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Environmental Protection Department Newsletter

A Common Redstart Passes Through Saudi Arabia.

Photo Source: Saudi Aramco

(Photo Source: Shuttertstock)

(Photo Source: Saudi Aramco)

A Message from Omar S. Abdulhamid, EPD Manager

I am pleased to deliver to you Issue 25 of Enviro News. In this edition, you'll see companywide participation in environmental awareness events across the Kingdom. Take World Environment Day. This year, Saudi Aramco's Environmental Protection Department and Public Relations Department in June displayed interactive exhibits at Al Rashid Mega Mall in Medina that focused on the need for water conservation. The campaign illustrated how individual actions can make a difference when protecting the Kingdom's water supplies, and it was no small affair either—an estimated 10,000 people of all ages participated.

Also in this issue, new surveys confirmed what many at Saudi Aramco know but few outside the Kingdom may suspect: that the country is rich in biodiversity. There are 505 bird species in Saudi Arabia, 102 reptiles, a third of which live nowhere else. The Kingdom is also home to 76 mammals, a fifth of which live nowhere else as well as 22 bat species and 2,250 flowering plants. Due to these numbers, Saudi Aramco has encouraged terrestrial biodiversity resources management within several company sites, and recent biodiversity surveys conducted at properties n Abha, Bahara and Medina have revealed surprisingly rich flora and fauna. Worker and community health remains a constant priority for Saudi Aramco. This issue will focus on the need to prevent occupational hearing loss, how to best ensure the most optimal indoor air quality, and we'll also reveal how Saudi Aramco ensures company dining facilities remain healthy thanks to a combination of vigilance and technology. Lastly and certainly not least in importance, we'll take a look at how to protect our skin while on the job, not an easy task considering the endless supply of chemicals we use both at home and at work.

To conclude I am pleased to present to you Issue #25 of Enviro News, my first one as the department's manager. I also look forward to hearing your success stories and ways you help reduce our environmental footprint in future editions of the magazine.

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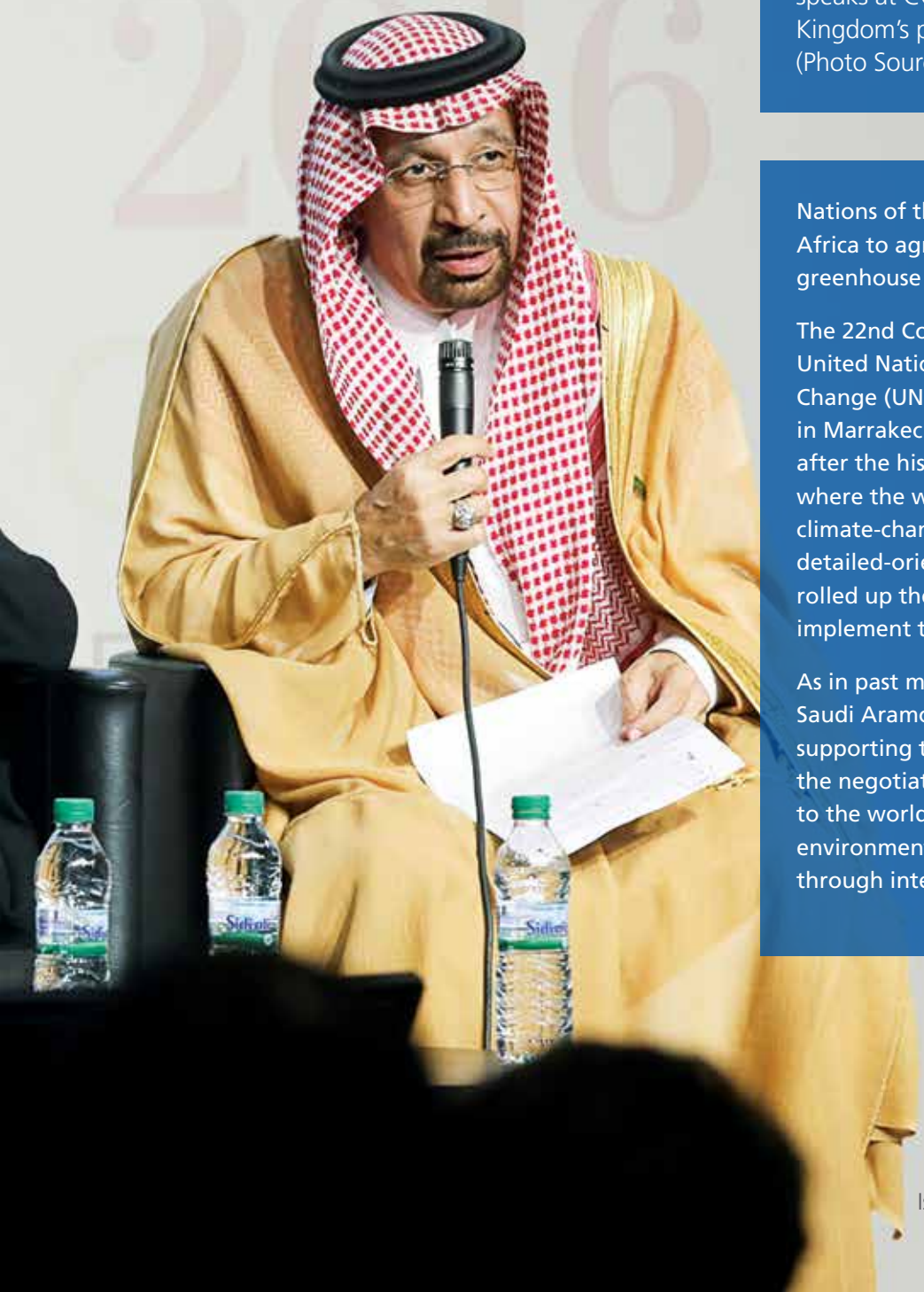
Enviro Snaps


Horizons

(Photo Source: Saudi Aramco)

Saudi Aramco Supports Kingdom at COP22 Summit in Marrakesh, Morocco

Abdullah Tawlah, EPD



His Excellency Khalid A. Al-Falih, the Kingdom's Minster of Energy, Industry and Mineral Resources, speaks at COP22, where he addressed the Kingdom's plans to reduce its carbon footprint (Photo Source: Saudi Aramco)

Nations of the world recently gathered in Northern Africa to agree on fresh steps to take to address greenhouse gas emissions and save the planet.

The 22nd Conference of the Parties (COP 22) to the United Nations Framework Convention on Climate Change (UNFCCC) convened November 7-18, 2016 in Marrakech, Morocco. Taking place one year after the historic 2015 Paris Agreement (COP21), where the world agreed on efforts to address climate-change challenges, COP22 begin the more detailed-oriented tasks under which participants rolled up their sleeves and sought ways to actually implement the agreement made in Paris.

As in past multilateral climate-change venues, Saudi Aramco representatives were back supporting the Kingdom in technical capacities at the negotiating tables as well as by showcasing to the world Saudi Arabia's efforts to lower its environmental footprint at side presentations and through interactive displays.

The COP, made up of all states' parties, is the UNFCCC's supreme decision-making body. It convenes once a year in a global session where decisions are made to address climate change. Decisions can only be made unanimously by the states' parties or by consensus. Saudi Aramco played a key role supporting the Kingdom in Morocco. The Environmental Protection Department (EPD) participated as part of the Saudi delegation, headed by H.E. Khalid Al-Falih, Saudi Arabia's Minister of Energy, Industry and Mineral Resources, who led the negotiations resulting in the announcement of the "Marrakesh Action Proclamation," which is a high-level, political action
on the implementation of the Paris Agreement.

Saudi Arabia maintained its stance that tackling climate change challenges requires a balanced approach, meaning research & development, new technologies and best practices can and should be used to deal with this global issue. Using a one-size-fits all approach to addressing climate change challenge will not be an effective approach.

Climate change and sustainable development goals need to be mutually supportive and reinforcing for both sets of objectives to succeed. Therefore, the world must embark on a path of utilizing all energy sources to achieve a sustainable energy landscape that includes energy efficiency, renewables and other complementary energy technologies.

"Saudi Arabia believes that the international response to climate change must fully respect the principles and provisions of the UNFCCC, particularly the principle of 'common but differentiated responsibility,' which must be the cornerstone of progress. It enables all countries—especially developing nations—to proactively contribute workable plans and solutions for climate action that take account of national priorities, capacities and circumstances, in keeping with the different stages of economic development," Khalid Al-Falih said in a statement.

Key GCC stakeholders and other international participants listen to speakers at a packed pavilion during a side-event presentation. (Source: Saudi Aramco)

"Saudi Arabia is confident that through dialogue and collaboration, the international community can achieve an effective, pragmatic and meaningful approach to tackle this global challenge. I have no doubt that our discussions in Marrakech will produce a positive outcome for all."

