

# Line Rider

Global Employee eMagazine



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February 2012



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## Zero Heroes

Teams across the enterprise are clocking up millions of hours without a single lost-time incident.

In Chevron, we like to say safety means going home unhurt to our families and friends every day. Around the world, in even the most challenging work environments, we are proving it. Millions of hours, year upon year, are being recorded without a safety incident. How are we doing it?

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*Left: Role-playing to reinforce safety in Nigeria.*



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### Zero *IS* Attainable

Chevron is a leader among its industry peers in preventing injuries as measured by Days Away From Work (DAFW) and Total Recordable Incident Rate (TRIR).

To recognize operational excellence (OE) success, Chevron honors outstanding safety performance with its Zero Is Attainable (ZIA) awards. These are given once a quarter to organizations across the enterprise that achieve 1 million hours or 1,000 days worked without a work-related injury or illness resulting in days away from work.

For comparison, it would take 10 people more than 50 years to work 1 million hours without a work-place injury.

"The ZIA awards aren't just about statistics, though – they're about keeping people safe," says Graham Edwards, manager of Planning and Performance in corporate Health, Environment and Safety (HES). "The far greatest reward is the everyday success: that all colleagues and contractors return home safe each day."

Organizations have tailored various safety programs to fit operational needs. Here are just a few of our zero heroes.

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### Engineering Marvel: 38 Million Safe Hours

The Escravos Gas-to-Liquids (EGTL) construction team at Chevron's Nigeria/Mid-Africa Gas business unit often works at heights and with heavy equipment. The risk of workers or objects falling from heights could be deadly, and heavy equipment could potentially crush a person if work is not conducted safely.

As of November 2011, EGTL had worked more than 38 million hours without a DAFW incident – not an easy feat, especially considering that operations are located at a highly congested site with a small footprint.

Safety has to be constantly reinforced, as it is in the drama pictured on our title page, where some members of the EGTL team performed a skit to reinforce the importance of safety during their 2010 Diversity Day celebration.

Among other aspects of their safety culture, project workers attend a one-week safety orientation before being mobilized to the site. "This training has greatly influenced the focus and performance of the personnel at the site. We have invested time and money upfront to train more than 10,000 workers," says Daniel Ashade, EGTL deputy project manager.

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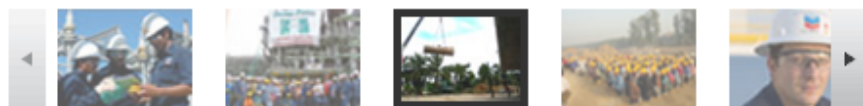
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### Walking the Safety Talk

Chevron Thailand Ltd. workers carry out high-risk tasks ranging from the removal of underground fuel storage tanks to working at heights to repair high-rise signs.

They are clearly doing it right, contributing 1.83 million hours to International Products (IP) Asia-Pacific team's 14.1 million hours of work without a lost-time incident, spanning from January 2010 to October 2011. The focus on safety is part of IP's priority to achieve a step change improvement in OE.

Chevron Thailand's successes result from identifying potential safety risks and developing practical mitigation plans.

"We frequently exercise field inspections using Work-in-Progress, a set of almost 100 questions to observe contractors' operations, to ensure contract workers are working safely," says Sakcharin Rattanawan, HES specialist.

"Chevron leaders 'walk the talk' by engaging with contractor management. This sends the message to workers that Chevron is most serious about what they do," says Maintenance and Construction team lead Wannop Jansawang.

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### From Bare Feet to Steel Toes

Achieving safety success at Chevron Bangladesh required a cultural "paradigm shift," says OE/HES manager Kinnesh Dalal. "The overall safety standard is very challenging because we are operating in an environment of low safety awareness."

Some of the workers needed to shift from bare feet to steel-toed safety shoes. Many needed to overcome fear of using stop-work authority on a supervisor.

"We now combine a strong leadership commitment to safety with intense oversight of contractors, continual training and mentoring, and an inspirational morning safety meeting [see photo left] with a key focus on sending everyone home safe," says Dalal.

Chevron Bangladesh has now earned 12 consecutive ZIA awards by successfully completing 28 million workforce hours without a DAFW injury.

