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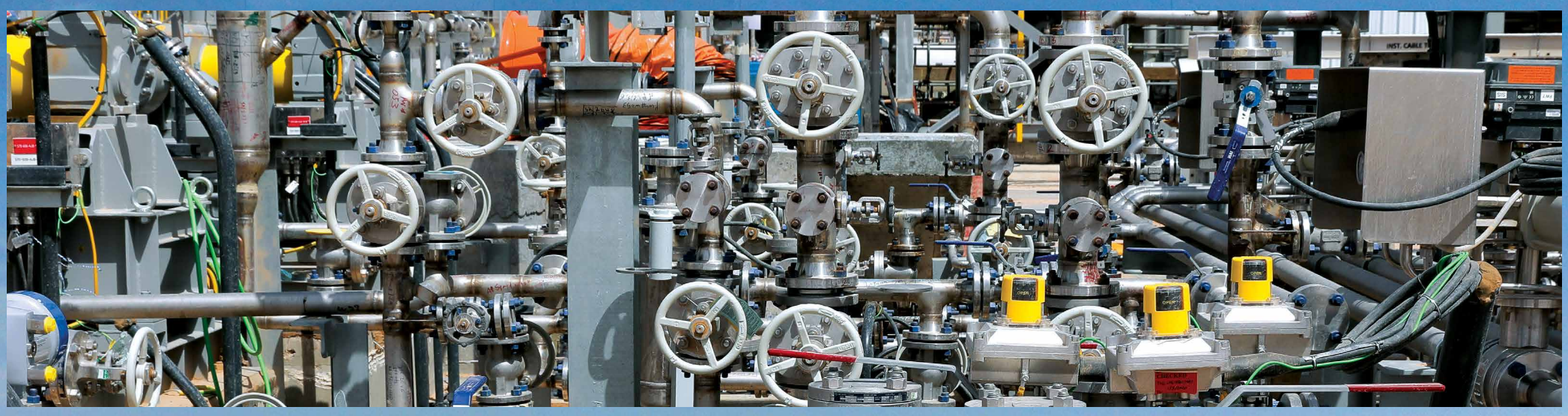


tackling a large challenge with a large solution

‘Ain Dar sulfur removal units commence operation

see pages 6 and 7

Ithra Annual Gathering sets calendar for upcoming year

The King Abdulaziz Center for World Culture "Ithra" hosted its second "Ithra Annual Gathering" on Sunday, Jan. 24, 2021, at the Center in Dhahran. In the presence of intellectuals, artists, writers, and thought leaders, Ithra announced the most prominent programs and events planned for 2021.

The events calendar features a vast slate of diverse cultural activities suited for all ages that address the fields of art, creativity, culture, knowledge, and society. Ithra's mission is to provide an environment that stimulates the production and exchange of knowledge, develops talent and provides a rich range of visitor experiences through local and international programming.

"The COVID-19 pandemic has led to major transformations in how we deal with the creative and cultural industries, as society has proven its ability to adapt to the pandemic," says Hussain N. Hanbazazah, director of Ithra.

"We were keen to provide innovative solutions so we could continue interacting with our audiences. While the threat of the pandemic is receding, we will remain committed to providing various programs and rich content that enhance the rapid growth and the massive transformations being experienced by the Kingdom's creative and cultural industries."

Hanbazazah underlined the ability of the creative sectors to enhance communication with others within a humanitarian framework we have not experienced before. He specifically pointed to the UN's resolution to make 2021 the international year of Creative Economy for Sustainable Development as evidence of the sector's importance. "After all, it was the creative industries — from film and television, books and music to art and gaming — that we all turned to for solace when the situation was bleakest."

Hanbazazah says COVID-19 revealed the immense potential of the creative industries. "Beyond their restorative and comforting qualities, these activities also enabled us to connect with others in our shared humanity like never before. There are personal and social benefits intrinsic to the industry, but the sector also has much to offer economically as the world works to recover financially."

"If 2020 has taught us anything, it's that we need to be more mindful of our digital well-being," says Abdullah Alrashid, Ithra's head of Programs. "In developing our activities for 2021, we've been conscious about not just using technology for the sake of having technological components, but we are continually considering how technology can be employed in a beneficial manner."

Alrashid says this year will see the inaugural Theater in Schools program, which supports the development of Saudi's theater and performing arts sector, both on and off stage. Also, we will launch the Ithra Academy, in which Ithra will partner with world-class institutions and entities to offer scholastic training programs that will provide long-term exposure to the creative and cultural industries.

Other highlights include the immersive Shatr AlMasjid: Art of Orientation exhibition, a deep dive into mosques and the objects they contain; Seeing and Perceiving, based on optical illusion and visual trickery; the return of the flagship creativity and innovation conference Tanween; and the annual 'Id and Saudi National Day celebrations.

According to Ithra's recently released Annual Report, the Center's Ithra Connect initiative had more than 1 million virtual attendees and over 19,000 participants, while 45,880 visitors attended the Vietnam oriented inaugural edition of the Ithra Cultural Days festival.

Ithra's live stream video with Neil deGrasse Tyson currently has more than 17,000 views on YouTube. In 2020, Ithra provided training for more than 20,000 young professionals, while the submissions for its National Reading Program "iRead" exceeded 50,000. Ithra also trained 1,500 volunteers in 2020, delivering 50,000 hours of productivity.

Ithra's 2021 calendar reinforces Ithra's status as Saudi Arabia's premier cultural and creative destination, and Ithra is proud to present programs and activities that are adding so much to the blossoming cultural landscape of the Kingdom.

For more information about Ithra and its programs, visit *www.ithra.com*.

World's post-pandemic energy landscape

Cleaner energy optimism after challenging 2020

By Janet Pinheiro

Abu Dhabi — COVID-19 has the world rethinking energy and emissions.

At last week's Atlantic Council's virtual Global Energy Forum, the discussion focused on the pandemic's unprecedented sweeping impact across the energy sector.

Hosted as part of the UAE's annual Abu Dhabi Sustainability Week, consensus at the forum was 2021 is a pivotal year for the world's energy sector.

The event, convened by Washington-based think tank the Atlantic Council, assembles the world's top energy and foreign policy decision makers to share insights into the world's energy systems, and galvanize impetus toward the trending global energy topics.

This year's scene-setting gathering was hosted to a buoyant background of the U.S. presidential inauguration, and included a special conversation with HRH the Prince of Wales, who said that achieving sustainability and profitability simultaneously was entirely possible.

He called for "regional and global cooperation around green and renewable energy investment and production."

Aramco chief technology officer Ahmad O. Al-Khowaiter was alongside the powerful lineup of speakers and respected experts sharing their insights at the forum.

Aramco chief technology officer, Ahmad O. Al-Khowaiter, was alongside the powerful lineup of speakers at last week's Global Energy Forum held by Washington-based think tank, the Atlantic Council.

Energy transition coming fast

"Real friends say the bitter truth," said International Energy Agency (IEA) executive director Fatih Birol, adding "the bitter truth is that real energy transitions are coming, and they are coming fast."

"I believe no country, no oil- or gas-producing government, no companies, nobody, will be unaffected by clean energy transitions," he added.

Birol, delivering one of the forum's most sought after sessions, said global energy demand declined about 5% in 2020, and that this was seven times deeper than the demand decline during the 2008-2009 world financial crisis.

Although emissions went down 7% last year, Birol warned this was not due to policy changes or new technologies.

"It was mainly because of the economic downturn and pandemic," he said. "If you want to see a structural decline again, new policies are needed."