At the request of the Ministry of Energy, Industry and Mineral Resources (MEIM) Saudi Aramco, led by EPD, supported the Kingdom's efforts by coordinating side-event presentations and managing twenty-four (24) showcase exhibits illustrating the Kingdom's contributions toward greenhouse gas emissions avoidance. Side-event topics included:

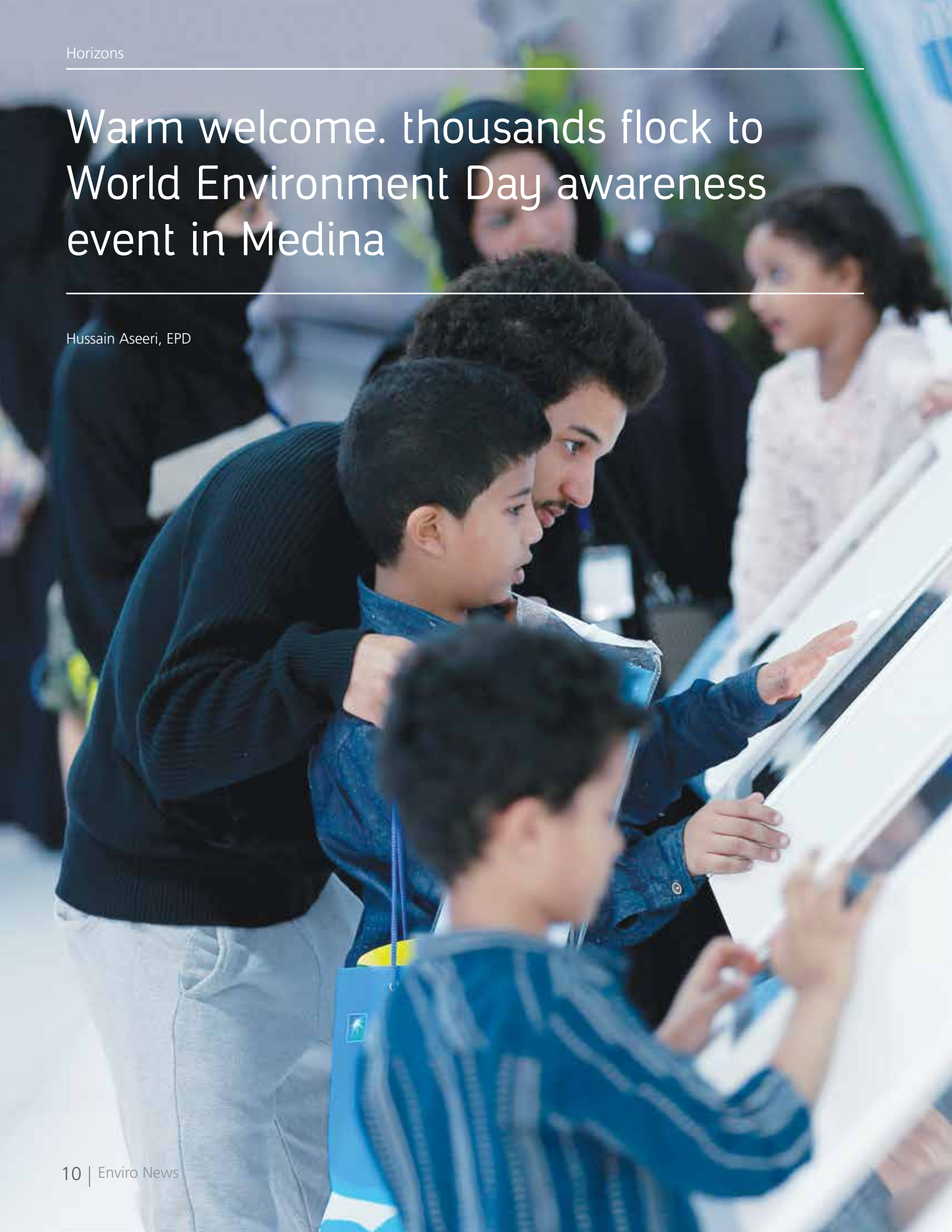
- Creating value from CO2
- Building resilience and adaptation measures with co-mitigation benefits in the Red Sea & Arabian Gulf
- A demonstration of GCC and regional efforts in adaptation actions
- The GCC countries' current and future renewable energy projects
- The role of research and development in GCC countries towards combating Climate Change
- The GCC countries' energy efficiency efforts
- Initiatives between European institutions and GCC countries

Tremendous support was provided by R&DC, EXPEC ARC, P&CSD, Power Systems, Corporate Affairs, Technology Strategy & Planning, and Corporate Planning.

Wael Bushah, of Saudi Aramco's Environmental Protection Department, guides guests through a Saudi Aramco exhibition. (Photo Source: Saudi Aramco)

Warm welcome. thousands flock to World Environment Day awareness event in Medina

Hussain Aseeri, EPD



Interactive exhibits reinforce environmental awareness and sound conservation skills. (Photo Source: Saudi Aramco)

Everyone plays a role when it comes to conserving natural resources regardless of age. Big industries employ best practices and new technologies to protect air, marine and terrestrial ecosystems.Still, personal actions and behaviors are just as important, and success in this area relies heavily on awareness campaigns.

With that in mind, Saudi Aramco's Environmental Protection Department and the Public Relations Department last June organized interactive exhibits focusing on water conservation at Al Rashid Mega Mall in Medina. The week-long event coincided with World Environment Day and welcomed up to an estimated 10,000 people of all ages to learn how their daily approaches to water usage can help save the planet.

The campaign consisted of six interactive display sections (Annual Renewable Freshwater Resources of Saudi Arabia and Water Scarcity, SA National Water Challenge; Water Conservation Display Tools; Water Conservation Games; Zero Escape; Recommendations for Kitchen Water Conservation) all of which appealed to both children and adults including the 4-D movie "Masah."

The event illustrated how incorporating daily habits can conserve the Kingdom's precious hydrological resources.

"Everyone was talking about how to conserve water both inside the house and outside, such as in household gardens," says Haifa Harthi, an event organizer and an EPD environmental scientist.

"They all gained a lot of information about water conservation, and they really enjoyed the 4-D movies."

Interactive displays allowed children to experience firsthand how their daily habits such as properly closing kitchen and bathroom faucets inside while making sure spigots, hoses and sprinklers don't leak outside can save water and ultimately, the planet.

National Saudi media were in attendance to cover the event, which also included a wall that attendees used to sign pledges by hand promising to conserve water resources. Saudi Aramco runs various awareness campaigns involving many departments, with World Environment Day being one of the biggest.

"Every year, EPD conducts this big event to celebrate World Environment Day," says Harthi.

"There are several big events such as Earth Day and Water Day, and along with World Environment Day, they are some of our biggest awareness venues."

Similar campaigns raise awareness as well. In March of 2016, for example, the Environmental Protection Department and the Public Relations Department partnered to organize an awareness campaign for water conservation at Dhahran Mall in celebration of the World Water Day. The campaign targeted families by utilizing 4-D multimedia technology to convey awareness messages. The objective sought to enhance public awareness of water importance, water scarcity, water resources and positive behaviors to conserve water during daily activities. Separately, Saudi Aramco representatives participated in similar World Water Day campaigns in Al Hasa and in Medina as well. Technical support and knowledge sharing regarding water conservation were made available to attendees. The campaign's objectives sought to enhance public behavior regarding water use and to trigger changes in the way water is perceived by sharing facts related to freshwater resources. Water conservation tools/kits provided by the Water Ministry were distributed to attendees.

Elsewhere in the Kingdom.

Saudi Aramco runs several events to boost environmental awareness among the general public, especially in our chlidren. Take the Saudi Aramco Environmental Education Program (SAEEP), which launched in 2007. The in-school program gives students the tools and know-how to protect the environment and builds a sense of accountability regarding their communities.

SAEEP is a joint partnership with the Ministry of Education that conducts a series of environmental awareness "Train-the-Trainer" workshops for elementary school teachers, focusing on basic but important elements of environmental education for communities and schools. Teachers then develop "Friends of the Environment" clubs, where kids both reinforce and share their newfound skills with their peers in various environmentally-friendly projects such as those involving flower and tree plantings, recycling, conservation, schoolyard cleanings and many others.

The program, which has grown to include 1,630 schools and a total of 1,146 Friends of the Environment Groups, was honored at 2015 ADIPEC Awards (Abu Dhabi International Petroleum Exhibition & Conference) for the Best Oil/Gas CSR/HSE initiative. SAEEP was nominated out of 500 entries submitted for this category.

Participants at a SAEEP workshop in Taif. (Photo Source: Saudi Aramco)

Wild, wild west. surveys reveal thriving biodiversity in Western Region

Mahmood H. Daghastani, Western Region Distribution Department

Biological diversity—or biodiversity—is the term given to describe the variety of life on Earth. It is the variety of all species of plants, animals and micro-organisms, and the ecosystems in which they live and interact, according to the World Wildlife Fund.

How much biodiversity can you find around you? As it turns out, a lot. Many assume biodiversity in Saudi Arabia may be sparse because of the harsh desert environment. However, a quick review of data points to the opposite.

There are 505 bird species in Saudi Arabia, 102 reptiles, a third of which live nowhere else. The Kingdom is also home to 76 mammals, a fifth of which live nowhere else as well as 22 bat species and 2,250 flowering plants.

Saudi Aramco is home to large areas of land with a variety of habitats, including marine, coastal, desert, valleys and mountain ecosystems. Many of these zones are protected areas, and some are even fenced in, which both safeguards and enriches biodiversity within company facilities. Due to this fact, Saudi Aramco has encouraged terrestrial biodiversity resources management within several company sites. Recent surveys conducted at Saudi Aramco properties in Abha, Bahara and Medina have revealed surprisingly rich biodiversity.

(Photo Source: Saudi Aramco)

Abha biodiversity survey

The Abha survey site included part of the Asir mountain range, which runs along the west coast of Saudi Arabia and into Yemen. The site consists of a mosaic of mountains, vegetated wadis and sandy plains. The Abha survey revealed 21 mammal species representing 28% of all mammals in the country.

(Photo 7) Arabian Wheatear

The survey also identified a total of 42 bird species within the site's boundaries, four of which are endemic to the region (Photos 5-8). The survey also identified many native plant species that are endemic to Saudi Arabia, including the Desert Rose (Photo 9).

(Photo 9) Desert Rose

Bahara biodiversity survey

The site is of great historical importance due to its location on an old Egyptian pilgrim route to Mecca and due to the presence of several cemeteries and historical water wells.

The survey showed the presence of seven species of mammals including the Rock Hyrax (Procavia capensis), which was listed on the national list of Taxa of High Conservation (Photo 10).

A total of 35 species of plants belonging to 20 families were recorded over the survey period, including two species, ***Commiphora gileadensis and Halyxolon persicum,*** which are on the list of Taxa of High Conservation Priority (Photos 11 and 12).

(Photo 11) Commiphora gileadensis

(Photo 12) Halyxolon persicum

Madinah Biodiversity Survey

The Madinah study area is located around 40 kilometers north of Madinah Al Munawwarah City. It consists of lightly vegetated habitats, wadis and Jebels. The site is characterized by mountainous terrain surrounding a system of wadis, where deep sand sediments habitats are present.

The survey revealed a total of 39 species of plants species belonging to 19 families. One species, ***Moringa peregrine*** (Photo 13), was put on the list of Taxa of High Conservation Priority.

(Photo 13) Moringa peregrina

The survey also revealed the presence of nine species of mammals represented in four groups, which included Insectivora, Rodentia, Chiroptera and Carnivora. Four species on the list of Taxa of High Conservation Priority were also present at the site. The species included the Egyptian Fruit Bat ***(Rousettus aegyptiacus)***, the Honey Badger ***(Mellivora capensis pumilio)***, the Rock Hyrax ***(Procavia capensis)***, and the Nubian Ibex ***(Capra nubiana)*** (Photos 14-17).

