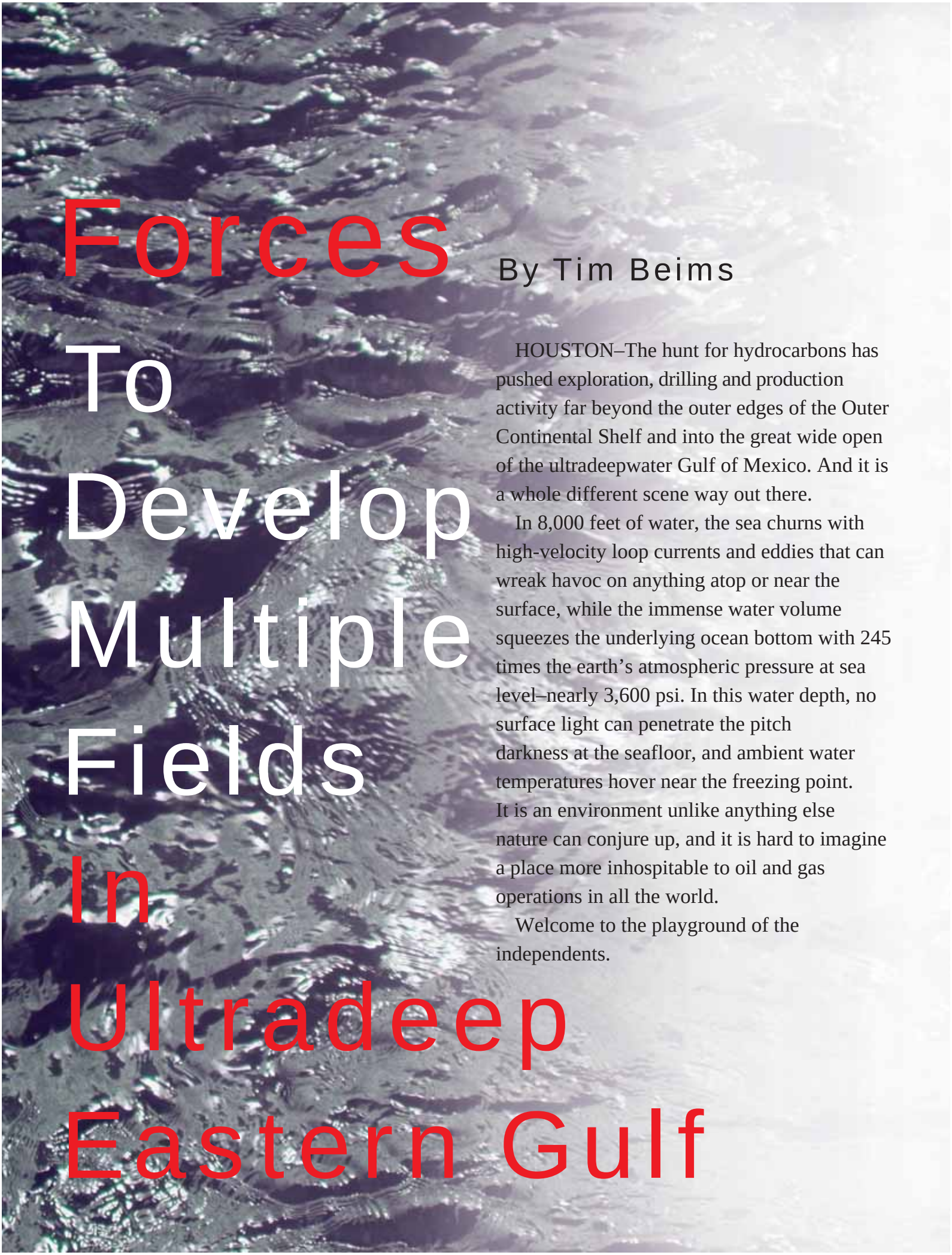
Independents Join



Forces To Develop Multiple Fields In Ultradeep Eastern Gulf

By Tim Beims

HOUSTON–The hunt for hydrocarbons has pushed exploration, drilling and production activity far beyond the outer edges of the Outer Continental Shelf and into the great wide open of the ultradeepwater Gulf of Mexico. And it is a whole different scene way out there.