Birol was keen to emphasize that oil will be required for the foreseeable future.

In a panel session he said, "The world will need oil and gas for several years to come."

"The producers in [the] Middle East are, almost all of them, low-cost producers, and they will continue to bring oil to the markets," Birol noted.

Aramco, well invested in clean energy

Energy and emissions are a forethought for the world, but planning for the world's energy future is nothing new at Aramco.

The world's largest oil exporting company, Aramco has the lowest upstream carbon intensity associated with oil production when compared with the world's other major oil producers.

Al-Khowaiter, participating in a panel discussing "The role of the Middle East and North Africa in the energy transitions," said Aramco's long history of energy leadership was the kind of futuristic view needed by today's energy industry.

"We have invested many years, long before the concerns globally around emissions, in the cleanliness of our product," he said.

"We have about 10 kilograms of CO_2 emitted with every barrel of oil we produce," said Al-Khowaiter.

> "At Aramco we believe not only in the affordability of energy, but as well, the sustainability of energy.
>
> — Ahmad O. Al-Khowaiter

Referencing the Kingdom's Master Gas System, he said, "We invested long ago, in the late 70s, mainly in capturing the associated gas, which had zero value at the time, but for environmental reasons, and what turned out to be great economic reasons."

Aramco moving to lower carbon products

For some time, Aramco has been undergoing its own transition to lower carbon footprint products.

Al-Khowaiter said Aramco is transitioning to a lower emission product mix.

Behind the company's transition is efficiency of its existing hydrocarbon production, and the low-emissions conversion of hydrocarbons to valuable materials.

"We are even getting more efficient in our production, and so we are investing in the more efficient production of oil, and that includes [the use of] renewable energy, if it is economically competitive," he added.

Beyond energy

Aramco is developing new lower emission uses of hydrocarbons, like carbon-based high performance materials.

The materials needed for the world's energy transition are mainly polymers and carbon-based products.

"The uses of hydrocarbons go beyond energy," said Al-Khowaiter. "We have a major program in what is called crude to chemicals."

Mid-last year, for a total consideration of $69.1 billion, Aramco acquired the 70% equity interest held in SABIC by Saudi Arabia's sovereign wealth fund.

Aramco's chemicals business now operates in more than 50 countries.

The acquisition made Aramco a major global producer of petrochemicals, expanding the company's capabilities in procurement, manufacturing, marketing and sales.

Carbon-free energy

In 2015, Aramco pioneered carbon capture and enhanced oil recovery in the Middle East.

Through carbon capture utilization and storage technology, Aramco is expecting to produce carbon-free products like blue hydrogen or blue ammonia.

Describing the sun as finally rising on hydrogen, Al-Khowaiter said, "Hydrogen technology has matured tremendously over the last 10 years."

He said the costs of fuel cells, which are the main technology that utilizes hydrogen, are becoming economic.

"We know the cost of hydrogen is very competitive, but the challenge is moving it to the consumer."

Al-Khowaiter said infrastructure work was needed to economically deliver hydrogen from production to the consumer.

Last year Aramco shipped a 40-ton cargo of blue ammonia to Japan for zero-carbon power generation.

"The logic behind our blue ammonia project was demonstrating that ammonia could be a competitive means to transfer renewable or decarbonized hydrocarbons to markets," said Al-Khowaiter.

"I think it is that kind of work that we are doing right now, which will enable hydrogen at scale, and therefore be economically competitive with hydrocarbons.

"If we can transfer that same energy in hydrogen, or a hydrogen carrier, like ammonia, we will get the same value from our hydrocarbons," he noted.

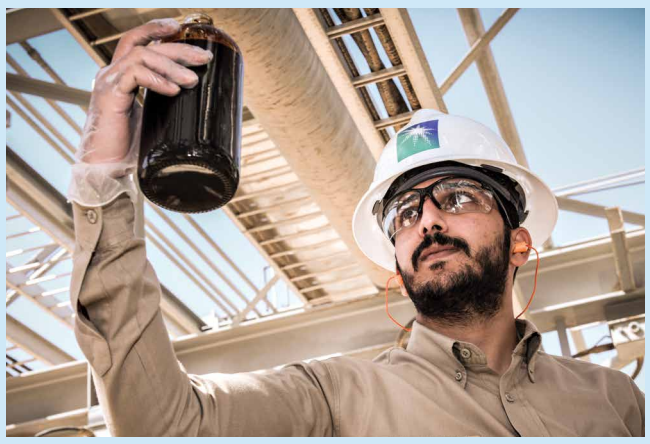
Abu Dhabi Sustainability Week

Held annually in conjunction with the Abu Dhabi Sustainability Week, the Atlantic Council's "Global Energy Forum" is recognized as a key event toward setting the world's global energy agenda for the year ahead.

Panel participants alongside Al-Khowaiter were Masdar Clean Energy executive director Yousif Al Ali; Jordan energy minister HE Hala Adel Al-Zawati; Schneider Electric Middle East and North Africa president Caspar Herzberg; and Atlantic Council senior fellow Jean-François Seznec.

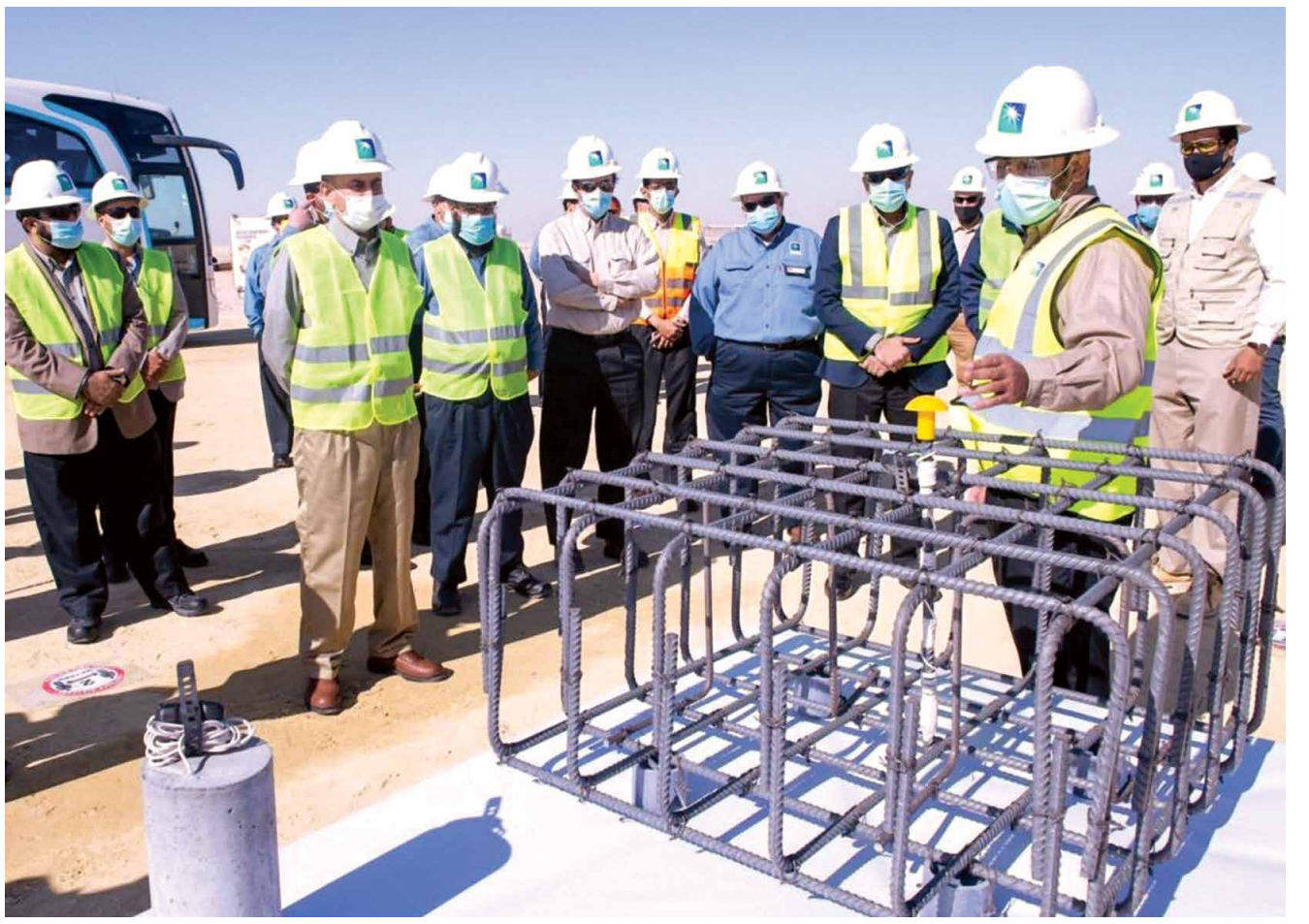
Lower greenhouse gas emissions and profitability flow from decades of thoughtful Aramco work practices with:

