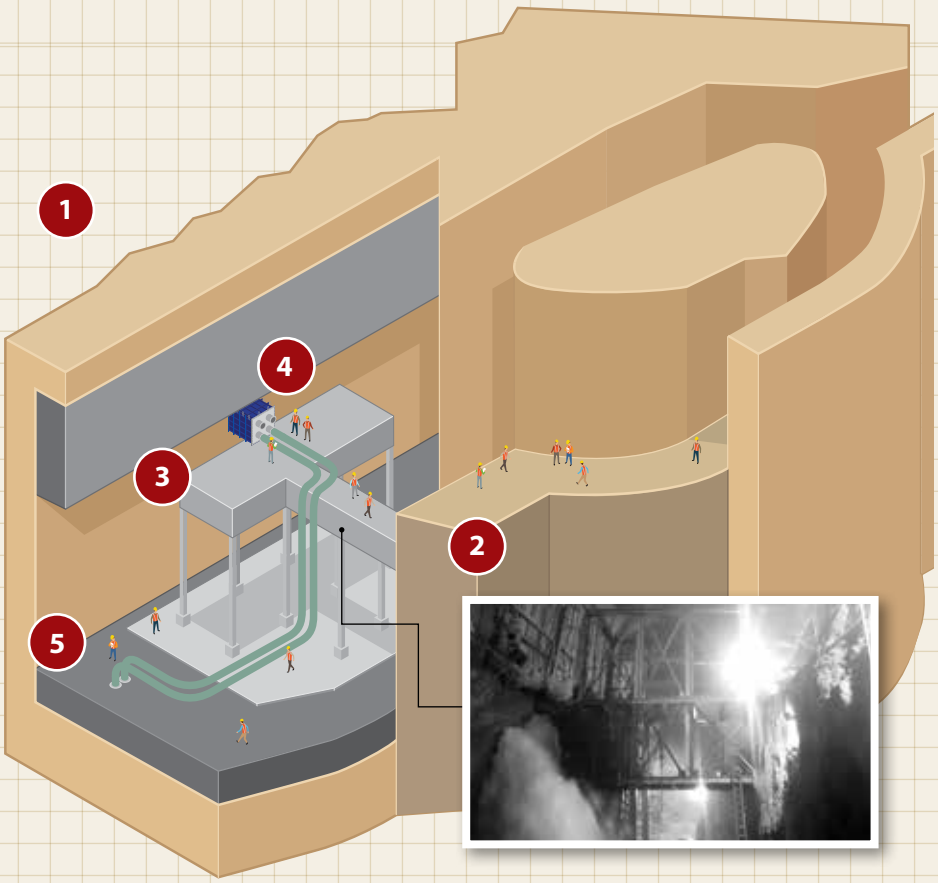
1 The cavern was drained to a level that allowed work to begin. The water pumping continued throughout the process.

2 The level 10 access ramp was expanded to accommodate the construction equipment.

3 A structural steel cable-stayed bridge was built from the access ramp to the cavern wall in order to reach the water breach. Total weight of the structures: 26 tons.

4 A water collector box was built to be placed over the breach in order to channel and control the flow. The box was manufactured in pieces and was assembled inside the mine. It was then raised onto the bridge, pushed up to the breach site and embedded in concrete.

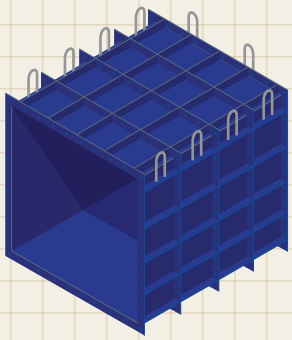
5 The water was diverted using a pipe installed in the box to channel it to a retention area, which uses ramps to carry it to the pumping stations on levels 12 and 13. From there the water was pumped to the surface.



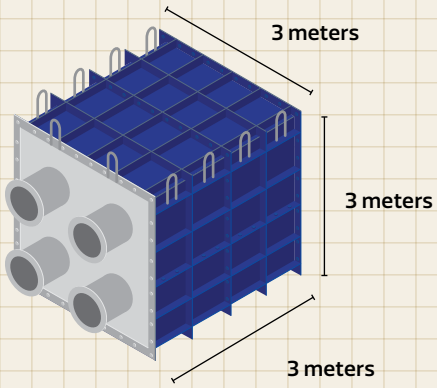
WATER COLLECTOR BOX

Materials: carbon steel plates reinforced with carbon steel girts.

The back of the box, which is uncovered, was placed over the breach to capture the water.