"Every member of the workforce feels passionate about looking out for one another and has a tremendous pride and passion for working safely, completing every task the right way, every time," says Dalal.

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### Communication Saves Lives

Understanding who you are – and who your teammates are – can be the most important safety tool.

That's the idea behind E-Colors, a process Drilling and Completions (D&C) has adopted to help identify different personality styles to improve communications and develop better team dynamics. This awareness has enhanced hazard identification and mitigation, and helped employees to better perform stop-work authority and personal intervention.

"Where we have implemented E-Colors, we've seen improvements in worker interactions and leadership behaviors, and there is an immediate positive impact in safety, reliability and efficiency performance," says David Philips, D&C HES consultant.

E-Colors helped improve D&C's performance at the San Joaquin Valley, California, business unit. DAFW incidents have decreased from three in 2009 to zero for 2010 and 2011. Recordable injury incidents have likewise decreased from 10 in 2009 to one in 2011.

Left: Drilling engineer Paul Benet displays "socializer" yellow and "doer" red colors on his hard hat as part of the E-Colors program.

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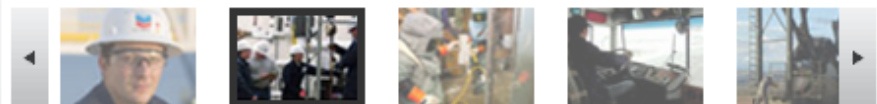
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### Building Knowledge to Prevent Incidents

Safe-work practice knowledge and application are at the heart of preventing incidents. To serve that end, the Gulf of Mexico (GOM) business unit implemented Field Competency Verification, a process that focuses on verifying the knowledge of frontline performers and others setting safe-work practice expectations.

Since implementation began, GOM's DAFW incidents have decreased from six in 2009 to two in 2011. Also, GOM's total recordable incident rate has dropped from 0.53 to 0.23, representing a more than 40 percent improvement.

A team of field competency coaches administers assessments and then trains the workforce to strengthen safe-work practice knowledge and application. More than 14,000 safe-work practice assessments have been conducted over a two-year period.

"We have people who go into the field to assess contractor knowledge and then provide immediate feedback," says Lane Blanchard, Contractor HES Management adviser. "We collect high-quality data to help break the incident chain before it happens," he adds.

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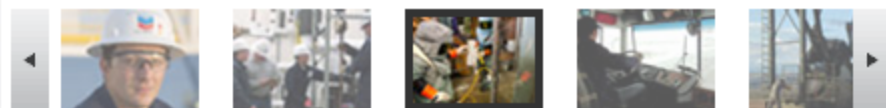
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### The Fundamentals of Staying Safe

By September 2011, El Segundo employees and contractors achieved 2 million hours without a DAFW or recordable incident – the California refinery's longest injury-free interval in more than two years.

Milestones like this don't happen by chance. In 2008, El Segundo rolled out Focus on Fundamentals to improve operational discipline by establishing structure, consistency and oversight to the way existing tools and processes are used in daily work. The effort paid off as the refinery celebrated 2010 as the safest in its 100-year history.

Five focus areas – from routine duties to work control – are designed to address root causes of major incidents: procedures/safe-work practices, risk recognition and supervisor oversight.

The strength of Focus on Fundamentals continues to grow as innovative training classes reinforce the importance of doing every task the right way, every time. For example, a new electrical safety class (pictured) prepares mechanics for high-risk work without actually working on a live system.

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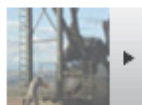
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### Safer by Miles

Kazakhstan's extreme winters and our facility's remote location make for difficult driving conditions. Motor vehicle safety has been a major area of focus for our joint venture Tengizchevroil (TCO). Beginning in 2005, a variety of activities were implemented such as winter driving training, road maintenance, improved signage – and, most notably, the installation of driving monitors.

Monitors have now been installed in more than 1,800 TCO company and contractor vehicles. These devices identify unsafe driving behaviors as they occur and provide immediate feedback by way of an audible alarm.

Mike Jennings, TCO's OE/HES general manager, says, "It's not only the audible alarms that gets the driver's attention, it's the consistent feedback provided to each driver by the weekly reports that are distributed."