- reservoir management
- flare minimization
- methane leak detection and repair
- energy efficiency.



New concrete testing system strengthens Tanajib Gas Plant project

By Loai M. Al Owa and Ibrahim Y. Al Daghrir



Demonstration of the concrete maturity sensor to Technical Services senior vice president Ahmed A. Al Sa'adi during Tanajib Gas Plant site visit on Nov. 24.

Tanajib — An inventive high-tech concrete testing system designed to improve build reliability and cut construction time and cost is being used for the first time at the Tanajib Gas Plant, 200 km north of Dammam.

Wireless mobile app-based concrete maturity sensors have been embedded in foundations set to support sales gas compressor equipment, said Hosam I. Al Jalal, manager of the Tanajib Gas Plant Projects Department (TGPPD).

"This is not only a remarkable major milestone for the work on the construction site, but it also includes introducing the latest concrete technology," Al Jalal said.

The smart sensors are attached to rebar, the reinforced steel rods, or bars, around which concrete is poured, and measure the material's temperature, humidity and strength as it dries and hardens. The temperature differentials from the surface and the interior of the setting concrete are sent to an app to monitor structural integrity.

Previously, a series of concrete specimen cylinders were set at a site and over a period taken to a laboratory to be tested. The cylinders in the lab were compressed until they were crushed to measure how strong the concrete was at that point of maturity. The new wireless sensor technology does away with the need for concrete cylinder break tests, saving transport and lab testing time and costs.

The sensors also speed up the collection, analysis and sharing of data — the latter improving safety at a job site with workers being able to share information while physically distancing amid the COVID-19 pandemic. Readily available data also reduces delays in receiving test results and taking down wooden construction form work.

"The system, which is monitored on a mobile phone application, improves data accuracy, promotes safety and quality, and reduces concrete testing delays," said Abdullah M. Al Guwaifli, project quality manager of the Inspection Department (ID).

The ID and TGPPD collaborated to deploy the sensors to achieve high quality concrete structures for multiple mass concrete foundations at Tanajib projects, Al Guwaifli added.

"One of the most important steps in construction … is monitoring the temperature of your concrete after placement to ensure proper curing," said Muhammad M. Abbas, managing director of the Osaimi Engineering Office, which provided the sensors and technical advice.

"This is especially true during extreme weather conditions," he said.

"Closely monitoring temperature variances in your concrete slab during curing is vital to ensuring the strength, quality, and durability of your structure. The temperature readings are very precise."

The sensors were installed on Oct. 29, 2020.

International training network welcomes Aramco's Nabil K. Al-Dabal as new president

Nabil K. Al-Dabal, vice president of Human Resources, is the new head of the regional section of the Association for Talent Development (ATD).

Al-Dabal succeeded Faisal A. Al-Hajji, the executive director of Community Services, as president of ATD's Middle East and North Africa (MENA) Learning and Development Member Network on Dec. 21, 2020.

Al-Hajji served as the founder and president of the ATD-MENA L&D Member Network from its inception in 2018, when it was established by Aramco.

"Faisal took the burden upon himself and began the journey, and even with the challenges of COVID-19, accomplished a tremendous amount of progress," Al-Dabal said. "He and his team deserve full credit for bringing the organization to where it is now."

Established in 1943, ATD is the world's largest professional organization dedicated to developing the knowledge and skills of employees who develop talent, improving their performance, and helping achieve results for the organizations they serve.

It is supported by a volunteer team based in Training and Development and designed to build knowledge, and share solutions, ideas, and best practices across its networks.

Taking the vision further

The network has grown through Al-Hajji's vision to create new professional development opportunities not only in the Kingdom, but also regionally. To accomplish this goal, the network introduced a variety of ATD certification programs and facilitated virtual training delivered by certified trainers.

"It has been an honor to work with such a dedicated team, both inside and outside of Saudi Arabia. We are proud of what we have accomplished, and we are excited for the future," said Al-Hajji.

Al-Dabal said he is looking forward to continuing Al-Hajji's vision, and expanding the network further.

"The COVID-19 pandemic has put people at the center of every company's operations, and has elevated both the necessity and impact of learning and development across the globe," he said. "My vision for the ATD-MENA L&D Member Network is to drive exponential growth in the skills and capabilities of HR, talent development, and learning and development professionals in the region."

The network board is represented by a number of prominent companies and institutions, including the Bahrain Petroleum Company, Emirates Flight Training Academy, the American University of Cairo, Saudi Telecom Company, and SABIC.

The network collaborates with training providers Mashreq in Bahrain, and Numou, Marafiq, Saudi Petroleum Services Polytechnic, and Sadara in Saudi Arabia.

More information can be found at *https://www.td.org/mena-ld-member-network*.

World looking up for new Downstream Development Academy

By Abdelbasit Ayoub and Lujain Alharakah

Mohammed H. Jaamal, a registrar in the HR Development Division, welcomes Mohammed Y. Al-Qahtani (far left) and Suleman A. Al Bargan, vice president of Domestic Refining & NGL Fractionation (second from left), and Fawaz I. Nawwab, general manager of the RT Refinery (third from left) to the Downstream Development Academy. (Photo: Moayed Al-Qattan/MPD)

A new world-class training facility for Aramco's downstream business has opened in Ras Tanura (RT).

The internationally accredited Downstream Development Academy (DDA) features a virtual reality laboratory, a computer lab, six purpose-built classrooms, and the multidiscipline training hub (MTH), which houses near plant-like learning and practice facilities.

The MTH, also known as Plant J99, was moved to the DDA building from the RT Refinery mostly by company trainee technicians. The hub was built in 2013 with equipment retrieved from retired plants and excess materials to mirror refinery operations for training in a controlled environment.

In opening the training facility on Dec. 24, Mohammed Y. Al-Qahtani, senior vice president of Downstream, said the DDA was a major milestone in the company's journey in becoming an employer of choice.

"I would like to thank all of you for this impressive academy. It will help Downstream and the company in solving future challenges," Al-Qahtani said. "Well done all."