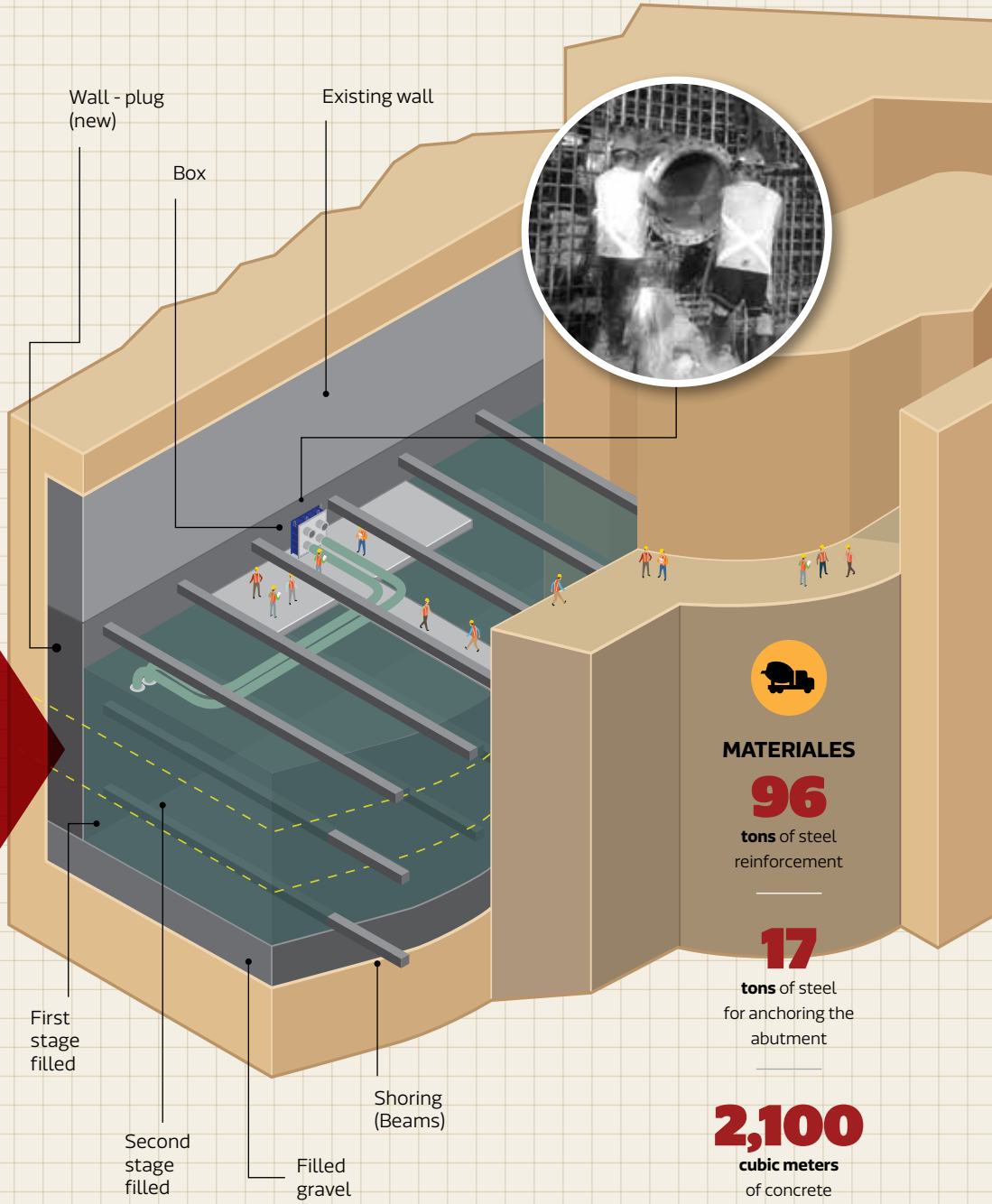
The front part has 4 nozzles that are 24 inches in diameter, in which valves and pipes were installed to divert the water while the containing wall was under construction.



PHASE 2: CONSTRUCTION OF THE CONTAINING WALL

Once the dry zone was established, construction began on a wall that was anchored to the rock wall of the mine. The materials were placed as follows:

1. Anchors
2. Steel reinforcement secured with anchors
3. Wood falsework
4. High resistance concrete
5. Concrete struts
6. Filled in with scrap and gravel



WALL MEASUREMENTS

37.5 m long

12 a 17 m tall

1 a 5 m thick

MATERIALES

96 **tons** of steel reinforcement

17 **tons** of steel for anchoring the abutment

2,100 **cubic meters** of concrete

After the setting time had passed, that is, the time necessary for the concrete to harden, the valves were closed and the cavern was filled in order to reinforce and cover the wall.

All those involved worked with exemplary dedication.

RECOVERY AND PREVENTION

- The project was carried out under the direction of the General Engineering and Construction Office.
- 340 people, including mine staff and contractors, participated in the work.
- Primary actions: recovery activities, operation of pumping systems, civil engineering, mechanics, electrical and structural, as well as switching and welding.
- 28 pumps with a capacity of 600 to 3,000 gallon per minute (gpm) were used to extract the water.
- 36,000 gpm was the installed capacity, with an average pumping rate of 28,000 gpm.
- 69 million m3 of water was extracted at a rate of 1.78 m3 per second, which is equivalent to 40% of the water consumption of the city of Chihuahua.

Teamwork divides tasks and multiplies results.

The walls of the mine are continually checked for possible faults.

Levels 10, 12 and 14 have alternating pumping systems.

The port terminals of Southern Peru (SPCC) are located at Port Ilo, at the southern tip of the country. It is through these port terminals that production is exported and equipment and the inputs necessary for mining and metallurgy processes are received.

From Peru to the world

A PORT THAT CARRIES A LOT OF WEIGHT

370,000
metric tons is the volume of cargo that the Port Ilo Terminal moves in a year

900,000
metric tons of sulfuric acid were shipped from El Marine wharf in 2015

1,610,000
barrels of oil were received at the Multi-buoy Terminal during 2015

SPCC's team in the cargo area.

PORT ILO TERMINAL

- Began operations on October 12, 1957, making it SPCC's oldest operating port.
- Multipurpose pier-type wharf, 180 meters long and 18 wide, with two rail lines for transporting cargo.
- It transports all of SPCC's finished products: copper cathodes, copper leachate, molybdenum, selenium, copper concentrate and sulfuric acid.
- Primary destinations: countries in Asia and the Mediterranean.
- Receives all of the supplies and equipment necessary for operation of the Toquepala, Ilo and Cuajone units.

The Port Ilo Terminal uses two rail lines to transport cargo.

El Marine wharf.

Juan Gilberto Ascaño
Crane operator, 39 years of service.

"As an Iloan, I have been a witness to the fact that Ilo has progressed significantly thanks to our company."

Genaro Mauricio Cecenardo
Shipping department Marine wharf, 38 years of service.

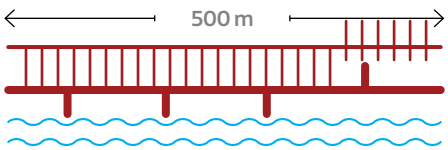
"I think our work is important because we are responsible for the commercial transportation of our final products."