An average of 1,150 drivers are active each week, and approximately 10 million miles (16 million km) are driven annually. Over the last 5 years, TCO's motor vehicle safety program has dramatically improved the crash rate, and the recordable crash rate was zero in 2009 and 2011.

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
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## Transforming Upstream

Global deployment will build on our successful *i-field*<sup>™</sup> investments in digital oil field systems and solutions.

Chevron has launched a major program to transform our exploration and production business into a highly-automated, hyper-connected efficiency machine aiming for annual savings and value creation of \$1 billion. It's called simply Upstream Workflow Transformation (UWT).

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*Left: Engineer Nathan Tabb in the Machinery Support Center.*

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The UWT program – grounded in our "digital oil field" effort known as i-field – aims to harness the full power of priority business processes enhanced by information technology. Through 2017, it is expected that UWT will deploy six to eight standard "Global Solutions" targeted at strategic assets in more than 40 locations.

"UWT is enabling us to make better, faster decisions and improve performance everywhere," says long-time program advocate Gary Luquette, president of Chevron North America Exploration and Production (CNAEP). Over the past decade, CNAEP has shepherded most of the i-field solutions and results that provide the business case to deploy i-field globally via UWT.

"Our i-field solutions are like 'apps' for engineers," says Melody Meyer, an early i-field supporter and president of Chevron Asia

Pacific Exploration and Production. "Much as online stores and collaboration software have transformed the way we shop and stay in touch with family, we're leveraging information technologies to transform how we use data to make asset management decisions and collaborate with our subject matter experts."



Learn how i-field works. [Click to enlarge](#)

UWT's Global Solutions build on successful prototypes from the Gulf of Mexico (GOM), San Joaquin Valley and Midcontinent/Alaska business units.

UWT's flagship solution, the Machinery Support Center in Houston, Texas, increases equipment reliability by remotely using sensors, visualization and other tools to link Energy Technology Company (ETC) experts to field operators. Experts continuously monitor Chevron's global compressors and other vital equipment, using sophisticated analytical tools to predict failures before they occur, minimizing production losses and other costs.

Expectations run high also for the Real Time Drilling Optimization Center solution, which aims to improve management of large, labor-intensive drilling programs in shale gas and other developments.

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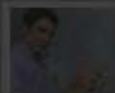
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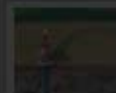
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### The Connected World of i-field

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Chevron's i-field solutions enable centralized analysis, collaborative decision-making and management by exception – a process that helps teams focus on the highest-value opportunities. Now Upstream Workflow Transformation is taking i-field global across business units. i-field features:

**Decision Environments** – Decision Support Centers and Asset Decision Environments bring employees together "virtually" for multi-disciplinary decision-making within a business unit or around the globe.

**Optimized Performance** – solutions support drilling, reservoir management and production, waterflood, and well-performance optimization.

**Facilities Solutions** – support equipment reliability and facilities optimization.

**Logistics Efficiency** – enables safer and more efficient planning and movement of vessels, aircraft, materials and people.

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It's an integral part of Chevron's strategy to meet demand for drill site managers.

The Waterflood Surveillance, Analysis and Optimization solution is built to slow the declines and elevate performance in 140 fields currently producing more than 600,000 barrels of oil per day worldwide, says ETC waterflood specialist Ray Clark.

Chevron's locally focused i-field projects captured some \$600 million in value through 2010. UWT plans to deploy i-field at scale across the enterprise and differentiate Chevron from competitors, says Dave Dawson, UWT's general manager. That could earn us \$1 billion a year in savings and value creation, says ETC President Paul Siegele.

Approved last May, the program is expected to cost about \$70 million in 2012. A joint UWT/ETC Technical Computing team, which is



**Connected world: Inside the Machinery Support Center.**

expected to grow to about 120 people, will mesh with ETC and Upstream Capability experts plus UWT coordinators, i-field managers and teams worldwide. Ultimately, the plan is that 300 or more people in ETC and Upstream will work full-time on UWT, underscoring Chevron's shift to an

"orchestrated strategic global program," says Mike Hauser, i-field program manager since 2002.