(Photo 14) Egyptian Fruit Bat

(Photo 17) Nubian Ibex

In summary, the survey revealed noteworthy levels of species in the region and championed those policies that protect biodiversity for future generations.

As a leading oil company, Saudi Aramco oversees an environmental management program—Engineering Procedure (SAEP-359)—to identify areas within company control that have high levels of biodiversity or ecosystems meriting specific protection measures, including those surveyed in Abha, Bahara and Mahdinah, which contain a great deal of biodiversity. It is very likely that many other sites within company reservation areas also contain areas of considerable biodiversity. The company encourages all to work together to help protect and enhance the Kingdom's precious biodiversity. (Photos Sources: Saudi Aramco).

Sounds of silence. preventing occupational hearing loss during design

Barto Watkins, EPD

Exposure to high noise levels in the workplace can cause hearing loss and affect worker productivity. Implementing noise controls that reduce worker noise exposure can eliminate these health-related noise concerns. The National Institute for Occupational Safety and Health (NIOSH), a U.S. federal agency that studies ways to prevent work-related injury and illnesses, recommends considering engineering noise controls during the project-design phases of processes and operations. Saudi Aramco often follows NIOSH recommendations.

Prolonged exposure to high noise levels can cause hearing loss and tinnitus (ringing in the ears). Other health effects include headaches, fatigue, stress and cardiovascular problems [Yueh et al. 2003]. High noise levels can also cause workers to become distracted and interfere with communication and warning signals. If workers do not hear warning signals, they may not take precautions to prevent hazards or injuries. [NIOSH 1996, 1998; Yoon et al. 2015; Cantley et al. 2015].

Although anyone can be at risk for noise-induced hearing loss in the workplace, workers in agriculture, mining, construction, manufacturing and utilities, transportation, and the military are at greater risk [Masterson et al. 2013].

The Saudi Aramco Environmental Protection Department (EPD) has an engineering standard in place that assists in controlling high noise levels at their sources through proper design and engineering controls. (SAES-A-105 Noise Control). Additionally, the standard provides guidance that protects employees from adverse health effects.

(Photo Source: Shutterstock)

Prevention through design

Prevention through design can be defined as designing out or eliminating safety and health hazards associated with processes, structures, equipment, tools or the work organization itself. The mission is to reduce or prevent occupational injuries, illnesses and fatalities by considering hazard prevention in the design, re-design, and retrofit of new and existing workplaces, tools, equipment and work processes. [NIOSH 2015].

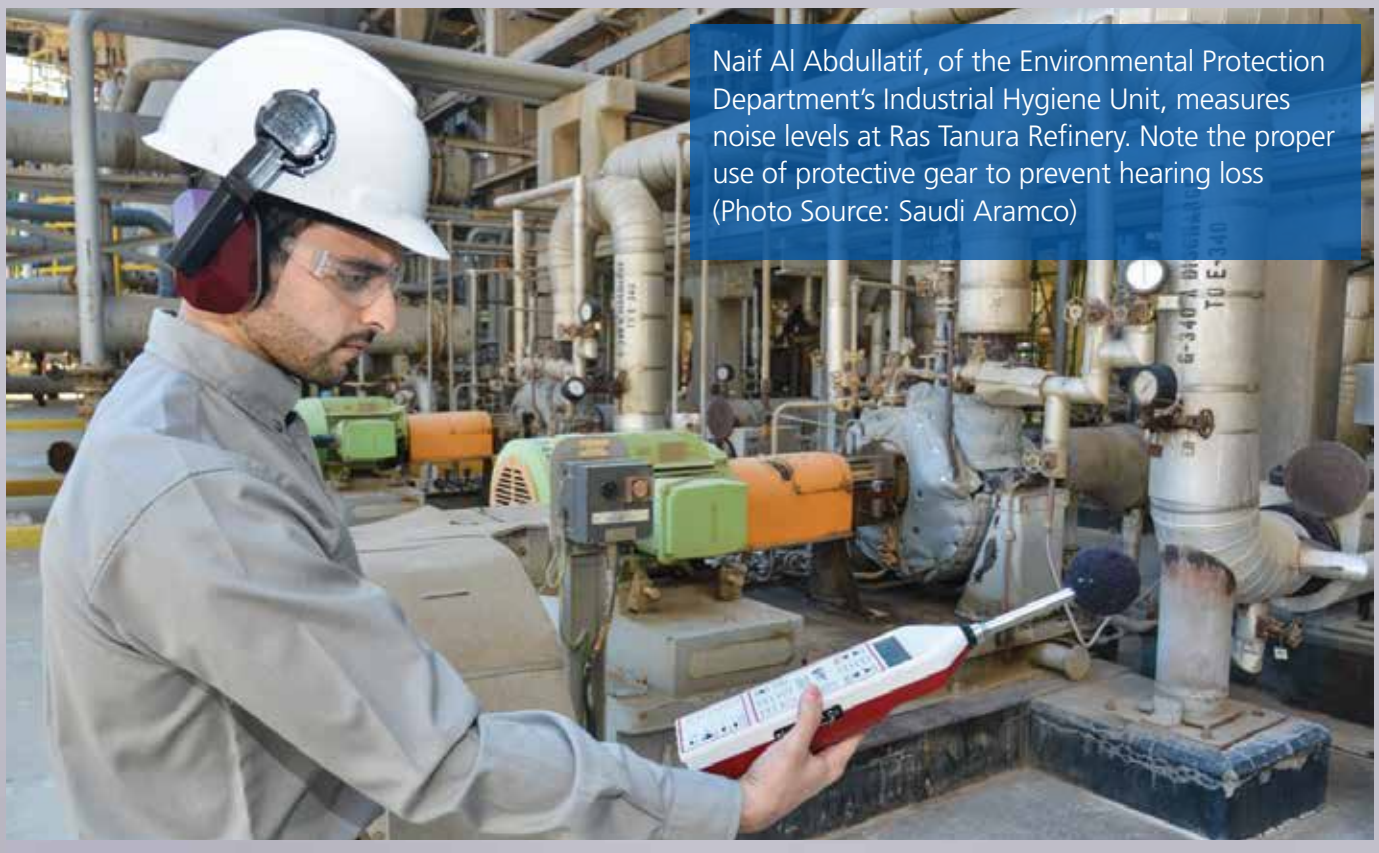
Exposure limits

Occupational regulations and standards were established to protect workers against the health effects of exposure to hazardous substances and agents when certain values, or limits, are reached. NIOSH establishes Recommended Exposure Limits (RELs) for various hazards, but those limits are not enforceable by law; they are based on best available science and practices. The REL for noise is 85 decibels using the A-weighting frequency response over an 8-hour average, usually referred to as time-weighted average (TWA)—exposures at or above this level are considered hazardous [NIOSH 1998]. The Occupational Safety and Health Administration (OSHA) sets legally-enforceable Permissible Exposure Limits (PELs) that require employers to take actions to reduce worker exposures. The OSHA PEL for noise is 90 dBA as an 8-hour TWA [29 CFR 1910.95].

Occupational standards specify a maximum allowable daily noise dose expressed in percentages. For example, a person exposed to 85 dBA per NIOSH or 90 dBA per OSHA over an 8-hour work shift will reach 100% of his or her daily noise dose. (The Saudi Aramco Engineering Standards, Noise Control, SAES-A-105 adheres to the 90dBA 8-hour time-weighted-average criteria).

Noise-induced hearing loss (NIHL) is 100% preventable; however, once acquired, it is irreversible. Understanding and minimizing the risks are key to preventing noise-related injuries and hearing loss. Eliminating or lowering facility and equipment-related noises at their sources reduces the NIHL risks and results in improved safety, productivity and comfort. [Tak et al. 2009].

The best way to reduce noise exposure is to address noise at its source by considering prevention through design principles. "Engineering out" hazardous noise found in the workplace before the exposure occurs (e.g., by installing quieter equipment or building acoustic barriers) is the most effective way to reduce noise levels in the workplace. [29 CFR* 1910.95]. According to a hierarchy of controls



Naif Al Abdullatif, of the Environmental Protection Department's Industrial Hygiene Unit, measures noise levels at Ras Tanura Refinery. Note the proper use of protective gear to prevent hearing loss (Photo Source: Saudi Aramco)

A sound level meter gauges noise levels. (Photo Source: Saudi Aramco)

recognized and applied by Saudi Aramco EPD, such measures take precedence over using Personal Protective Equipment (PPE) such as earplugs.

These noise reduction measures can lower costs associated with workers' compensation for hearing loss, protect workers' hearing, and they can also improve productivity. Costs are reduced, as associated retrofitting of noisy equipment is no longer necessary.

NIOSH case studies

The following case studies demonstrate how small design and operational changes can reduce noise levels and reduce associated costs.

Compressed air is often the most common noise source in manufacturing plants and other industries. It is used to operate equipment such as air cylinders, air valves, solenoids, etc., or move parts/product, blow off debris, close flaps on corrugated containers (boxes/cases), or perform similar service-type actions. The noise generated by compressed air is caused by turbulence from the mixing of gases with widely different velocities, particularly when the high-velocity air stream flows into the relatively still surrounding air. Additional turbulence is created as the compressed air blows against objects such as parts or sections of the machinery.

Compressed air noise can be controlled by reducing the air velocity to as low as practical while maintaining performance requirements and by treating all open-ended discharge lines and ports, including standard air jets and nozzles with commercially-available quiet-design nozzles or pneumatic silencers.

Addressing noises produced by compressed air provides the greatest noise reduction per dollar invested, and can even result in cost reductions through energy savings and increase equipment life expectancy. [Driscoll 2011].