TABLONES PORT TERMINAL

Located to the north of Port Ilo, it includes **El Marine** wharf and **Multi-buoy Terminal.**

EL MARINE

- Began operations on May 2, 2010.



- Wharf designed exclusively for shipping sulfuric acid, measuring 500 meters long by 4 meters wide, with a shipping dock that measures 20 meters in width by 30 in length.
- It is equipped with signal lights and beacons, as well as other technological resources that allow for 24-hour operations.
- Virtually all of the production of sulfuric acid, which was previously transported to the port by rail, is shipped directly from the smelter plant, reducing transportation hazards in populated areas.

MULTI-BUOY TERMINAL

- Began operations in 1960.
- Uses a system of mooring buoys anchored to the sea floor.
- Exclusively for unloading oil and gas, which is done by connecting underwater hoses to the ships that supply industrial oil and diesel oil used in mining operations.

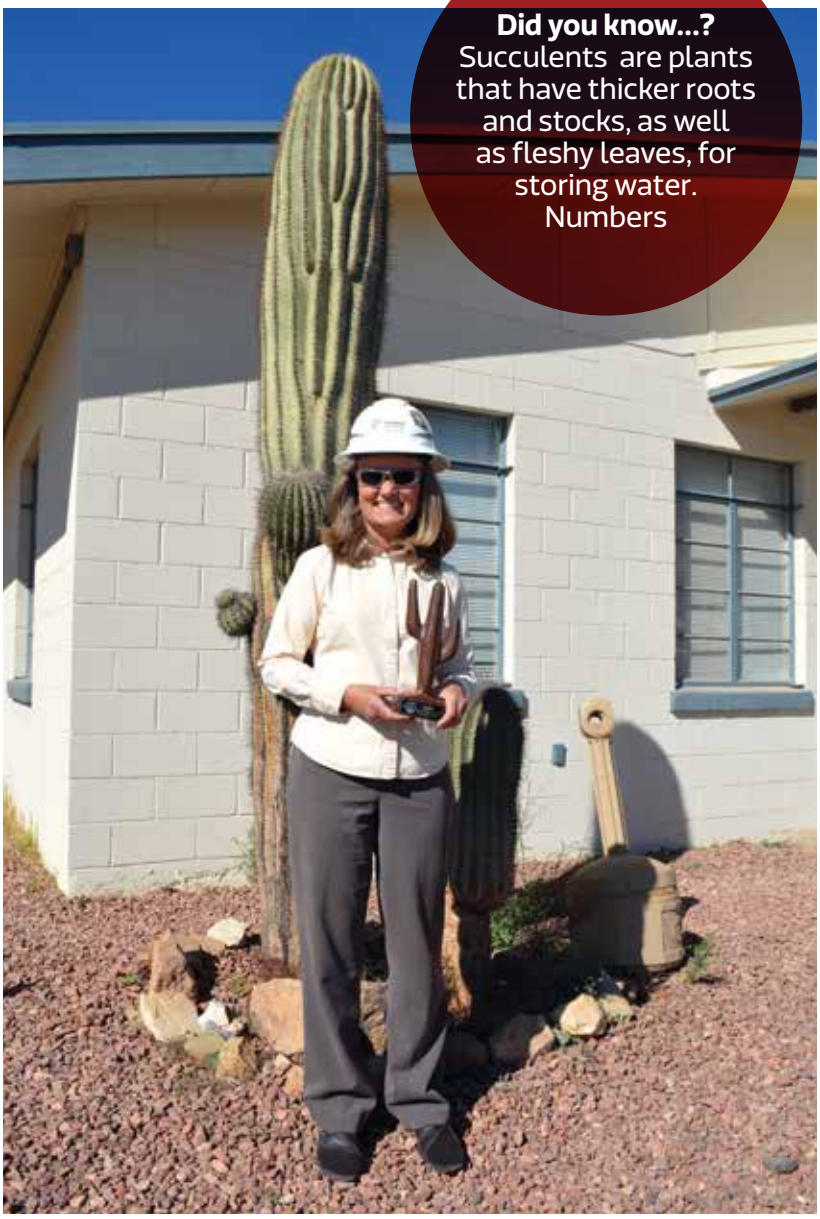
Did you know...?
On December 22, 1959 the first shipment of blister copper was made from the Port Ilo Terminal, headed for the US.

Save to preserve

The rescue of desert flora prior to the start of mining activities is a commitment that ASARCO has made to the environment.

Since 2008, the Silver Bell mine has worked with the Tucson Cactus and Succulent Society (TCSS) to remove cactus and native plants from the areas that will be for the mining operation.

TCSS is an organization founded in 1960 and dedicated to education and information about and conservation of cactus and succulents.



Did you know...?
Succulents are plants that have thicker roots and stocks, as well as fleshy leaves, for storing water.

Numbers

RESCUE OPERATIONS

- **Days:** Saturday and Sunday
- **Hours:** from 7:00 a.m. to 12:00 p.m.
- **Team:** from 20 to 40 people, including volunteers and TCSS staff

SPECIES RESCUED

- Saguaro cactus
- Hedgehog cactus
- Prickly pear
- Cholla
- Fishhook Barrel Cactus
- Ocotillo

ACTIVITIES

Digging out dirt to remove the cactus.

Hauling and wrapping the specimens to load them in the vehicles that will transport them.

Unloading them in TCSS's nursery and cataloging them for future sale.

Unique specimens are donated to parks, universities and botanical gardens for exhibit. The rest of the cacti are used for charitable purposes: TCSS organizes special sales for the general public and the money generated is donated to science teachers in Tucson, Arizona, to provide scholarships to students.