An independent U.S. vocational education organization, the Accrediting Council for Continuing Education and Training, has accredited the academy, highlighting in its on-site evaluation the DDA's institutional management, professional relationships, and curriculum revision. The accreditation status will help the academy further attract external customers who will benefit from the internationally endorsed training facilities and programs.

Yahya Q. Daghriri, superintendent of the RT Clustered Shared Services Department's HR Division, said the new academy will make learning more engaging, challenging, and realistic.

"The DDA serves as an internationally accredited and certified training hub for the growing customized industrial Downstream operations and maintenance training," said Daghriri. "Our customer base goes beyond serving Aramco organizational training needs to include local joint ventures."

Training at the academy, which can accommodate 250 trainees, is divided into three streams: professional, industrial, and safety. The majority of courses offered are of short duration, from one day to one week. New equipment has increased the number of on-the-job training opportunities to around 1,600 tasks from a previous 600 tasks, which integrate new training platforms, including virtual and augmented reality.

"Downstream is where one can find the highest complexity processes, which drives high-level technology integration, therefore, DDA becomes the pioneer in offering the most modern, current, and relevant training opportunities for our workforce and for others," said Saleh R. Zahrani, champion of the MTH project.

Berri fire chief wins 2020 Eastern Province Best Driver Award

Fahad Y. Al-Salami, the battalion chief at the Berri Fire Control Unit of the Fire Protection Department (FrPD), has edged out almost 43,000 other entrants to win the 2020 Eastern Province Best Driver Award.

The award, sponsored by HRH Prince Saud bin Nayef bin Abdulaziz Al Saud, Governor of the Eastern Region, strives to promote a safe driving culture and encourages participants to maintain a violation-free record.

Al-Salami won the Non-Violator Section (36 to 50 years) after passing his theoretical and practical driving tests.

The recognition ceremony was conducted virtually and attended by Nabeel A. Al-Jama', senior vice president of Human Resources and Corporate Services, along with Aali M. Al Zahrani, vice president of Safety and Industrial Security.

"My journey started when Aramco and FrPD announced via (the company) home page the registration of the 2020 award in January 2020," Al-Salami said. "I registered my name among the other 43,000 Eastern Province entrants."

"The registration and filtration process took a long time," he said. "I received a message stating that I was qualified to take the written test on Oct. 14, 2020.

"After passing the written test, I was qualified to take the practical test, which I did on Nov. 11, 2020. After completing the practical test, I was informed that I successfully passed all sections and won the award.

"I am very grateful for what FrPD and Aramco gave me, and I consider this award as an achievement to my department and company, reflecting a good image on all Aramco employees and how overall defensive drivers they are.

"The company emphasizes all efforts, committees, and programs to elevate driving behaviors and I urge all of my colleagues to participate in the upcoming Traffic Safety Excellence Awards to pay back everything this great company has provided us with."

FrPD management congratulates Al-Salami for his outstanding hard work and achievements, and encourages all employees to be a role model when it comes to road safety. All these efforts reemphasize FrPD's commitment to safety and excellence.

Fahad Y. Al-Salami

Aramco completes major onshore sulfate removal effort

‘Ain Dar’s five sulfate removal units commence operation

By Janet Pinheiro

There are many ways for the natural pressure of an oil and gas reservoir to get a helping hand.

Injecting seawater is one way to assist, but sometimes the ocean’s salt reacts with the underground formation, causing oil and gas production issues.

Scale formation plugs reservoir porosity, impacting production.

Removing the salt before injection — desulfation — solves this, and Aramco recently turned on one of the world’s largest onshore sulfate removal plants at ‘Ain Dar.

Flicking on sulfate switch

In September 2020, on the eastern border of Ghawar, the world’s largest oil and gas reservoir, the company fired up five newly constructed giant sulfate removal units.

Following a January 2018 contract signing and October 2018 commencement, construction of ‘Ain Dar’s sulfate removal plant took 21 months to complete.

The impressive new facility takes power from ‘Ain Dar’s water injection plant to energize its electric motors, and its equipment includes a substation, five nano-filtration trains, four high-pressure water injection pumps, and common utilities.

New construction technology for the project included cost-effective and timesaving polymer for sand stabilization on pipeline berms, and durable lightweight nonmetallic grating.

Prior to touring ‘Ain Dar, visitors from the Sea Water Injection, Inspection, and Industrial Security Operation departments and Project Management receive a safety brief from Sea Water Injection Department operator Abdullah M. Alabdulqader. (Photo: Ding/MPD)

Project Management vice president Abdulkarim A. Al-Ghamdi listens to project engineer Hussain M. Alramadhan present on the construction achievements of the Sulfate Removal Facility at ‘Ain Dar. (Photo: Ding/MPD)

Seawater for enhanced recovery

Ocean waters account for more than 95% of the Earth’s water, and in arid Saudi Arabia, using seawater to enhance oil recovery makes good sense, and contributes to water conservation.

The sulfate removal units supply more than 12,000 gallons of water per minute to be used for enhanced oil recovery.

Through each unit, the 100,000 m^2 facility pumps high-pressure Gulf waters piped from Aramco’s Qurayyah seawater plant, across finely membraned filters for injection into Ghawar’s ‘Ain Dar and Fazran fields.

Oil Facilities Projects Department then manager, Ahmed U. Al-Aredhi, said that using desalinated seawater to push oil from a reservoir to a well was a prudent use of the Kingdom’s precious resources.

“Using seawater with reduced sulfate has less impact on operational facilities, which translates to a lower industrial footprint,” said Al-Aredhi.

Getting salt out of water

Making seawater suitable for industrial use involves applying pressure.

Gulf waters are particularly salty, with approximately 57,000 milligrams of salt content per liter, which is higher than most oceans and seas around the world.

The five sulfate removal units use nano-membrane filters for the large-scale removal of salt and impurities, and project engineer Hussain M. Alramadhan says the units’ sophisticated nano-filtration stops almost all sulfate from getting through.

“The units reduce the sulfate in the seawater from 4,400 ppm to less than 200 ppm,” said Al-Aredhi.

The nano-membrane filters remove large dissolved salts — divalent and larger ions, ions with electronic charge of 2 and larger, such as sulfate ions SO_4^{-2}, Ca^{+2}, and Mg^{+2}.

Monovalents — small dissolved salts and ions such as Na^{+1} and Cl^{-1} — will pass through the filters as they have no impact on reservoir formation.

Every drop used

Al-Aredhi said rejected seawater is redirected back to the existing water injection wells, “No drop of the seawater is wasted.

“Although high in sulfate, the rejected water can be used in oil fields whose oil and gas chemistry does not react with the sulfate,” he explained.

Product water from the ‘Ain Dar facility is sent to north Ghawar and lower Fadhli oil reservoirs.

The Kingdom has a small number of large and productive oil reservoirs, low per barrel gas flaring rates, and low water production.

This combination results in less mass lifted per unit of oil produced, less energy used for fluid separation, handling, treatment, and reinjection.

Together, all contribute to the low upstream carbon intensity of Arabian oils.

Aramco’s newly completed sulfate removal plant uses sophisticated nano-filtration technology to treat and inject low sulfate water to the Ghawar oil field, and during its construction phase, used smart helmet technology to establish virtual connectivity with overseas vendors.

Khurais multiple stream

Khurais, one of the world’s largest intelligent fields, also recently commissioned a multiple stream seawater reverse osmosis and sulfate removal facility.

Put onstream in August 2020, the first-of-its-kind facility in Aramco is part of an environmental commitment by Khurais to stop the use of non-potable (non-drinkable) groundwater in the processing of crude oil.