Setting the stage for transformation, adds Dawson, was the 2006 creation of the Upstream Capability organization. It defined global standards for key base-business tasks, such as Waterflood Surveillance and Optimization, which in turn serve as the basis for UWT's Global Solutions. These enterprise-wide standards helped prepare Upstream people to embrace the Global Solutions. Indeed, leaders from petrotechnical and operations disciplines selected the solutions in the UWT five-year plan as top priorities for deployment.

While UWT is expected to improve important base business assets such as Tengiz in Kazakhstan, there's an even stronger emphasis on future assets like Gorgon in

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Australia. Already, recent major capital projects like Agbami in Nigeria are incorporating automated monitoring systems and other digital oil field components.

"During startup of our Tahiti deepwater field in the Gulf of Mexico, we were able to reach maximum production rates in a short period of time, proving that incorporating solutions like Real Time Production Optimization into major capital project designs can deliver huge incremental value through increased production and reserves," says Warner Williams, GOM vice president.

Along with all the sensors, software and screens, it's expected UWT will optimize Upstream workflows and procedures using processes such as Lean Sigma. "While optimization adds value, revising operating procedures introduces significant cultural change," says Ana Simonato, heading UWT's



**UWT research projects include one allowing operators to train on "virtual" platforms.**

organizational capability and change management effort.

Traditional work processes, which use less technology, are sometimes organized along departmental and functional boundaries. So

UWT must blend technology and training to link practitioners on a collaborative basis, she says.

UWT plans to invest about \$10 million per year in research and development (R&D), says Dawson, including our partnership with the Center for Interactive Smart Oil Field Technologies at the University of Southern California. R&D efforts include designing a visualization system, to allow operators to train on 3D virtual platforms that have not yet been built.

But while the quest for dazzling new tools continues, Dawson is clear about the UWT challenge: "Our focus now is delivering the Global Solutions to provide us with a platform for automated, integrated asset management."

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## Scrub Your Reservoir Clean

Two pilot projects are teaching us how chemical injection technology could breathe new life into declining oil fields.

The onshore Minas Field in Indonesia and offshore Captain Field in the North Sea might seem to have little in common. But both reservoirs have reached peak production, and both are ideal for flooding with chemical pushers and scrubbers to help capture billions of barrels of crude oil beyond the limit of current waterflood technology.

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**Horizontal Producer**

**Horizontal Injector**

**Captain Field**

**Minas Field**

### Waterflood at Captain

At the Captain Field in the North Sea, we pump millions of barrels of water through long injector wells to push oil toward the production wells. Unfortunately, Captain's injected water narrows its course near the producers in a "coning" pattern, bypassing large, oil-rich sections of rock. With about 70 percent of Captain's original 1 billion barrels of oil remaining, Chevron is applying its waterflooding know-how to advance the technology of polymer flooding.

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**Polymer at Captain**

How to make a better waterflood? Thicken the water with polymers - used in food additives and various chemical products - to more efficiently push oil through the reservoir. This increases costs, but models from Chevron Energy Technology Company suggest this technique could reduce "coning" at Captain and achieve a more uniform sweep through the rock and greater oil recovery. A pilot project - five years in planning - began pumping in the polymer last year through a horizontal injector well to a horizontal production well.

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Captain Field Minas Field



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### The Minas Opportunity

Discovered in 1944 with initial production beginning in 1952, Indonesia's 50,000 acre (202 sq km) Minas Field has an estimated 9 billion barrels of original oil in place. Waterflooding began at Minas in 1972, and the field's currently 320 water injectors and 1,200 production wells make it the largest waterflood field in Southeast Asia. Chevron has recovered approximately half the field's resource to date. For the past 10 years, teams have screened enhanced oil recovery processes to define the best method to further increase recovery. Surfactant/polymer flood was deemed the most promising, and a team is in place to pilot this technology with scheduled first injection in mid-2012.

[View Minas Field ▶](#)

Captain Field      Minas Field



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### Surfactant/Polymer at Minas

Water can do only so much to recover the residual oil that clings to the reservoir rock. Surfactant is designed to help this residual oil break away from the rock in the same way that a household soap works. The mixture is then swept along by the polymer to the producing wells. The \$165 million trial will use a surfactant formulated by Chevron Oronite Company, our additives subsidiary. Full-scale development would require billions of dollars of investment in surfactants, but would bring with it the potential of recovering hundreds of millions more barrels of oil and extending the field's productive life for several more decades.

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