9,000 cacti
and other native plants have been rescued since 2008

4,046.86
square meters of desert have been covered by the program (1.1 acres)

200
kilograms is the weight a single cactus can reach

Infrastructure

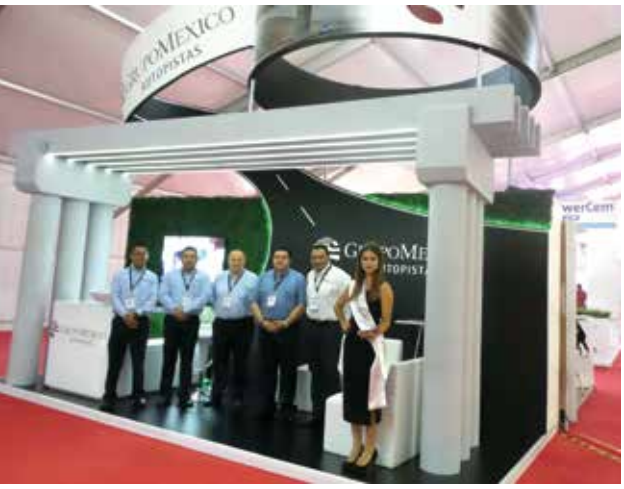
APRIL-JUNE 2016

TO THE RESCUE IN OAXACA

Casa Grande volunteers support the community in the context of the social conflict in the state.

1 A week of activities was organized with leaders from three neighborhoods in La Ventosa. More than 50 boys and girls participated in cleaning and reforestation activities, as well as soccer and baseball games. They also painted a wall representing each neighborhood.

2 A presentation was given on the Community Development Model for Marketing students at the Inter-American Development University, Juchitán Campus. At the conclusion, a proposal was made to create a campaign to raise awareness regarding issues of education and culture to be implemented with Casa Grande.

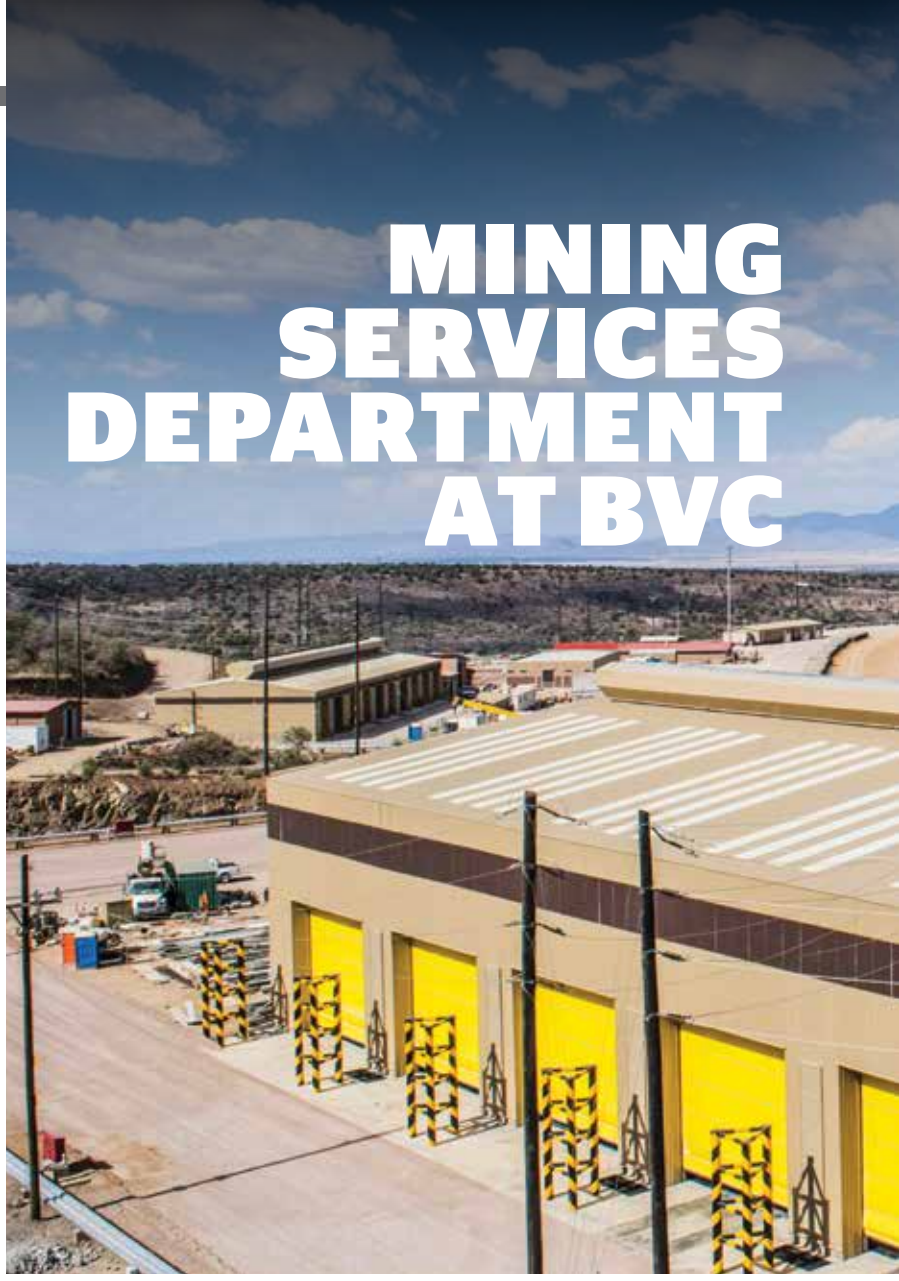


XXI NATIONAL ENGINEERING AND ROADWAYS MEETING

México Compañía Constructora (MCC) participated in this event that brought together the main companies of the sector in order to evaluate the quality and sustainability of the roadways. This year's meeting, held in Puerto Vallarta, Jalisco, included an exposition hall where MCC displayed audiovisual material presenting the Salamanca-León Highway.

GM ENERGY: COMMITTED TO THE COUNTRY

On July 11, the National Energy Control Center sought help from La Caridad combined cycle power plant to generate more energy, intermittently, during the intermediate and peak rate hours, as the local transmission lines that run from northeast to north become saturated and surpass their limit, and it is necessary to take remedial action. As a result, the plant reached a net power output of 510 MW for 4 hours and both plants went up to their maximum output without a hitch.