Another case study involved a NIOSH investigation of the sound levels in the truck cab of an air-rotary drilling rig. Investigators found that workers had exposure levels between 91 to 112 dBA. Tests were conducted to identify and isolate the dominant noise sources. Isolating the cause of the in-cab noise indicated that vibrations were transmitted from multiple hydraulic pumps to the control panel producing the dominant spike in the sound level spectrum. The researchers also conducted field tests to evaluate noise controls to reduce in-cab sound levels. Hydraulic noise suppressors were successfully used to reduce the structure-borne noise that is transmitted from the structure to the control panel. Furthermore, the hydraulic noise suppressors and enhanced soundproofing lessened the risk of hearing loss for workers by reducing the in-cab exposure levels by as much as 4 dBA at high idle and by 1 dBA when the rig was hammer drilling. Covering a gap at the cab/inside door interface with lead-fiberglass blankets further reduced noise levels by 3 dBA compared with baseline conditions. [Yantek et al. 2007].

Recommendations

To reduce the incidence and severity of work-related hearing loss, NIOSH recommends hearing conservation programs for all workplaces with noise levels that exceed the REL of 85 dBA. In most cases, the preferred approach to reduce noise in the workplace is to eliminate or reduce noise at its source and to follow the hierarchy of controls. [NIOSH 2014b; 2015].

NIOSH recommends the following at each stage of the design process:

- **Conceptual Design:** Identify and apply relevant noise control regulations, consensus standards and codes to establish project noise emission goals.

- **Preliminary Design:** Assess the risk for noise hazards, factoring in noise from various sources that can affect workers' overall noise exposures and develop risk control alternatives. Identify noise sources and work processes that have the potential to contribute to a worker's overall noise exposure. Eliminate or reduce potential noise sources by substituting quieter processes, elements, parts and equipment.
- **Buy Quiet:** Implement a Buy Quiet program and set design specifications regarding noise levels to be adhered to in equipment purchasing decisions. Develop equipment specifications that will be included in procurement documents. Develop test protocols for factory acceptance testing and commissioning. [NIOSH 2014c]
- **Procurement:** In accordance with Buy Quiet program implementation, ensure noise levels of all equipment purchases are specified by the manufacturer. Gather like model equipment noise levels, specifications and pricing from equipment suppliers. Account for operational needs and commitment levels regarding Buy Quiet initiatives and always execute appropriate purchases when needed. Ensure that purchased equipment meets design specifications and doesn't exceed maximum noise levels as specified.
- **Commissioning:** Conduct tests to ensure that specified noise levels have been achieved. Consider including testing in factory-acceptance venues. Acceptance test data can be reported in A-weighted sound power levels for small machines and A-weighted sound pressure levels for large machines based on recommended operator positions. All test measurements shall be made with manufacturer-recommended operating conditions.
- **Start-up and Ongoing Operations and Maintenance:** Conduct noise surveys to ensure that noise levels do not exceed the recommended established limits; develop Standard Operating Procedures (SOPs) to maintain noise controls and ensure worker noise exposures are controlled as new equipment is introduced or existing equipment is modified. Equipment noise levels should be noted post-maintenance and periodically in the Buy Quiet documentation.

Applying noise controls within Saudi Aramco facilities, which decreases worker exposure, will reduce high occupational noise health-related concerns. Overexposure to

Proper equipment should be used to protect hearing on the job (Photo Source: Saudi Aramco)

high noise levels can cause hearing loss and affect worker productivity. It is recommended to consider the engineering noise controls outlined in this article during project design phases of processes and operations.

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Proper signage at Ras Tanura Refinery conveys the importance of using proper gear to prevent hearing loss. (Photo Source: Saudi Aramco)

A clean plate. Saudi Aramco employs new environmental health technology to ensure food safety

David Corry, Jason Hall & Tom Hullock, EPD

How can we be sure that the food we are buying is genuine, healthy and nutritious and will not pose health hazards to us or our families? By constant vigilance and new technologies, that's how. For over 70 years Saudi Aramco has strived to ensure that hygiene standards in its food facilities and commissaries meet the strictest of international standards. Traditionally, food hygiene inspection—a periodic check on the cleanliness of a premises and the practices of the vendor—served as the main tool utilized by the Environmental Health Unit's scientists and technicians. While still valid and widely used today, this approach alone is no longer sufficient in the modern and ever-evolving world. Globalization of food production and increased trade have made food chains longer and more complex, potentially exposing all to a greater range and diversity of food hazards, thereby complicating investigations into foodborne disease

New technologies allow for better food safety monitoring, including FoodCheck™ Complete Food Safety Control (Source: Kelsius)

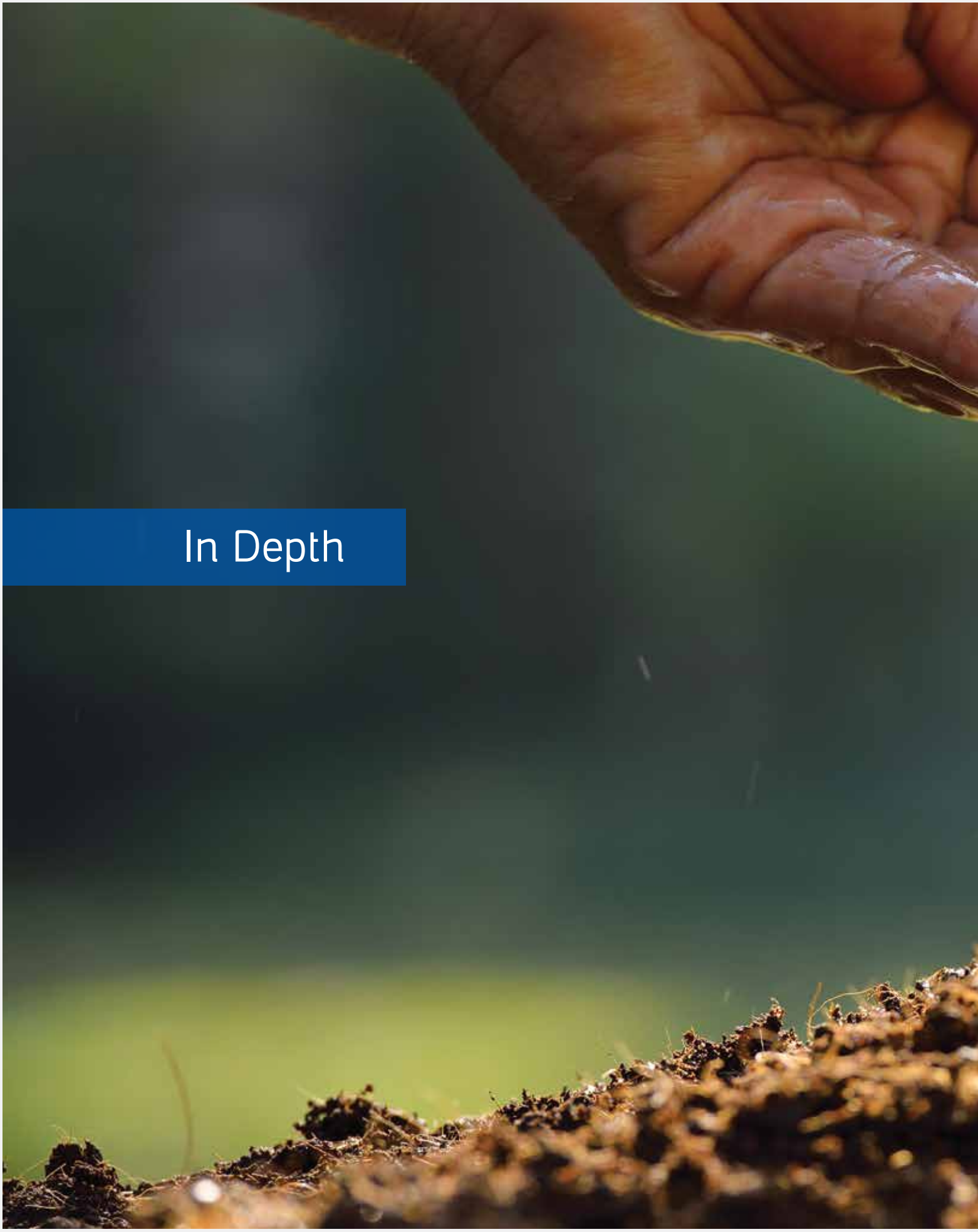
outbreaks. Though more multifaceted, food safety remains essential as ever, making it all the more of a challenge. The EPD's Environmental Health Unit has decided to meet this challenge by implementing a comprehensive electronic food safety management system through investments in cutting-edge technologies to assure the quality and safety of our food in company facilities across the Kingdom.

One of the main defenses against foodborne illnesses involves correct temperature control, either through adequate cooking or through proper hot or cold storage techniques. Unfortunately, the EPD cannot have an experienced inspector available at each food facility across the company 24/7 to check temperature controls in real time. To enhance its capability EPD has successfully piloted and further implemented a remote temperature control monitoring system known as FoodCheck supplied by Kelsius, a supplier of automation technology for product safety to the food services and healthcare industries. FoodCheck is a revolutionary web–based, paperless Hazard Analysis and Critical Control Point (HACCP) system that provides complete visibility of food safety compliance in a food operation from any PC anywhere in the world. HACCP is a food safety management system in itself and highlights the Critical Control Points (CCP) in any food operation, which allows the food producer to mitigate risks to the end user by way of implementing control measures in its process. Systems such as FoodCheck improve the quality of food by putting the user in control of food safety with automated processes that can drive cost savings and labor efficiencies. The pilot program began at Al Midra Tower in 2015. A year later in 2016, the pilot project expanded in size in Al Midra Tower and later moved to facilities at three pump stations along Saudi Aramco East West Pipelines.

Originally designed for the temperature-critical pharmaceutical industry, the system allows EPD to monitor temperatures in real time at kitchens located thousands of kilometers away from the department's base in Dhahran. It is now deployed at four sites across the company with plans to extend the implementation of the system in the very near future. The facilities currently utilizing the installation have all benefited substantially from the program, as it gives them a far clearer idea of where to target their limited training and maintenance resources. The FoodCheck system gives facility operators peace of mind that the food they produce is being delivered, stored, cooked, held and served according to strict industry standards and guidelines, and additionally it offers a due diligence defense with regards to food safety.

The many different approaches to ensuring food safety with FoodCheck™ (Source: Keslius)

The FoodCheck™ pilot program began at Al Midra Tower in 2015. A year later in 2016, the project expanded and later moved to facilities at three pump stations along Saudi Aramco East West Pipelines. (Photo Source: Saudi Aramco)



In Depth

(Photo Source: Shutterstock)

Breathe in the air. indoor biological pollution and asthma—tips for a healthy indoor environment

Abdulrahman Al Jaafari, EPD

Indoor air quality—is it important?