Treated through nano-membranes, the low sulfate seawater is injected into the Khurais Lower Fadhli reservoir, enhancing crude oil production by reducing scaling and clogging of the oil reservoir caused by sulfate.

The seawater reverse osmosis and sulfate removal facility at Khurais has 14 trains, producing four streams of water with several ionic compositions, each used for various purposes.

Qurayyah seawater backfilling Master Gas System since 1978

“The most ambitious energy project in history,” was how Aramco described the Master Gas System (MGS) in 1976.

Unprecedented in scope and cost, by the time the initial MGS was completed in 1982, it could process about 3.5 billion standard cubic feet per day of gas — the energy equivalent of 750,000 barrels of crude oil.

Associated gas used to maintain pressure in the oil reservoirs was now slated for industrial use.

Aramco turned to a more efficient alternative for maintaining reservoir pressure: injecting treated seawater.

The Qurayyah Seawater Treatment Plant, a massive undertaking, began pumping 3.7 million barrels per day of seawater from the Gulf in 1978.

The plant removed impurities, but not salt.

Huge pipelines, engineered to withstand the corrosive effect of the Gulf’s extremely salty water, carried the treated seawater to injection facilities in the Ghawar field.

Operators in the control room of the Qurayyah Seawater Treatment Plant in 1979 monitor the processing and delivery of 4.2 million barrels per day of seawater for injection into oil fields to maintain reservoir pressure.

Aramco’s seawater injection system replaced the use of water drawn from onshore saline aquifers for reservoir pressure maintenance.

New pressure exchanger technology deployed in reverse osmosis plant

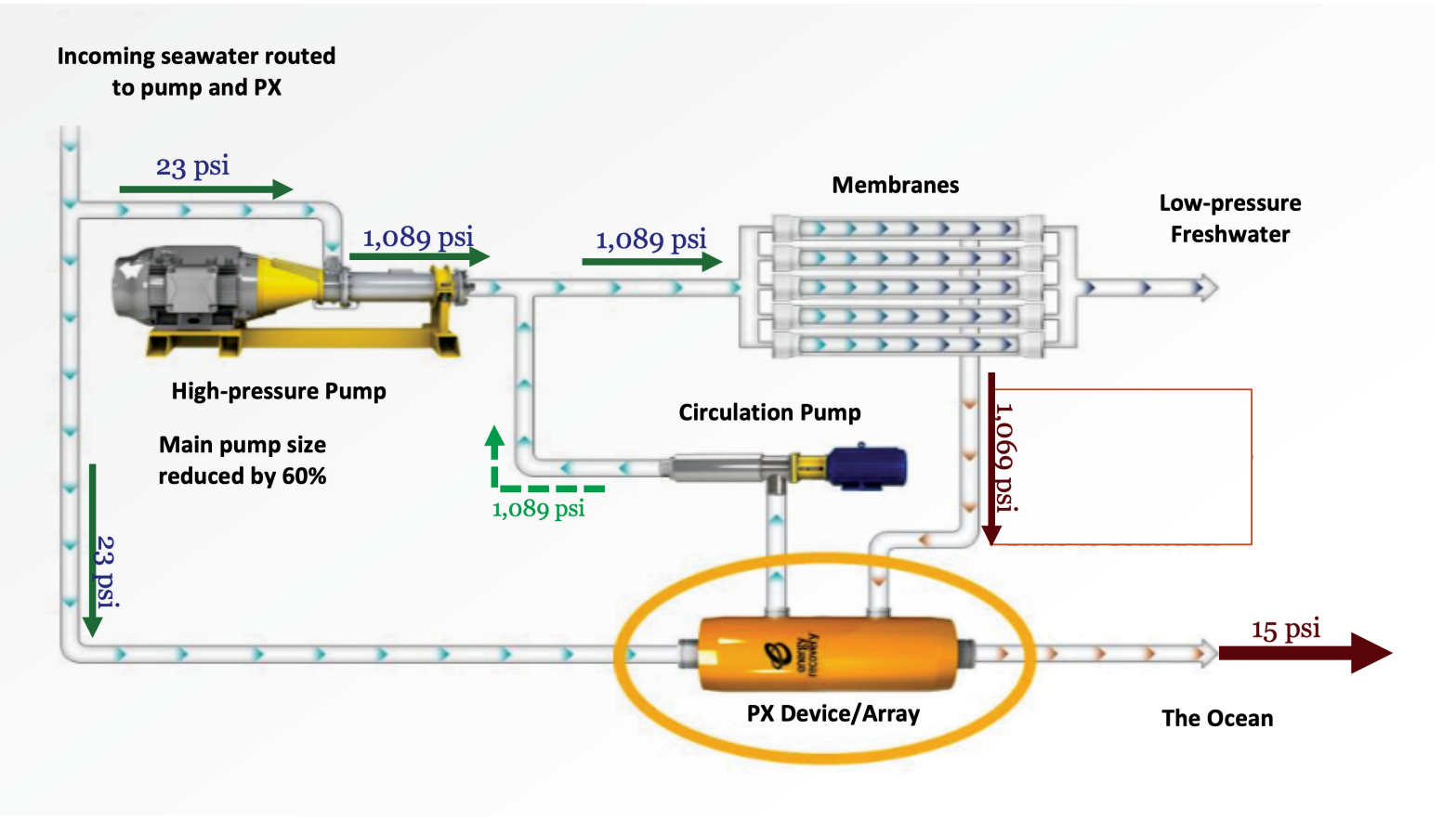
By Abdullah O. Altwaijri

The Oil Facilities Projects Department (OFPD) is currently constructing a new reverse osmosis (RO) desalination plant in the Safaniyah gas-oil separation plant to provide 1,500 gallons per minute of desalinated water.

In alignment with Project Management's new technology deployment initiative, OFPD has pursued the implementation of a new energy recovery device (ERD) in the project with substantial value — both environmentally and economically — which will lead to a total cost saving of $12 million throughout the plant's life cycle.

RO is a common and effective method to produce desalinated water, and RO plants have been constructed at numerous locations within Aramco. These plants produce desalinated water by utilizing membrane sheet technology. The membranes are uniquely made to allow water molecules to pass through, while preventing the passage of larger molecules, such as salt. To achieve the desired separation, the incoming saline water must be fed through the RO membrane under significantly high pressure. As such, conventional RO plants require the installment of large high-pressure pumps upstream of the membranes.

RO plants have established their value in producing sweet water; nevertheless, areas of improvement exist for any successful process. When seawater is sent to the RO for processing, the separated sweet water leaves the membrane at a low pressure for further processing, while the saltwater concentrate leaves the plant at a high pressure, and is sent back to the sea.



To enhance the efficiency of the traditional process, OFPD has successfully implemented an ERD known as a pressure exchanger (PX). In the new design, the PX exchanges energy between high-pressure concentrate and the incoming low-pressure seawater. Therefore, the project was able to design the new desalination plant with 60% smaller pumps.

The PX technology offers an innovative take on energy recycling, reducing the carbon footprint of the plant, and contributing greatly to the environment. Since the size of the high-pressure pumps was reduced by 60%, the plant's capital expenditure was lowered by $1.2 million, while the operating expense was lowered by $400,000 annually. Given the value addition of the PX technology, the device is surprisingly simple.

Designed for 25 years of service, the PX is made from a ceramic component, and is maintenance free since it does not contain any electronics. The simplicity of the device adds an additional layer of value to the technology.