MINING SERVICES DEPARTMENT AT BVC

TO FUNCTION IN OPTIMAL CONDITIONS

Last June annual maintenance was performed on the El Retiro electrical substation in Juchitán, Oaxaca. The procedures, according to the safety protocol, included inspection of equipment, locks, equipment grounding and preventive maintenance in tower 32, LAT. In addition, a safety talk was held in order to make personnel aware of the existing hazards and how to prevent them.

The Engineering and Construction Division, through Grupo México Engineering Services, developed this new complex in Buenavista del Cobre, which aims to provide comprehensive maintenance for trucks and support equipment.

The facilities, which are already operating, will allow for increased availability of operational vehicles and fewer unscheduled repairs. The investment made in this project was 60 million dollars.

FACILITIES

7
shops that can provide maintenance simultaneously to 16 CAT 797 F trucks and 10 support vehicles

1
wash system with a capacity of 20 trucks per day

1
warehouse for tires and parts

SEED CAPITAL FOR SALAMANCA-LEÓN

8
social projects were selected

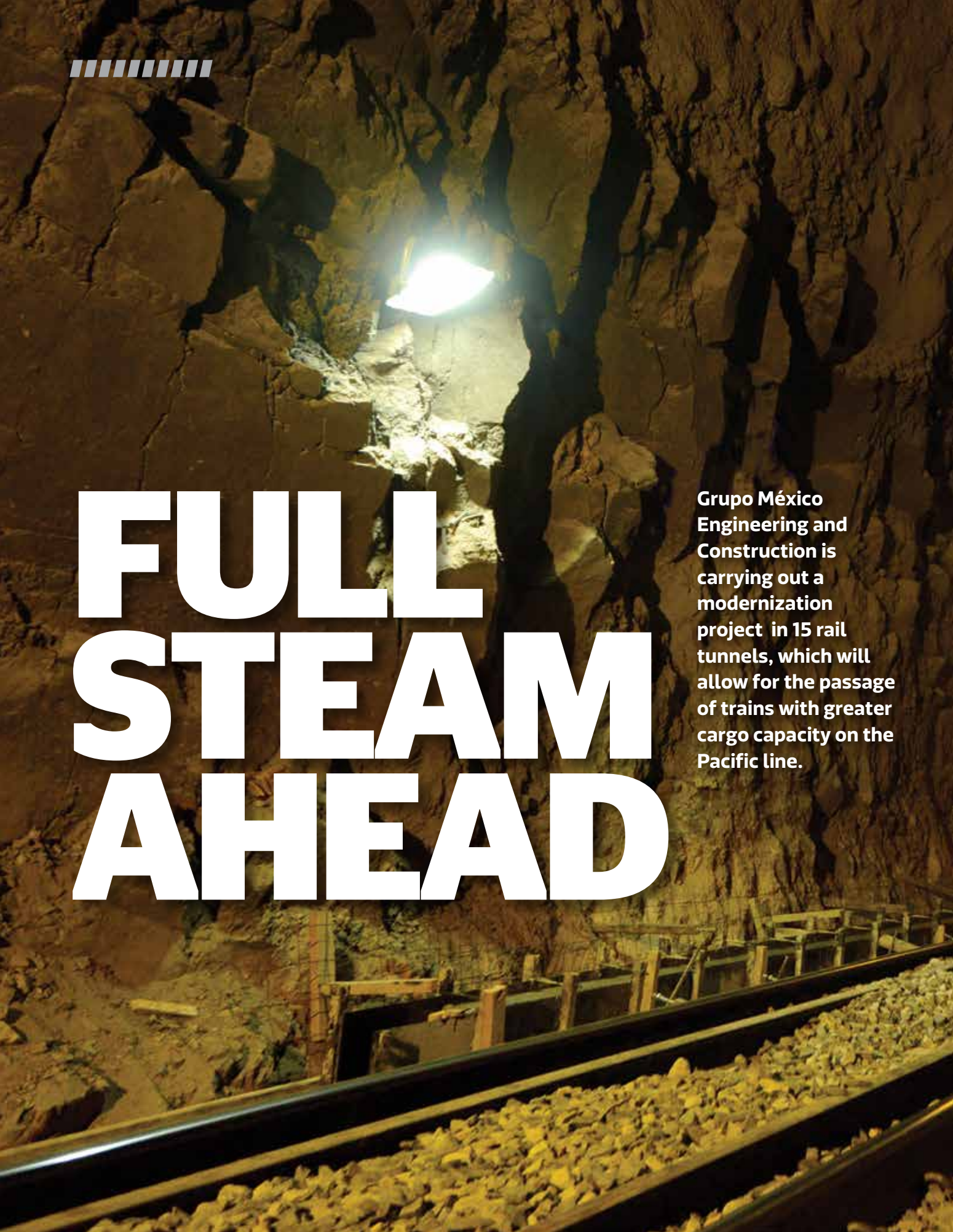
Grupo México Infrastructure Operator of Bajío, through the Community Development department and Casa Grande, launched the first Call for Social Projects to benefit communities in Salamanca, Irapuato, Silao, Romita and León.

The Community Committee, made up of citizen leaders, selected eight projects presented by educational institutions, civil society organizations and residents of the municipalities, to receive the Seed Capital, which provides the tools and material resources necessary so they can begin operations.

Did you know...? Currently 9,500 vehicles per day travel the Salamanca-León Highway.

COAHUILA ENERGY CLUSTER

Grupo México Energy was an honored guest at the annual meeting of this industry group, which took place in the city of Saltillo. Its objective is to connect the efforts of companies, universities, research centers, as well as state and municipal authorities, to promote sustainable regional development and business opportunities.