There are few things in life, if any, as important as the air we breathe. Quality air is important to maintaining a safe and healthy life, and that's true not only outside but inside as well. Indoor Air Quality (IAQ) refers to "the air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants," as defined by the U.S. Environmental Protection Agency. We breathe in approximately 10 M^3 of air daily, and we spend around 80-95% of our time in indoor environments. Such numbers illustrate the need for considerable focus on indoor air quality from environmental researchers in an effort to identify the best ways to maintain healthy environments.

Are there biological pollutants in my home?

Yes. Many biological pollutants enter our lives from a variety of sources, making our indoor air unhealthy to breathe. Common indoor biological contaminants, which can irritate lung tissue and result in respiratory diseases, include dust mites and mold allergens along with pet and pest allergens, according to the American Lung Association. These allergens are often the products of poor indoor conditions with high humidity levels and bad ventilation.

(Photo Source: Shutterstock)

Biological hazards		Common places
Dust mites		Dust mites cannot be seen, but their numbers can be reduced. Thousands of dust mites can be found in carpets, mattresses and pillows, leading to the production of millions of pellets per day.
Pest allergens		Pests such as cockroaches and mice can carry many allergens into home environments, where they are mainly found in bedrooms, dry warehouses and kitchens.
Pet allergens		Domestic pets such as cats and dogs are endearing, but they pose potential human health hazards. They contain a high allergenic potential for the household, as they carry tiny allergens in their fur, which are easy to inhale and are mostly present in bedrooms and living rooms.
Mold allergens		Mold can grow easily and generate their spores on any organic materials such as dirt in the presence of moisture or high humidity. Bathrooms, kitchens and basements where moisture levels are high are considered to be common places for mold growth, according to the American Lung Association.

Health impact

The most serious illness related to indoor biological pollutants is asthma and asthma-related symptoms. Indoor allergies cause 20% of asthma cases. Asthma is "a disease characterized by recurrent attacks of breathlessness and wheezing, which vary in severity and frequency from one person to another. In an individual, they may occur from hour to hour and day to day," the World Health Organization reports. According to the U.S. Centers for Disease Control and Prevention (CDC), 9.6 million children and 24.4 million adults suffer from allergenic asthma. The United Kingdom has the highest rate in Europe, with about 5.4 million currently suffering from asthma and asthma-related symptoms, according to recent estimates.

Are children more vulnerable to asthma?

Yes. Due to the small size of their bodies, children need to breathe more frequently than adults, thus inhaling more pollutants and are therefore more affected by indoor contaminants. Furthermore, due to the weakness of their young metabolic systems and difficulties they often encounter in excreting toxins, they are more likely to become ill with some form of respiratory illness.

How can we mitigate this problem?

Self-Inspection

- Sampling your own air is not the cheapest way to determine the presence of biological contaminants in your home. At first, use your own senses—your nose and eyes—to observe pollutants and pinpoint their sources, experts say.

Control moisture levels at home

Moisture or humidity levels are considered to be major factors in the spread of biological contaminants at home. Moisture-borne pollutants can be mitigated by:

- Fixing all leaky bathrooms and kitchens.
- Ensuring good ventilation by using exhaust fans in bathrooms and kitchens.
- Ensuring natural ventilation by opening doors and windows.
- Maintaining heating and cooling systems regularly (i.e. replacing damaged filters and cleaning moldy showers, healting and cooling systems).
- Maintaining a deep-cleaning schedule for all humid places, such as bathrooms and kitchens.

Keep your House Clean

- Properly clean surfaces with the use of sufficient detergent to kill organisms (e.g. chlorine bleach)
- Vacuum the dwelling, particularly more sensitive places like bedrooms and basements that usually accumulate considerable amounts of dust. A weekly vacuum of furniture, including pillows and sofas is also highly recommended.
- Replace the carpet in the living room and bedrooms with tiles or wooden flooring in order to reduce the accumulation of dust and pet fur.
- Establish a regular maintenance and cleaning schedule for any air ducts in order to reduce the indoor spread of dust and mold spores. This is vital and is best carried out by professionals.

(Photo Source: Saudi Aramco)

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Finishing touch. how to protect skin from harmful exposure and ensure a healthy work environment

Masra Ohali, EPD

Introduction:

Skin-related problems originating from workplace activities, such as exposure to chemicals, irritants and other substances can be very common. However, due to an absence of scientific dermal exposure assessment methods that one may find when dealing with inhalants, many industrial hygiene experts find themselves at a loss on their search for, say, industry-specific dermal exposure limit values. Yet while many experts forgo developing their own assessment methods or occupational exposure limits, many do make work recommendations for employees to protect their skin. And taking those recommendations today can lead to a blemish-free tomorrow when it comes to protecting our skin.

Occupational skin disorders may arise as a result of skin contact with substances in the workplace. Results can include discomfort, skin disease, sickness and absence. Skin ailments are one of the most common occupational diseases reported in the USA and in the European Union (EU). In EU countries, work-related skin ailments are second to muscoloskeletal ailments. The most frequently and directly affected regions of the skin are the hands and upper arms.

Efforts to reduce or prevent skin problems in many industrial settings are lacking, as work-related problems involving skin are often accepted as part of the job. The occupational skin problems issue must be re-evaluated and the methods of assessing and reducing chemical exposures to skin must be improved, especially when it comes to exposure to chemicals.

(Photo Source: Shutterstock)

Skin exposure to chemicals

Skin exposure to chemicals is the main cause of work-related skin disease. Frequent contact with various chemical substances such as acids, bases, cooling lubricants, greases, pesticides, cleaning agents and even frequent contact with water can cause skin problems if not handled properly. Skin exposure to chemicals can occur in several ways:

- Immersing bare hands into chemicals
- Direct handling of contaminated work equipment
- Skin contact with contaminated surfaces
- Splashing when handling or mixing chemicals
- Fumes or airborne deposits on skin (e.g., cement dust)
- Keeping hands wet for long period (e.g., frequent contact with water in combination with soaps or detergents)

Chemical substances can be grouped into four main groups:

- Corrosive substances that can cause burns
- Irritant substances that irritate the skin and may lead to irritant contact dermatitis
- Sensitizing substances that can lead to allergic contact dermatitis
- Substances that cause other diseases (e.g., urticaria, skin cancer)

Health effects of skin exposure to chemicals

The health impacts of hazardous chemical substances on skin can either be local—exerting their effects at the point of contact with the chemical, or systematic—when the chemical substances penetrate the skin, resulting in diseases inflicting other parts of the body, including cancer. Therefore, it is important to distinguish between substances acting primarily on the surface (local irritants and/or allergens) of the skin and those that penetrate dermal layers, enter the blood vessels and then harm different internal systems. In general the health effects of skin exposure to chemical substances are as follows:

Example of health effects

Dry Skin

Irritant

Corrosive

Sensitization

Specific Organ (exposure to solvent)

Skin exposure assessment

When it comes to inhaling harmful substances, worker exposure is relatively easy to evaluate, either by measuring the concentrations of the hazardous substances in the air and comparing that figure to a validated occupational exposure standard. However, assessing skin exposure to chemicals is much more difficult because several factors have to be considered. These include, but are not limited to, mass and/or concentration of the substance on the skin, extension of the exposed area, localization of the substance's effects on the body and duration of exposure. Other factors include the skin's transport mechanisms, the chemical substance's behavior with increasing skin damage, the difference in behavior between liquid and vaporous substances on the skin, the level of moisture on the skin's surface and the effects of work clothing on

substance uptake. A practical and simple strategy to best conduct exposure assessment to chemicals are outlined below:

- Identify all chemicals used in the workplace, including any chemical byproducts that may be generated during the process
- Give special consideration to chemicals that pose health risks through skin contact
- Evaluate potential for direct skin contact with chemical substances in any form (vapor, liquid, etc.)
- Implement chemical/skin contact prevention measures following the hierarchy of control measures
- Monitor and document the presence of skin-related problems in the workforce

Controlling risks associated with skin exposure

To minimize the risks of skin exposure to chemicals, the exposure must be either prevented or controlled. There are several ways to do just that:

Avoid contact by elimination

Avoid the use of non-required chemicals from a work process. For instance, use disposable brushes instead of cleaning them with a solvent.

Avoid contact by substitution

Consider using less harmful chemical substances in lieu of a harmful chemical or product. For instance, replace a solvent-based substance with a water-based one.

Avoid contact by using engineering controls

Engineering control measures can be very effective in reducing skin contact during normal operations. These include but are not limited to the following measures:

- Modify the process

Modify a process to eliminate chemical exposure. For instance, use automated handling methods rather than manual handling; use mechanical cleaning tool rather than hand-cleaning.

Managing skin exposure risks at work. From left to right, and incorrect way to handle chemicals (left) versus the correct way (right) (Photo Source: Shutterstock)

- Add ventilation

Minimize potential exposure to airborne chemicals by using good, localized general ventilation. For instance, during spray-painting operations consider using ventilation to reduce airborne levels of isocyanates.

- Modify work practices

Modify work procedures to eliminate or reduce skin contact with chemicals. For instance, rather than applying a solvent with a rag, use a brush. Use a long-handled spreader instead of a short-handled spreader to reduce the likelihood of contact with the coating.