Trainer awards recognize top teaching performance

By James A. Tolland

The Industrial Training Department (ITD) recently held its annual teacher awards ceremony.

The 2020 Annual ITD Teacher Observation Development System (TODS) Awards ceremony was the second such event and was held virtually due to the COVID-19 pandemic.

TODS, which was inaugurated in August 2017, is Training & Development's (T&D) award-winning system for tracking instructional performance. It utilizes data from thousands of instructor observations and documents their progress in key domains of sound pedagogy, assigns appropriate developmental goals, and leverages identified talent to raise the bar of instructional excellence throughout the training organization.

Job Skills trainer, Anil K. Vadhel, teaches "Analyzers and Detectors" to a group of trainee Vocational College Graduate Non-Employees at the Ras Tanura ITC.

TODS stands at the heart of T&D's goal to continuously improve the quality of instruction in training programs, and has been shared with several Aramco organizations as a best practice in managing instructor observations for performance evaluation and development.

The awards began with opening remarks from T&D general manager, Sami T. Murshed, who welcomed everyone to the event and gave an overview of the background and achievements of TODS. Murshed was followed by Yousif N. Masoudi and Eissa A. Alamri, both HR assistants in the Western Region Distribution Department, who provided a trainee's perspective of TODS.

The attendees then heard from observer and observed. Isaac Venkatachalam, a safety training instructor at the Dhahran North Industrial Training Center (ITC), talked about his own professional development journey with the system. Juan-Wessel Lubbe, a senior teacher at Rahima ITC in Ras Tanura, described what it was like to be a TODS observer.

After each speech, awards for distinguished instructors and observers, respectively, were announced. The event also included special awards for the most improved instructors, as well as best division awards highlighting specific areas of excellence.

Thomas A. Heenan, an ITD career counselor and one of the personnel behind the creation and maintenance of TODS, then outlined recent improvements to the system.

Closing remarks included a speech thanking all those involved for their efforts in creating and successfully implementing the system. It was reemphasized that TODS was the result of a cross-functional development effort and that close collaboration within T&D will be essential as it matures and expands.

Fire Protection Department's burning desire to save lives and protect assets, ensure business continuity

Lightning strikes a crude storage tank, igniting vapors around the rim of the floating roof. Firefighters from the Fire Protection Department (FrPD) respond, discharging foam through permanent equipment attached to the tank, quickly extinguishing the fire and limiting both damage to the facility and interruption to the core business.

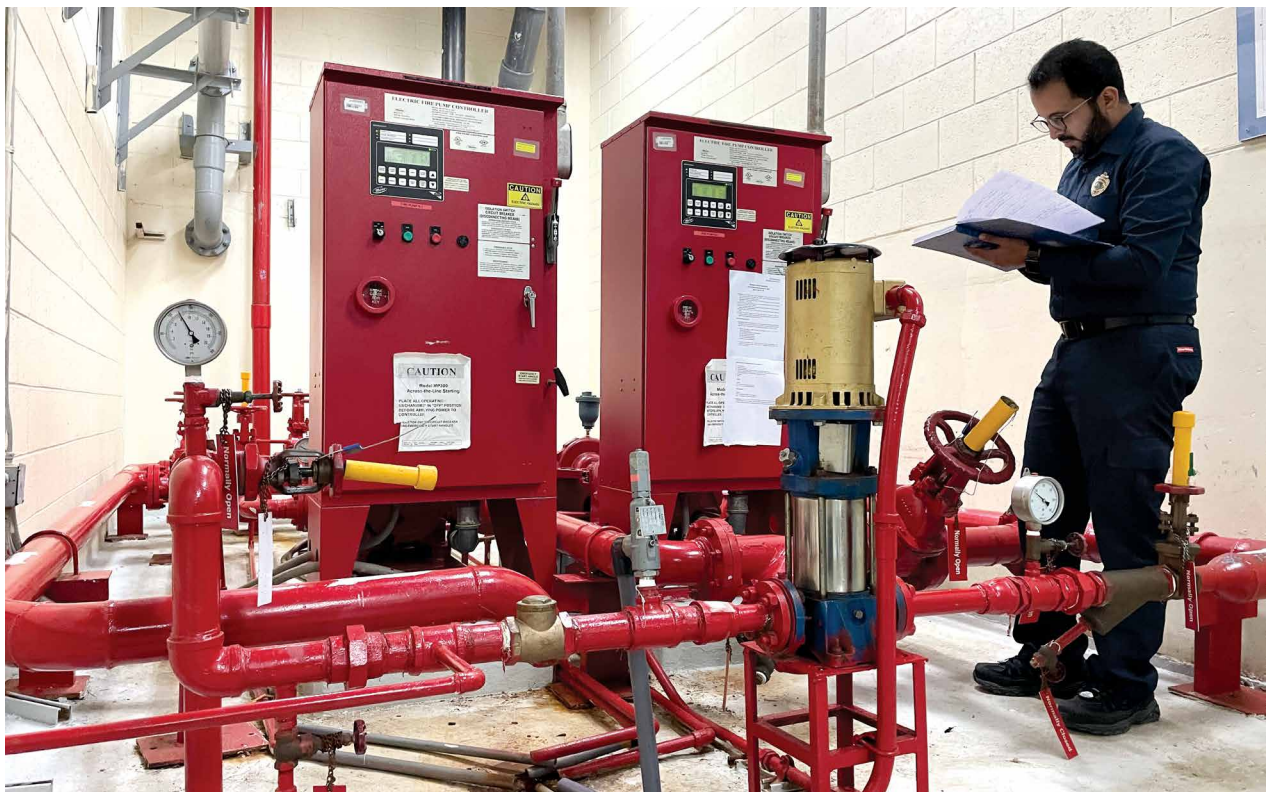
Without immediately available water, or properly maintained equipment, additional manpower and equipment must be mobilized; the extra time leads to a larger fire, increasing the downtime of the affected equipment. This is a prime example of the criticality of maintaining fixed fire equipment.

First line of defense

Being the first line of defense against fire, the readiness and optimum performance of a fixed fire system and equipment is a critical component for managing risk in our facilities. During a fire, any failure of fixed fire protection equipment, such as a fire pump or foam skid, may prevent firefighters from achieving early control, potentially resulting in the total loss of a facility.

Fortunately, as a result of good design, defined controls, and strong management, fires occur at Aramco facilities on an infrequent basis.

Company fires often start as a result of accidents, miscommunication, equipment failure, or nonstandard activities — such as those used for a turnover and inspection process.



An inspector records the fire water pump data during an annual pump performance test.

FrPD and general personnel rely on the immediate availability of a variety of fire extinguishers — water, foam, inert chemically reactive gases, and dry and wet chemicals — to protect lives, save assets, and ensure business continuity.

Importance of inspecting equipment

The complex arrangement of equipment requires frequent inspection, testing, and maintenance. At Aramco, this effort showcases the unique cooperation between 93 departments and the FrPD. The former own and maintain the equipment, ensuring that it is inspected and maintained according to standards; the latter provides technicians to witness and participate in annual performance tests and assessments, confirming that the company's fixed fire protection equipment — of which there are more than 85,000 elements — will function as designed and when needed.

FrPD also inspects and tests 110,000 pieces of portable equipment, such as fire extinguishers, on a regular basis.

FrPD has been actively improving fixed system testing capabilities, along with their knowledge, from contributions by subject matter experts to increased departmental quality assurance/quality control activities to revised job ladders, new assignments, and reorganization to retain highly qualified technicians.