FULL STEAM AHEAD

Grupo México Engineering and Construction is carrying out a modernization project in 15 rail tunnels, which will allow for the passage of trains with greater cargo capacity on the Pacific line.

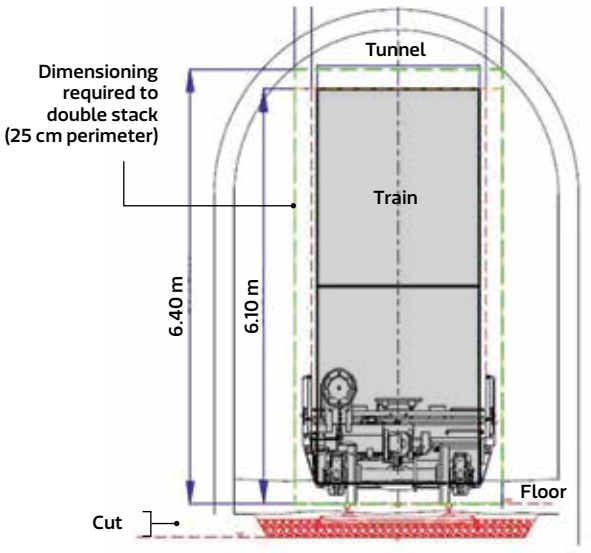
The Plan de Barrancas--a topographically complex region with a series of mountains and steep drop offs-- is located between the states of Nayarit and Jalisco, along the railway from Tepic to Guadalajara. This railway, along with the tunnels that pass through the mountains along the route, was built in 1927.

For many years these tunnels were high enough for the trains to pass through, but today, with the evolution of cargo transport, their size is no longer sufficient for the passage of double-stack railcars, that is, railcars that carry two stacked containers. Thus it became necessary to increase their height, and that is why Ferromex sought the services of the Engineering and Construction Division.

THE PROJECT

The minimum passing distance the tunnels should allow, both vertically and horizontally, is known as the clearance. In this case, in order for trains carrying two 9' 6" containers to pass, the vertical clearance of each tunnel must be 6.4 meters high.

Since these tunnels were build more than 80 years ago, the rocks in their walls and vault have become compressed, so the best option for achieving the required height is to lower the floor of the railway. Or, in technical terms, lower the level of the current grade line.



Based on a number of geophysical studies, detailed engineering was developed for the 15 tunnels included in the project. Since all of them had different characteristics, such as dimensions and type of rock, a specific design was developed for each one, which including determination of the following:

a) Reinforcement of the tunnel, with anchors and/or braces, in order to provide retention and stability to the rock during excavation of the floor.

The anchors are steel bars that are 6 meters long and are inserted in boreholes drilled into the walls of the tunnel, and which are later filled with a slurry of cement and water. The braces are concrete beams that are placed from wall to wall under the floor.

b) Thickness of the excavation, that is, the number of meters the floor must be lowered to make the tunnel the desired height.

c) Length of ramps for entering and exiting the tunnels, given that the railways cannot have steep slopes, and after lowering the level of the floor inside the tunnels, the slopes of the outer railways must be lengthened so that they are almost imperceptible.

The following is a summary of the primary data from the analysis:

- **Length of the tunnels:** from 77 to 897 meters
- **Length of entrance and exit ramps:** 255 to 406 meters
- **Thickness of excavations to lower the floor:** from 59 to 99 centimeters
- **Total length to excavate:** 11,470 meters (tunnels + ramps)
- **Total anchors:** 4,059
- **Total braces:** 668

PLANNING

The work plan was developed taking into account the restrictions imposed by an operating railway. For example, all of the operations had to be carried out in periods of 15 hours per day (called windows), between 02:00 p. m. and 05:00 a. m., in order to allow trains to pass the rest of the time. In addition, work can only be performed between October and April, as May to September is the harvest season and there is increased traffic on the railway.

The tunnels can only be accessed by railcars and only through four towns: La Quemada, Barrancas, Ixtlán and Compostela.

PRELIMINARY WORK

Several preparations were made prior to starting work. These included, among others, importing the reinforcement anchors from Europe, transporting all of the equipment to the area, as well as cleaning the railways and the right of way (lateral areas).

Railcars were also prepared for transportation of personnel, materials and machinery: two cargo platforms and two passenger cars that are hauled by four tractor trailers modified to run on the railways. The equipment includes borers, backhoes, mechanical levelers, concrete mixers and cranes.

LOGISTICS

Although the work days are established in advance, Ferromex must issued a permit each time the railway is entered, for safety reasons. The transportation of personnel and equipment to the tunnels takes 45 minutes. The crew is made up of 120 people, divided into two shifts. The activities in each tunnel were organized on different schedules, depending on the hardness of the rock, the depth of excavation and the available time.

EXAMPLES OF SEQUENCES AND ACTIVITIES CARRIED OUT IN 15 HOURS

SEQUENCE FOR REPLACING RAILWAYS

- Transportation of personnel to tunnel
- Removal of welded railway
- Loading of ballast (gravel under railway)
- Removal of ballast in gondolas (open cars)
- Placement of steps and ballast
- Hand fitting and leveling of the railway
- Removal of personnel

SEQUENCE FOR LOWERING THE FLOOR

- Transportation of personnel to tunnel
- Removal of steps
- Loading and removal of loose ballast
- Excavation of the floor
- Removal of excavated material
- Placement of steps and ballast
- Mechanical fitting and leveling of the railway
- Removal of personnel

THE PROCESS

The entire railway is on a single welded rail and to be able to excavate, it must be replaced by sections of screw-on rails called steps. In this case, two sections are used, each approximately 12 meters long, which are assembled in advance. Thus, during each entry, work is performed only along a 24-meter section.