Proper use of brushes, gloves and body positioning can protect the skin at work.
(Photo Source: Shutterstock)

Use personal protective equipment (PPE)

Personal Protective Equipment (PPE) is an important control measure when other reasonably practicable control measures do not provide enough protection. PPE is available for use with a wide variety of materials. PPE includes chemical-resistant gloves, aprons, coveralls and boots. For instance, use recommended gloves when mixing epoxy resin to avoid skin contact. Selecting the correct protective equipment is critical. Still, always remember that PPE has a number of limitations:

- PPE usually protects only the wearer
- PPE must be appropriate to the task at hand and be the right size
- PPE must be put on and taken off appropriately to give the protection needed
- PPE may restrain the wearer's movement
- Effectiveness of the PPE will depend on proper cleaning, maintenance of the PPE and training provided to the wearer

Good housekeeping practices

A clean work area helps prevent skin contact with chemicals from work surfaces. Furthermore, maintaining healthy skin will help to prevent the onset of adverse skin conditions. The following actions are recommended:

- Provide washing facilities close to the working area
- Remove any accidental contamination quickly

- Wash areas of skin that may have been exposed to chemicals immediately, preferably with warm water
- Provide appropriate skin cleaning and after-care products

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Schedule of Events

Date	International Events*	Location
December 4-17, 2016	COP13 Convention on Biological Diversity	Los Cabos, Mexico
Janunary 16-19, 2017	World Furture Energy Summit (Part of Abu Dhabi Sustainability Week)	Abu Dhabi
January 16-20, 2017	IMO Sub-Committee on Pollution Prevention and Response (PPR)	London
January 25-26, 2017	Oil & Gas IP Summit	London
January 26, 2017	SPE Hydraulic Fracturing Technology Conference and Exhibition	The Woodlands, Texas
January 30, 2017	2017 API Inspection Summit	Galveston, Texas
February 6-9, 2017	IAGC Gulf of Mexico Oil Spill and Ecosystem Science Conference	New Orleans
February 7, 2017	SPE Global Integrated Workshop Series: Managing Well Integrity in a Low Cost Oil Environment	Abu Dhabi
February 7, 2017	SPE Workshop: Advanced Field Development–Sustainability and Challenges	Muscat, Oman
February 7, 2017	SPE Workshop: Asset Integrity Management–How to Improve Profitability, Performance, Efficiency and People	Abu Dhabi
May 29-June 2, 2017	IWRA World Water Congress XVI	Cancun, Mexico

Date	National Events	Location
April 2017**	SAEEP Train the Trainer Session Closing Ceremony	Taif, KSA

Date	Saudi Aramco Facilities Environmental Events/Topics	Location
December 1, 2016	Beach Clean Up Campaign	SACR CSD/ARCSD/Abqaiq Qurayyah Beach
December 25, 2016	Campaign and Exhibit on Gas Leak	BGP

Date	Annual International Environmental Days***
Feburary 2	World Wetlands Day
March 22	World Water Day
April 22	Earth Day
May 22	World Biodiversity Day
June 5	World Environment Day
June 8	World Oceans Day
June 15	Global Wind Day
August 22	National Honey Bee Day
September 23	Saudi Arabia National Day
October 24	International Day of Climate Action
December 5	World Soil Day

* Source: Individual web sites
** Date to be determined
***Source: Environmental Technology & Management Association

EPD does not guarantee the accuracy of this calendar as dates and events themselves are subject to change, postponement or cancellation.

In Focus

(Photo Source: Saudi Aramco)

In Focus

SEC, Eastern Province to Partner in Recycling Technology Venture

The Saudi Electricity Company (SEC) and the Eastern Province Municipality signed a memorandum of understanding in June of 2016 to establish a recycling technology partnership. The agreement, signed by the Eastern Province Mayor Fahd Al-Jubeir and SEC CEO Ziad Al-Shiha, aims to convert waste into power, thus reducing reliance on landfills. According to Muhammad Al-Omani, Director of Hygiene Management for the Eastern Province Municipality, the agreement includes a study on the region's waste as well as best-practice methods for converting waste into power. The project, Al-Omani stated, will also go a long way in both creating and increasing income sources while at the same time reducing expenses to keep up with the Kingdom's Saudi Vision 2030 economic transformation plan. The initiative would be open to investors in the field of energy production.

EPD Attends Montreal Protocol Meetings in Vienna

As part of Saudi Arabia's negotiation team, EPD attended the resumed session of the Thirty-Seventh meeting of the Open-Ended Working Group to the Montreal Protocol on

EPD's Alaa Jahdali asks for the floor to speak at the resumed Session of the 37th Meeting of the Open-ended Working Group (OEWG 37) of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, OEWG 38 and 3rd Extraordinary Meeting of the Parties to the Montreal Protocol (Photo Source: IISD)

Substances that Deplete the Ozone Layer (OEWG 37). EPD was also present at OEWG 38 and the third Extraordinary Meeting of the Parties to the Montreal Protocol (ExMOP 3) on July 15-23, 2016. These meetings seek to reach a global phase-down of high global warming potential hydro fluorocarbons (HFCs), which are used in various applications including refrigeration and air-conditioning. A key outcome of the resumed session of OEWG 37 involved an agreement on possible funding solutions. During OEWG 38 and ExMOP 3, parties initiated discussions on the most critical components of the potential HFC amendment: baselines, freeze dates and reduction schedules for both developed and developing countries. Due to time constraints, parties did not reach an outcome on this component. For Saudi Arabia, it is important to maintain the exemption provisions for high ambient temperature countries due to the lack of suitable HFC alternatives in such conditions.

Saudi Aramco Rolls Out Water Safety Plan Requirements

Access to safe drinking water is essential to public health. As a means of ensuring the safest drinking water supplies to Aramco communities, EPD introduced requirements for all water producers to develop Water Safety Plans (WSP) by the end of 2018 in accordance to the 2013 revision of the Saudi Aramco Environmental Health Code (SAEHC). WSPs are based on the multiple-barrier approach and the Hazard Analysis and Critical Control Points principle to ensuring safe drinking water supplies. The WSP identifies potential hazards and prevents risks of contamination to drinking water from source to consumers' taps and comprises key components including: system assessment, control measures, operational monitoring, verification, management plans, documentation and surveillance. Thus, the company is no longer merely relying on final treatment and water-quality monitoring. To assist Saudi Aramco water producers to develop their WSPs, EPD has developed a template and a risk assessment matrix. The development of Aramco's first WSP is being undertaken by Dhahran Utilities & Technical Support Department, which is conducting trials on development tools. After the trial, the WSP development will roll out to the remaining water producers within Aramco. If you are involved in water treatment and would like more information on developing a WSP, please contact David Corry at 880-0793, or Mohammad Yagout at 880-1308.

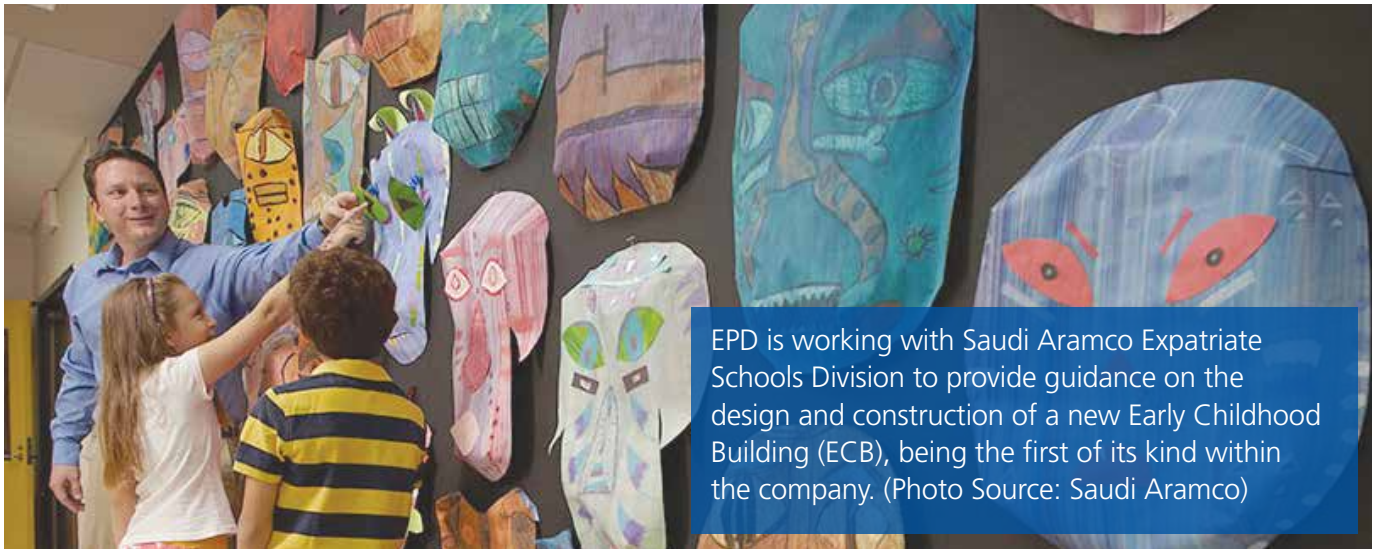
Mapping and Documenting Birds of Saudi Arabia

EPD met with Taif University biology staff to map the national distribution and seasonal timing of every bird species (n=505) recorded in Saudi Arabia. GIS maps and spatial layers have been developed for 95% of bird species, with the remainder to be finalized in 2016.

Furthermore, 90% of the Kingdom's bird species have been photographed. Key aspects of behavior and seasonal abundance of every bird species have been documented. Once completed, this information will enable Saudi Aramco to make informed decisions about the impacts of project developments on the Kingdom's valuable avifauna.

Saudi Aramco Develops New School Building to Assist Working Mothers

EPD has worked closely with Saudi Aramco Expatriate Schools Division to provide guidance on the design and construction of a new Early Childhood Building (ECB). Being the first of its kind within the company with the intention of providing preschool



EPD is working with Saudi Aramco Expatriate Schools Division to provide guidance on the design and construction of a new Early Childhood Building (ECB), being the first of its kind within the company. (Photo Source: Saudi Aramco)

daycare facilities for working mothers, EPD provided guidance on adhering to current national and international standards. Criteria included space requirements and provisions of essential facilities for caring for small children such as food preparation areas and laundry facilities. This effort will ensure that employees' children who attend the facility will be protected according to the best worldwide practices.

Dhahran Community Expands with Worker Health in Mind

Dhahran is expanding while keeping worker and community health in mind. Continued EPD support of PMT efforts to ensure construction worker safety has yielded significant improvements to the construction site's drinking water

A worker takes a well-deserved drink of water. EPD and proponents continue to make sure adequate drinking water is available to contract workers across operations. (Photo source: Saudi Aramco)

supplies. In particular, water is now being delivered to sites and stored with residual disinfectants to eliminate pathogens that may cause illness. Safe drinking water for construction workers is particularly important through the summer months, when they may need to drink at least 1 cup every 10 minutes due to high temperatures. EPD will continue to provide support to ensure Company Environmental Health Standards are maintained at the site. In the short-term, focus will move to onsite dining arrangements and basic sanitation requirements.