At the heart of FrPD's efforts to improve the technical knowledge and capabilities of technicians, and the experts who support them, is the burning desire to support proponents, and Aramco, as we all save lives and protect assets.

Your voice

The art of good communication in one word: simplicity

By Motsham Manzoor
Dhahran
Motsham.Manzoor@aramco.com

Logical, sequential, precise, to-the-point and flowing; these are the classic standards we all need to learn to communicate effectively at work.

American television journalist, Tim Russert, was a famous communicator. During NBC's coverage of the 2000 presidential election between George W. Bush and Al Gore, Russert became the talk of the town due to his simple way of explaining the U.S. electoral process. During the night of the election, he got a whiteboard and indicated by adding electoral votes in each state that whoever wins Florida, will win the election. No "handi-dandi," complex, multicolor graphics and charts. No metaphor. No long interview and advice from political pundits. All he did was follow his dad's advice, "Stay simple and understandable son — simplicity is the key to convey your message."

Good communication can have many dimensions, rules, and standards, but simplicity and "understandability" are always the most important traits.

Simple and understandable

The best communication is always simple and straightforward, accounting for an audience and its capability to understand a message. The message for technicians will be different than that for engineers, and the message for managers will be different than for executives. We often hear executives say, "Please, no technicality, only explain in layman's language," while engineers would like to get the complete technical picture. Technicians, meanwhile, are more interested in following the procedures for maintenance or troubleshooting.

Precise and to-the-point

So, for communication surrounding the repair of a critical piece of equipment, for example, an executive is waiting for the message, "The plant is back in operation and the team is available for continuous monitoring." It is not appropriate to elaborate who did what, or how many hours were utilized, or which parts were replaced.

These details can be shared with engineers and supervisors to discover the cause of the failure and improve processes. The manager is looking for cost and delivery detail. Explaining the process would be a moot point.

Sequence and flow

In any report or presentation, the chronological order or flow of information is as important as the contents. Unless this information is tucked in sequentially, the report will not make sense. It would, instead, create confusion.

Communication means staying simple while understanding your audience and being straightforward, precise, logical, and sequential. You have now learned the art of communication in the workplace.

As British writer C.S. Lewis said, "Don't use words too big for the subject. Don't say 'infinitely' when you mean 'very'; otherwise you'll have no word left when you want to talk about something really infinite."

Your Voice reflects the thoughts and opinions of the writer, and not necessarily those of the publication.

A date with history at Al Murabba Palace

During the 2019 Riyadh season, the historical district was decorated and hosted fine dining restaurants. Those visiting the palace will be delighted with its gardens.

By Musherf Alamri

Riyadh — Two kilometers north of the old town of Riyadh sits a restored royal palace in which some of the most important decisions in the Kingdom's history were made, including the issuance of the national currency (the Riyal) and the establishment of formal schooling.

Al Murabba Palace is the former home of King Abdulaziz and his family. Construction on the first palace built outside the old city wall began in 1936. The king moved in 1938 and it was from here that he managed the affairs of the Kingdom until his passing in 1953.

The name of the palace refers to the square shaped towers (the word *murabbar* means square in Arabic). It is located within the King Abdulaziz Historical Center block in the Al Murabbar neighborhood, and two kilometers north from Riyadh old town, which contains Al Masmak Fortress.

Al Murabba Palace is built from adobe blocks, rocks, palm fronds, and tree trunks, adhering to traditional local architecture. It has two floors, each consisting of 16 rooms, and a beautiful courtyard, according to the nearby King Abdulaziz Foundation for Research and Archives.

King Abdulaziz requested that the Red Palace be built for his son King Saud in 1943. The name refers to the extensive use of red on its walls. (Photo: Musherf Alamri)

The National Museum contains 3,700 historical artifacts from across the Kingdom. There are eight permanent exhibitions with subjects ranging from historic civilizations in the 4th millennium BC to early Saudi states. (Photo: Musherf Alamri)

Those visiting the palace will be delighted with its gardens. In the past, this land used to be farmed during the rainy season. Walking toward the palace is an experience in itself: people go through narrow alleys among buildings with traditional Najdi architecture and numerous towering palm trees providing shade.

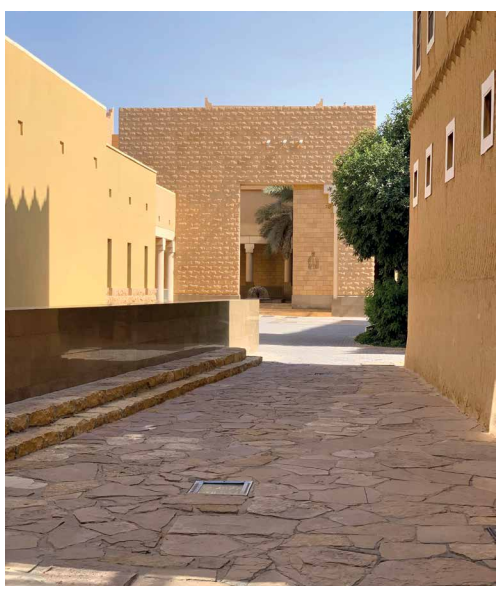
A 10-minute walk east from the palace is the National Museum, which contains 3,700 historical artifacts from across the Kingdom. It was completed in 1998 with a total built area of 28,000 m^2, according to the museum's website.

There are eight permanent exhibitions with subjects ranging from historic civilizations in the 4th millennium BC to early Saudi states. One of the exhibitions displays pottery, petroglyphs and weapons from the various civilizations that flourished across Arabia prior to Islam. Some of these artifacts show how ancient inhabitants interacted with other civilizations, such as the Greeks and Assyrians.

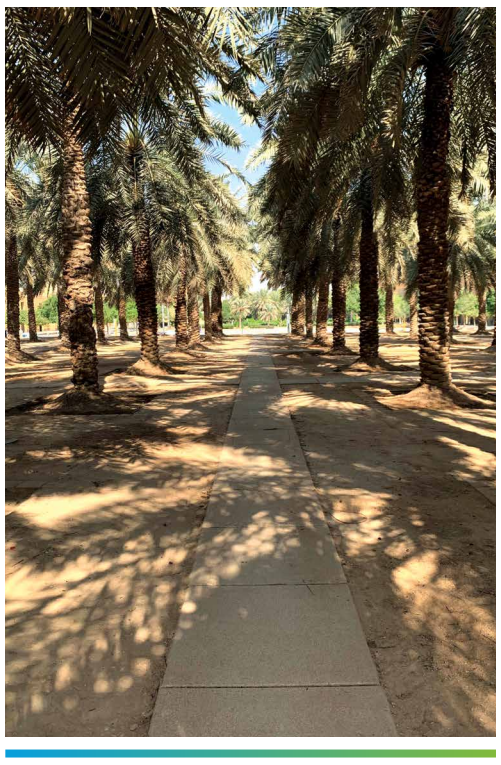
Additionally, the museum has exhibitions on Medina and Makkah, which contain models of the holy two mosques along with historic artifacts. (Check before visiting as COVID-19 precautions may have impacted access.)

South of the palace and across the street, lies Al Yamamah Park with its lovely trees and walking trails. This is connected to the Red Palace, which King Abdulaziz requested be built for his son King Saud in 1943, according to the Saudi Press Agency. Years later, the palace hosted the Council of Ministers. The name refers to the extensive use of red on its walls. Currently, the building is unoccupied, and is not open to the public, but visitors can catch a glimpse of the building through the closed gate or over the external wall.

In short, visitors will be charmed with the enchanting garden, history, and antique buildings of Al Murabba's historical area.