In very general terms, these are the tasks that must be performed in each tunnel:

1. Reinforcement with anchors

2. Replacement of welded rail with screw-on railways (steps)

3. Excavation to lower the floor, including entry and exit ramps, as well as placement of braces if necessary in the specific tunnel

4. Replacement of steps with welded rail and construction of gutters for rainwater drainage.

PROGRESS

The first stage of the project was carried out between January 5 and May 17 of 2016. During this period, the results exceeded the plan: 8 tunnels were reinforced with anchors and the floors of 5 tunnels were lowered. Additional work was performed with shotcrete in areas of potential risk. It is important to mention that there were no accidents of any kind.

The two subsequent stages will be carried out in a single period: from September 1, 2016 to May 15, 2017.

PROGRESS

89
days of work

1,335
hours worked in windows of 15 hours per day

8
tunnels reinforced with 1,871 steel anchors

2,236
meters excavated in 5 tunnels, including their entrance and exit ramps

CASA GRANDE CIUDAD DEL CARMEN

The dreams of a community and the social responsibility of Grupo México come together here with a single purpose: to grow together in well-being.

A PLACE FOR EVERYONE

WHAT IS CASA GRANDE?

A community development model, which is built with the people, for the people and by the people, through which we seek to improve the quality of life in the communities in which we operate.

HOW DOES IT WORK?

First we determine the community's needs through dialog with the local population. Then, based on those diagnoses, we develop educational, cultural, athletic, artistic and health and environmental programs, which we implement through the Casa Grande community development centers.

In addition, we put out requests for proposals for Seed Capital to approve productive, social and infrastructure projects proposed by members of the community.

WHO IS BEHIND CASA GRANDE?

Specialists in social issues, volunteers, teachers, community leaders and company employees.

IN THE PEARL OF THE GULF

Community outreach activities began in 1989. The opening of the most recent Casa Grande was on May 27, 2016, when Grupo México Oil and Gas Drilling inaugurated Casa Grande Ciudad del Carmen, in Campeche.

Present for the event were volunteers, workshop leaders, as well as directors and team members from Grupo México. It is worth noting that a variety

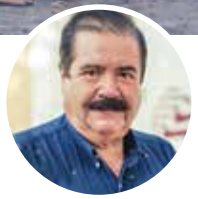
of non-governmental organizations, academic institutions and company suppliers have joined our initiative to sponsor projects that benefit the people of Ciudad del Carmen.

Grupo México Oil and Gas Drilling has offices and operating bases in Ciudad del Carmen. In addition, several of its platforms are located in the Campeche Sound, which is the largest oil and gas extraction area in the country.

Did you know...?
Grupo México has 16 Casa Grande community development centers throughout the country.

CASA GRANDE CIUDAD DEL CARMEN ACTIVITIES

- Creation of urban food gardens
- Preparation of healthy food
- Folk dance and dance classes
- Visual arts workshops
- Physical expression workshops
- Reading and writing
- School regularization
- Volleyball



Jorge Fernández Villaseñor,
Maintenance coordinator for self-raising platforms

"We are responsible for taking care of the equipment and now Casa Grande will take care of the people of this community."

Gustavo González Paredes,
In charge of safety for sea platforms

"The inauguration of this Casa Grande seems to me like something very good the company is doing. Ciudad del Carmen needed it."

Sustainable Energy: latest trends

Fully assuming its responsibility to the environment, future generations and a low carbon economy, Grupo México focuses on clean and renewable energy.

Non-polluting energy is becoming increasingly important throughout the world. Among other reasons, because it helps fight climate change through mitigation of greenhouse gasses, and it promotes environmentally

DID YOU KNOW...?
El Retiro Wind Park, our park in Oaxaca, reduces greenhouse gas emissions by 120,000 tons of carbon dioxide, which is equivalent to taking 22,000 cars off the road.

sustainable development.

Renewable energy is produced from natural sources, such as wind and sun, which are inexhaustible and do not generate waste products or toxic emissions. Clean energy, on the other hand, is obtained from resources with limited reserves and that can be exhausted at some point, such as natural gas, and have little or no environmental impact.

According to Ing. Adolfo Velasco, Director of the Energy Division, Mexico has very good resources for producing these types of energy. All of the country's northern deserts, for example, are ideal for solar energy, while the Tehuantepec Isthmus, because of its high winds, is one of the best areas in the world for wind energy. Its volcanoes allow for geothermal energy production, while its damns and rivers make hydroelectric energy generation possible.

We generated 2,962 gigawatt-hours (GWh) in 2015, which is equivalent to the annual electricity consumption of more than 1.4 million Mexicans.

Solar technology, explains Ing. Velasco, has seen significant advances in recent years, with lower costs and more efficient equipment. In Mexico, in fact, the domestic residential market for photovoltaic panels has grown considerably. Wind energy has seen the fastest advances in technology. For its part, the industry is focusing on developing solar thermal energy since it allows for reserves and storage.

OUR ENERGY INFRASTRUCTURE

The Energy Division was created in 2013 in order to produce electricity to supply GM's operations. Now, thanks to the opening of the Mexican electrical market, we also have the opportunity to sell energy to others, and as a result, several clean energy projects are currently being studied (solar, wind, geothermal, cogeneration).

La Caridad I and II

Combined cycle power plant that operates with natural gas and steam

- **Location:** Nacozari de García, Sonora
- **Capacity:** 500 megawatts (MW)
- **Clients:** Mining Division operations in Sonora

El Retiro Wind Farm

Produces energy using wind

- **Location:** Juchitán de Zaragoza, Oaxaca
- **Capacity:** 74 megawatts (MW) using 37 wind turbines
- **Clients:** Mining Division underground operations, Ferromex and Cinemex

In addition to supplying itself with energy, the company leases the land at Mission, one of its operations in Arizona, USA, for others to general photovoltaic solar power through the Avalon project.