Temporary Construction Camps as Part of Master Gas System Expansion Phase II Get Environmental Green Light

EPD was consulted on the design package review for the East West Pipelines Department's remote area Saudi Aramco Project Management Team and contractor camp facilities as part of the ongoing investment in the Master Gas Expansion program. The layout of the facilities within the camps were satisfactory with environmental health recommendations reported to ensure company standards are followed for food safety, disinfection of potable water, collection of sewage, proper garbage disposal and adequate camp pest control, accommodation standards as well as laundry and clinic facilities. Maintaining proper food hygiene, adequate level of disinfection in the potable water supply, proper collection and treatment of sewage and garbage is required to prevent spread of diseases. Ensuring clean, spacious sleeping accommodation and sound facilities that meets high Aramco standards ensures high standards of hygiene and maintenance are provided at company facilities

EPD, RC Tackle Jubail City Odor Nuisance Complaint

Company delegates consisting of EPD and Berri Gas Plant (BGP) Management in addition to Government Affairs met with the Royal Commission Environmental Control Department (RCECD) in Jubail to discuss the recent Jubail City odor nuisance complaint. Attendees agreed that due to the close proximity of residential areas to BGP, there is a need to minimize incidental flaring that could lead to local complaints regardless of compliance with all regulations and standards. Additionally, there was a consensus to cooperate in enhancing the communication of these incidents proactively to RCECD to better manage these complaints. The company team presented the current emission monitoring and controlling measures to ensure that BGP complies with environmental regulations. The presentation also highlighted future capital projects that will minimize flaring, SO^2 and liquid hydrocarbon burning such as installing FGRS, upgrading SRUs and installing Hydrocarbon Liquid Recovery System. Both Saudi Aramco and the Royal Commission agreed to establish a communication protocol between Saudi Aramco Government Affairs and BGP to ensure any future upsets will be communicated in a timely manner to the Royal Commission. Additionally, Saudi Aramco will soon deploy a special design mobile air quality station to BGP to monitor all regulated pollutants and odors between BGP and Jubail Residential Area.

Number of Certified Radiation Protection Officers Grows

Three members from the Environmental Protection Department's Radiation Protection Unit (RPU) successfully achieved certification and accreditation as Radiation Protection Officers (RPO) by the Saudi Government Regulatory Authority, King Abdullah City for Atomic and Renewable Energy (KACARE). This milestone increases the number of certified RPOs in RPU to seven and the company to 36. Certification requires prospective RPOs to pass a stringent examination set by KACARE. This year has seen a significant increase in the number of certified company RPOs, rising from 24 in January 2016 to 36 in July 2016, providing the company with greater support in radiation protection issues.

A Radiation Protection Officer conducts a RAD survey at Saudi Aramco (Photo Source: Saudi Aramco)

A damaged jebel (up) compared with a repaired jebel (down). (Photo Source: Saudi Aramco).

Dhahran Jebel Repaired

Jebels damaged during site preparation activity at Al-Midra Pipe Laydown Yard in Dhahran have been repaired. The jebels were damaged by Onshore Maintain Potential Projects Department (OMPPD). EPD issued an EPA finding and provided guidance on how to remediate the damaged jebels. OMPPD responded quickly to fix the problem. This simple yet strong action serves as a sound example of departments collaborating to maintain healthy environmental systems for both the company and community.

Saudi Aramco, Partners Mull Creating National Industrial Wastewater Champion

The Environmental Protection Department is partnering with New Business Development along with other stakeholders (e.g., FPD, RTR, etc.) to evaluate the technical and economical merits of creating a national champion for treating industrial wastewater and handling spent caustic.The team has evaluated and ranked the proposals submitted by three companies. The team presented the Phase I recommendations to the Management Committee and obtained the committee's approval to proceed with Phase II of the initiative, which involves conducting bankable technical/economics studies and developing the business model's terms and agreements.

Successful Captive Breeding of Oryx and Gazelle at SWS

The Shaybah Wildlife Sanctuary (SWS) co-championed by EPD and SYPD has reached a landmark milestone this week with the first offspring born in captivity. Thus far, eight juvenile gazelle and one oryx have been born at SWS. These represent the first oryx and gazelle offspring to be born in the central Rub' al-Khali for the last 50-100 years (since the animals were extinct from the region). These animals are protected within the 637-km^2 area of the fenced SWS, contributing to the international effort to recover these globally threatened species. Company protection of this iconic landscape and the reintroduction of these species are internationally significant achievements.

Successful captive breeding of the Oryx and Gazelle takes place at SWS.

Dengue Fever Case Reported at Jazan Economic City

EPD investigated a case involving an employee who tested positive for the Dengue fever virus at Jazan Economic City (JEC). This virus is mainly transmitted by a specific mosquito species. As preventative measures, EPD recommended the initiation of a mosquito survey and the implementation of an Integrated Pest Management (IPM) program. Additionally, EPD provided information on mosquito prevention and control.

Mosquito-borne Dengue fever has been reported at Jazan Economic City. Saudi Aramco is taking steps to minimize and control mosquitoes and pests in general. (Photo Source: Shutterstock)

EPD, P&CSD Unveil New Binary Weather Data Tool for Energy Calculation

The Environmental Protection Department (EPD) partnered with Process & Control Systems Department (P&CSD) to publish a new Saudi Aramco Best Practice SABP-A-064 entitled "Binary Weather Data Tool for Energy Calculation." This best practice is based on actual meteorological measurements over the last 10 years derived from EPD's Air Quality and Meteorological Monitoring Network (AMMNET) for five cities. These meteorological data sets are specifically required for use in nonindustrial building energy simulations for energy efficiency calculations. Meteorological data are always needed in HVAC systems, predicting energy consumption and baseline electrical development or measurements and verification assessments in nonindustrial buildings. EPD worked with P&CSD to create the typical meteorological year in binary weather data. The binary method refers to a procedure where monthly weather data are sorted into discrete groups (bins) of weather conditions. Each bin contains the number of average hours of a particular range of weather conditions occurring during monthly or annual basis.

IMO Agrees to Implement Mandatory GHG Emissions Data Collection by All Member Nations

EPD supported the Saudi delegation to the International Maritime Organization's (IMO) Marine Environment Protection Committee (MEPC) in its 69th session in 2016. The delegation was led by the Ministry of Transportation and included reps from MinPet, Presidency of Meteorology and Environment (PME), Ministry of Interior, Ministry of Defense and Saudi Ports Authority. The IMO MEPC 69th session covered several topics that may impact Saudi Aramco's business, namely the reduction of GHG emissions, energy efficiency applicable to shipping, bunker fuel Sulphur limits, and ship ballast water management. With regard to GHG emissions from ships, the IMO was moving to implement market-based measures/mandatory data collection by all member nations, which will involve ships calling on Saudi Aramco terminals. Data collected will be analyzed to determine further measures to reduce GHG and limit CO_2 emissions, which might include market-based measures (i.e., carbon tax) on emissions from marine commercial vessels. KSA and like-minded countries pushed for adopting a phased approach that includes data collection and data analysis, which should be utilized to evaluate the effectiveness of implanting further measures without specifically mentioning market-based measures. It is worth mentioning that oil companies and refineries globally are following this issue due to possible impacts on capital spending at existing refineries needing to upgrade facilities to produce low Sulphur fuel oil or switch production away from fuel oil and increase production of other distillates. The discussion on ballast water management involved issuance of updated guidelines on ballast water management implementation, which includes onboard testing of ballast water for ships during their stay in ports or terminals

The IMO's Marine Environment Protection Committee (MEPC) meets for its 69th session to address greenhouse gas emissions in the shipping sector as well as updated guidelines on ballast water management. (Source: IMO)

Endangered Hawksbill Turtle rescued

A juvenile hawksbill female turtle, an internationally endangered species, was rescued by volunteers on RT beach. The turtle who was washed ashore on the beach was initially cared for by local volunteers. With the support of EPD and the Dhahran Veterinarian Clinic, the turtle was examined and x-rayed in Dhahran for signs of injury. The examination revealed a blocked esophagus, which the veterinarians cleared under surgical conditions. The turtle is now recovering and will be photographed by Public Relations as a symbol of Saudi Aramco's Environmental Stewardship efforts. The turtle will be released back to the sea once it is fully recovered.

An injured juvenile hawksbill female turtle, an internationally endangered species, recovers after being rescued by volunteers on Ras Tanura beach. (Photo source: Saudi Aramco)