Walking toward Al Murabba Palace is an experience in itself: people will go through narrow alleys among buildings with traditional Najdi architecture and numerous palm trees towering above and providing shade. (Photo: Musherf Alamri)



Those visiting the palace will be delighted with the surrounding gardens. In the past, this land used to be farmed during the rainy season. (Photo: Musherf Alamri)

Loss Prevention receives international recognition for safety initiatives

The Loss Prevention Department (LPD) has been recognized by the Institute of Chemical Engineers (IChemE) for its efforts to advance safety and promote inclusion in the workplace.

The IChemE Global Awards celebrates excellence and are considered the world's most prestigious chemical engineering awards.

Two of the department's initiatives were selected for commendation in the categories of Process Safety and Diversity and Inclusion. These initiatives were titled: "Developing an Innovative Hybrid Approach for Planning Land Use around Saudi Aramco Facilities," and "Developing a Flame Resistant Shirt for Women," respectively. A third initiative, an effort at driving excellence across the company was also selected as a finalist in the Process Safety category.

The LPD initiatives competed against more than 100 submissions from top-tier global organizations.

"We are extremely pleased to receive this commendable recognition by such a reputable multinational institute," said Ghassan G. Abulfaraj, the manager of LPD.

Safety, comfort and modesty

With a growing number of females joining our workforce, Aramco is making every effort to promote employees' empowerment, emphasizing inclusion and diversity in the workplace.

LPD recognized a need to provide both safety and comfort to female employees in the field, and developed an initiative to provide customized flame resistant clothing designs. LPD partnered with chemicals company DuPont to create a design that improved comfort and maintained safety requirements while meeting cultural requirements.

Safe land release

The company has traditionally reserved land around its hydrocarbon facilities to maintain an exclusion zone for safety purposes. This approach was driven by regulations, but did not reflect the company's efforts to invest in effective process safety management practices.

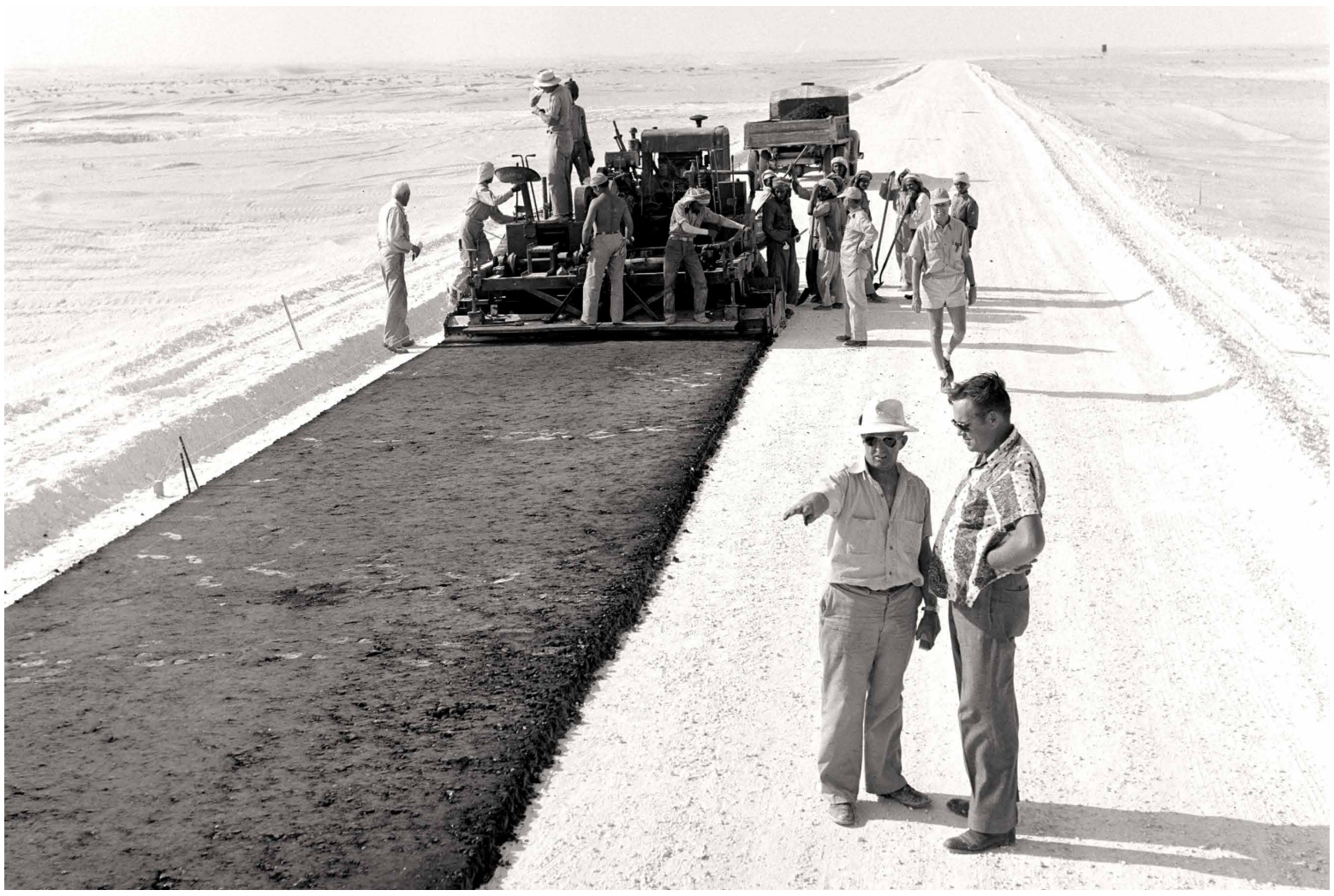
With growing demand for land release, and to avoid potential costs associated with land reservation, a new approach was developed to manage land use around Aramco's hydrocarbon facilities more effectively.

The Hybrid Approach for Land Use Planning is a risk-based approach that allows for the release of land for different purposes, including industrial, low residential and high residential areas.

The land use is determined by the risk levels posed by a facility.

Process safety practices

Recognizing that effective process safety management is the key to controlling any risk posed by our operations, LPD spearheaded Aramco's Process Safety Excellence initiative. This initiative is a customized effort based on a comprehensive assessment of the company's process safety practices, and designed to provide high impact solutions to process safety challenges at both corporate and site levels.



Photographic memory

A Saudi and American construction team spreads the first layer of asphalt on a section of the new Dhahran-Abqaiq Highway in 1954. The highway was on one of the worst sand areas encountered at the time, making it difficult to build the highway. However, that year, engineers were able to overcome this problem, and a $1 million addition to the highway was built. (Photo: T. F. Walters.)

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Publishing director: Waleed Al Helal (A)
Editors: Jamsheed Din, Todd Williams, William Bradshaw
Editorial staff: Musherf Alamri, Eamonn Houston, Scott Baldauf, Dalia Darweesh, and Rawan Nasser.
Designer: Husam Nasr.

Articles and coverage can be requested through CRM. Correspondence may be addressed to the editor, North Admin Building, Room AN-1080, C-05A.

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the arabian sun

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In Al Murabba palace, some of the important decisions in the Kingdom's history were made, such as the issuance of the national currency (the Riyal). It was the first palace outside the old city wall of Riyadh.

see page 10

Sunset at Tanajib

Ahmed J. Al Saad captured this sunset in the Tanajib community in November last year. He used his iPhone 8 without any special settings.
Al Saad is a control system engineer working with the Northern Area Technical Support Department. He has been with the company for 12 years.