Photovoltaic cells

Panels that absorb solar radiation to generate electricity

- **Location:** Hermosillo, Sonora
- **Capacity:** 81.8 kilowatts
- **Clients:** corporate and administrative offices of Grupo México

OUR CONTRIBUTIONS IN 2015

2,833,567
megawatt-hours (MWh) generated by our combined cycle power plants

220,235
megawatt-hours (MWh) produced in our wind park

237,379
tons of CO2 eq mitigated thanks to our energy facilities

574
megawatts (MW) is our capacity with state-of-the-art technology

Did you know...? One of the most innovative technologies is tidal energy, which uses the tides of oceans and rivers to produce electricity.

Transportation

APRIL JUNE 2016

HELPING TO HELP

The National Lottery for Public Assistance launched a commemorative ticket in honor of Dr. Railcar–The Health Train for the Big Ten that took place on July 20, 2016.

GRAND PRIZE

10

million pesos in two series

TICKETS

80 thousand

numbers in two series

FERROMEX SUPPORTS THE AUTO INDUSTRY

22 vehicles per railcar are transported by Ferromex trains

The North American division of Nissan awarded a recognition to Ferromex for having contributed to an increase in inventory savings, as well as reduced transport time and cost per unit.

Since 2003, Ferromex has been transporting Nissan vehicles by rail nationally through two border crossings (Piedras Negras and Ciudad Juárez) and two port terminals (Veracruz and Mazatlán). In 2015 it transported 336,000 vehicles out of a total of 519,000 exported.

DR. RAILCAR: HEALTH SERVICES CONTINUE

The Health Train continues to provide free medical services in the most remote and needy communities in Mexico, on board its 11 railcars equipped as a traveling clinic. Between March 5 and August 4, it visited 17 towns in 7 states, providing care to approximately 300 people per day:

ROUTE	MUNICIPALITIES AND/OR TOWNS VISITED
Nayarit	Acaponeta – Ruiz – Compostela
Jalisco	Tequila – Sayula – Tuxpan
Colima	Colima – Jala – Tecomán
Guanajuato	Celaya – Silao – Apaseo el Grande
Querétaro	San Nicolás, Tequisquiapan
Hidalgo	Huichapan
Puebla	Santa María Moyotzingo – San Andrés Chalchicomula – San Antonio Soledad

POLYETHYLENE: A NEW HORIZON

The company Braskem Idesa's (BI) Ethylene XXI petrochemical complex located in Nanchital, Veracruz, will produce 1,050,000 tons of polyethylene annually. This is a polymer that is used in the manufacture of packaging, bags, cables and pipes, among other products. In order to guarantee its distribution to different markets, BI signed a contract with Ferromex that includes domestic transportation.

BI's logistical platform is one of the most competitive in Mexico and it is considered the largest in Latin America: it has a parking capacity of 450 railcars and 25 kilometers of railways, in a 60,000 m2 spur.

Frederico Maciel,
Commercial Operations Manager of Braskem Idesa.

"Rail transport guarantees us more safety than highway transport, and that is why most of our transport will be made by rail."

450
railcars

25
kilometers
of railways

MOVING THE AGRICULTURAL INDUSTRY

Our Transport Division contributes significantly to the supply of food in Mexico, guaranteeing the provision of raw materials for different productive sectors.

The agricultural segment of Ferromex is dedicated to transporting inputs for the farming industry, primarily grains such as wheat, corn, sorghum and soy. Its service is primarily aimed at the movement of domestic crops from the northwest and the Bajío region, as well as importation of yellow corn. It also participates in the export of white corn and sugar.

This segment is distinguished by its continue growth and because it moves the most kilometer-tons per year in the whole Transportation Division. For example, of the large volume of crops produced in Sinaloa, Sonora and Chihuahua, which is the largest in the country, Ferromex transports more than 60%.

Its geographical coverage allows it to move cargo from different regions in Mexico, the United States and Canada. International freight is transported through four border crossing points, in association with Union Pacific and BNSF, while it can connect with the rest of the world through six ports.

The products the agricultural segment transports serve different industries (dairy, meat, poultry) as well as flourmills, sugar mills and vegetable oil producers, among others.

NUMBERS 2015

400
clients between processors and sellers

261,000
cars transported

23 millions
tons of agricultural products shipped

FERROMEX AGRICULTURE

A division that strengthens the development of the Mexican food products market.

5,560 hoppers

806 boxcars

PRODUCTS TRANSPORTED

PRINCIPALES

- Corn
- Wheat
- Sorghum
- Soy

OTHER

- Sugar
- Beans
- Syrups and starches
- Oils
- Pastas and DDG (dietary proteins)

HOW IS IT MOVED?

Each agricultural train can carry:

- **75 to 110 bulk** hoppers
- **6,750 to 11,000 tons** of cargo
- **3 crew** members (conductor + 2 guards)

In 2016 new equipment was obtained to increase the fleet:

- **550 jumbo** bulk hoppers
- **100 tons** of capacity
- **50 million dollars** in investment

LOOP TRAIN

Ferromex has a dedicated train program, which can move 110 hoppers and which travels exclusively from a single origin in the US to a single destination in Mexico; at the loop terminal, the hoppers are unloaded in a maximum of 24 hours and then they return to the origin.

300

names, approximately, were written on the truck as a show of support

A SUPPORT OPERATION

The maintenance team at ASARCO painted this truck pink in order to raise awareness about breast cancer and brain cancer. Team members of the Department then wrote the name of someone they know whose life has been affected by these diseases. The truck still operates today, painted pink.

AL CUIDAR EN GRUPO, SE PROTEGE MEJOR EL MEDIO AMBIENTE.

Nuestros invernaderos ubicados en distintas regiones del pais, pueden producir 4 millones de árboles al año, lo que nos convierte en el principal productor de árboles del sector privado. Nuestro compromiso con el medio ambiente va en serio.

www.gmexico.com.mx

Minería | Energía | Ingeniería y Construcción | Transporte

GRUPOMEXICO

En Grupo se trabaja por México

CERO ACCIDENTES

TODOS SOMOS SEGURIDAD

La seguridad y la salud son un objetivo para todos

GRUPOMEXICO