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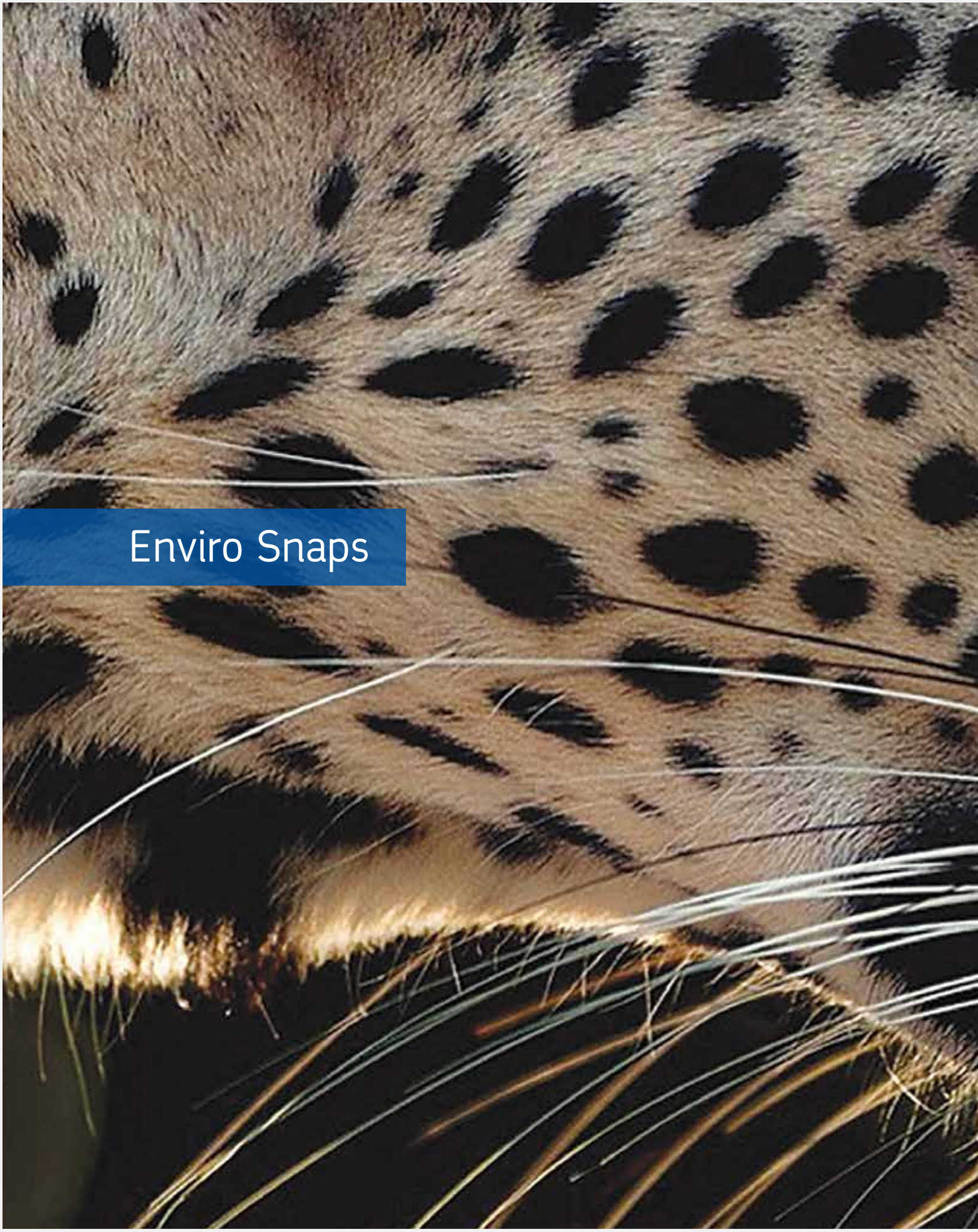
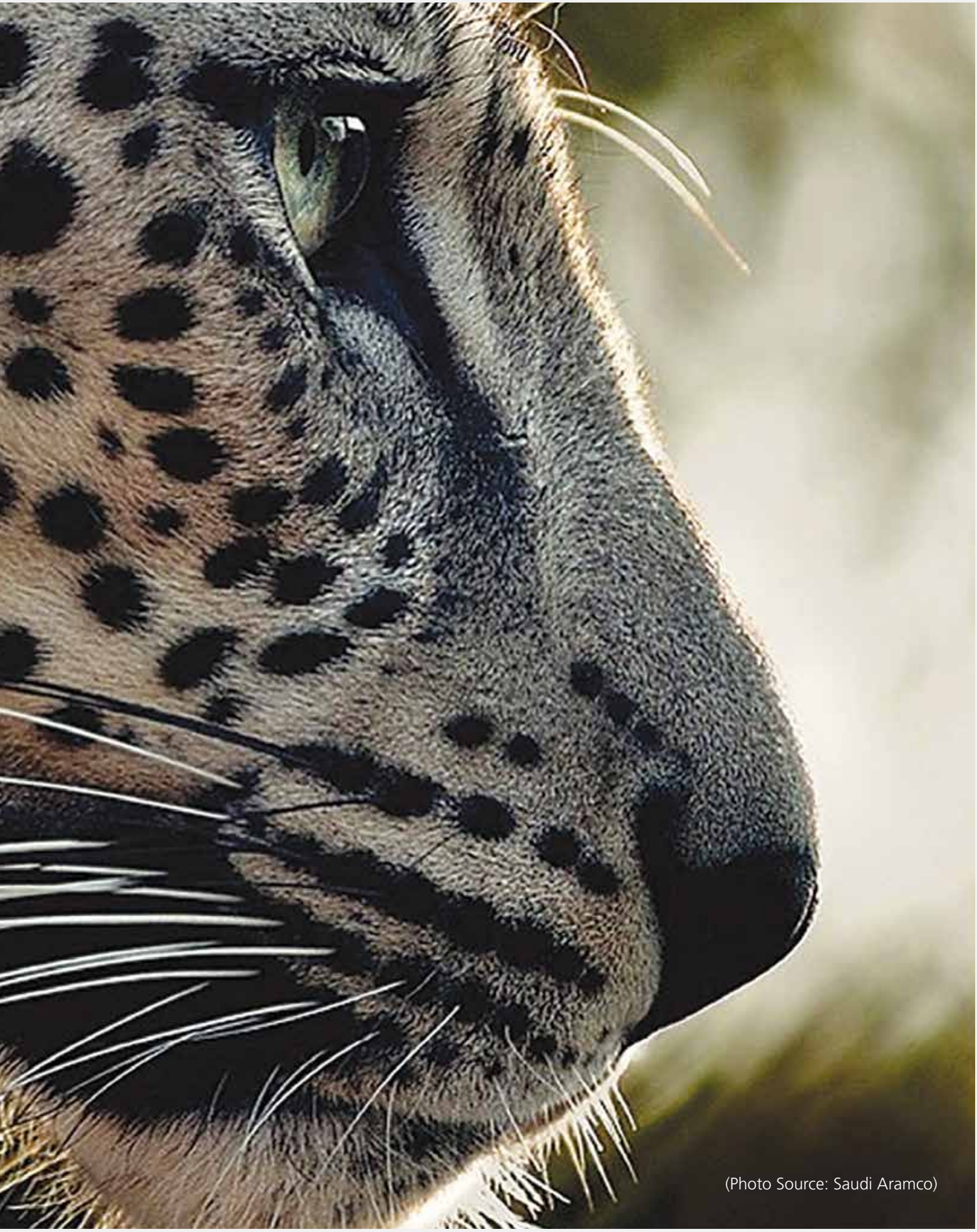

Enviro Snaps



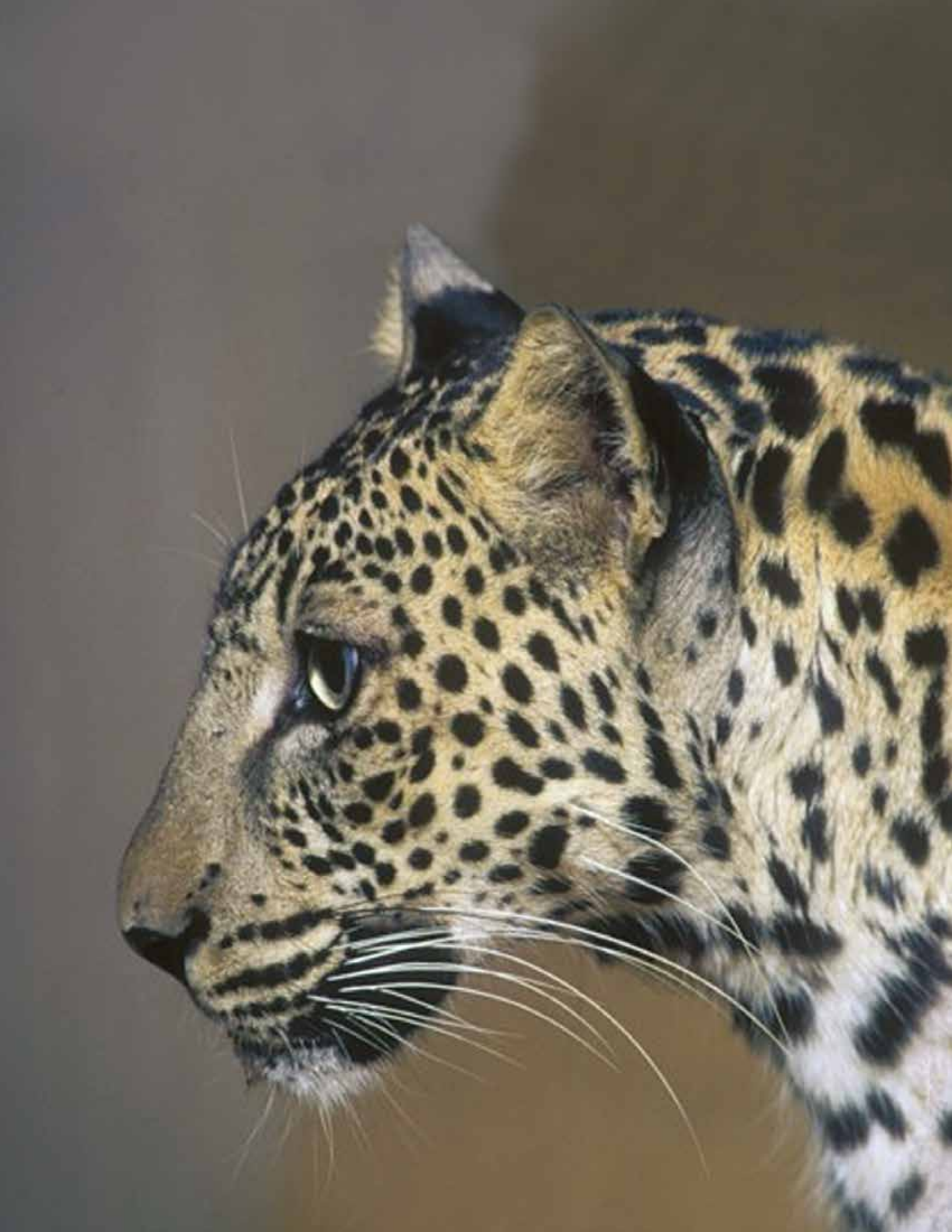
(Photo Source: Saudi Aramco)

A Legend Impaired - The Arabian Leopard

Abdullah Alsuhaibany

(Photo credit: Bandar Al-Jaber)

The Arabian leopard is one of the smallest leopards and is closely related to the African leopard. Unlike the African species that stores carcasses in trees, the Arabian leopard prefers to stash its prey in caves or lairs. It is an endemic species to the Arabian Peninsula and classified as Critically Endangered by the International Union for Conservation of Nature. It has been estimated that as of 2012, only 300 individuals exist in the wild. Add to that, the population is severely declining due to loss of suitable habitats, food sources and poaching. These animals are on the top of the food chain and play a major role balancing the environment. This leopard also plays a prominent role in southwestern Arabian culture, and its preservation is crucial.



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