In 8,000 feet of water, the sea churns with high-velocity loop currents and eddies that can wreak havoc on anything atop or near the surface, while the immense water volume squeezes the underlying ocean bottom with 245 times the earth's atmospheric pressure at sea level–nearly 3,600 psi. In this water depth, no surface light can penetrate the pitch darkness at the seafloor, and ambient water temperatures hover near the freezing point. It is an environment unlike anything else nature can conjure up, and it is hard to imagine a place more inhospitable to oil and gas operations in all the world.

Welcome to the playground of the independents.

Independent operators are leading the charge into the ultradeep Gulf, operating nine of the 12 discoveries announced in 2004 in water depths of 5,000 feet or greater. In fact, over the past three years, independents have accounted for eight of every 10 ultradeepwater discoveries, according to the U.S. Minerals Management Service. Many of the deepest-water finds to date have been made in the relatively unexplored Eastern Gulf, where water depths routinely exceed 8,000 feet.

"A good number of independents–including Anadarko–are focusing on deep water," says Mike McEvilly, manager of facilities and construction, worldwide deepwater, at Anadarko Petroleum Corp. "I believe that you will continue to see independents being very active not only in drilling new discoveries in deep and ultradeep water, but also finding creative ways to develop those discoveries, enabled in many cases by the combination of subsea tiebacks and some type of floating production facility."

Clusters of subsea iron one-and-a-half miles or more beneath the surface water connected by winding trails of umbilicals and flowlines to a far-away floating platform may well be the shape of things to come in the ultradeep, where commercializing reserves is the name of the game. "As independents push into the ultradeepwater frontier, you will have discoveries that may not be economical to develop on a standalone basis," McEvilly explains. "But by grouping several discoveries in a given area using a 'hub-and-spoke' concept with clusters of subsea wells tied back to a central facility, you can achieve the economies of scale to make those reserves commercial."

Independence Hub

That is precisely the approach Anadarko and its fellow producers are taking on the Independence Hub and associated Independence Trail projects in the previously untapped Eastern Gulf (Figure 1).

Six independents–Anadarko, Kerr-McGee Oil & Gas, Dominion Exploration & Production, Spinnaker Exploration Co., Murphy Oil & Gas, and Devon Energy Corp.–are joining forces under the umbrella of the Atwater Valley Producers Group to partner with midstream energy services provider Enterprise Products Partners LP to collaboratively put the production facility (Independence Hub) and pipeline (Independence Trail) in place to produce an initial 19 subsea wells in nine fields in water depths ranging from 7,800 to 9,000 feet.

In so doing, the project partners are quietly accomplishing a number of "firsts," including the world's deepest water depths for a floating production facility, riser system, and export pipeline, as well as the world's largest monoethylene glycol (MEG) injection and reclamation system. The nine anchor fields also represent the first producing fields in the Eastern Gulf since the area was opened to federal leasing in 2001.

Moreover, even though the discovery well on at least one of those fields was still drilling scarcely a year ago, the project is being executed on a fast-track timeline that calls for first production by mid-2007.

"This is a complex development, with clusters of subsea wells in the Eastern Gulf Planning Area tied back long distances to a new hub facility in 8,000 feet of water just inside the Central Gulf Planning Area. On top of it, you have a divergent group of six independent companies that has had to come together in a short time to agree on a development concept and collectively put that plan into action on a fast-track basis," McEvilly remarks. "This all sounds very difficult, but ultimately, all the partners' needs converged and we all recognized that we shared the common goal of producing the reserves in a timely manner we each had found in our ultradeepwater fields."

The Independence Hub facility will be operated by Anadarko, with Kerr-McKee and Dominion maintaining representatives on the platform to monitor their respective wells, but is owned by Independence Hub LLC (owned 80 percent by Enterprise and 20 percent by Cal Dive International). The Independence Trail Pipeline will be 100-percent owned and operated by Enterprise. Both are monumental undertakings, and first production on the systems will be a crowning achievement for all project participants, but according to McEvilly, it is all in a day's work for the operators involved, albeit a long day.

"For Anadarko, the Independence project is simply a progression of our deepwater strategy. Our field development focus has progressed from Marco Polo, to K2 and K2 North, to Genghis Khan, and now we are stepping out even farther and scaling up even more with Independence," he points out.

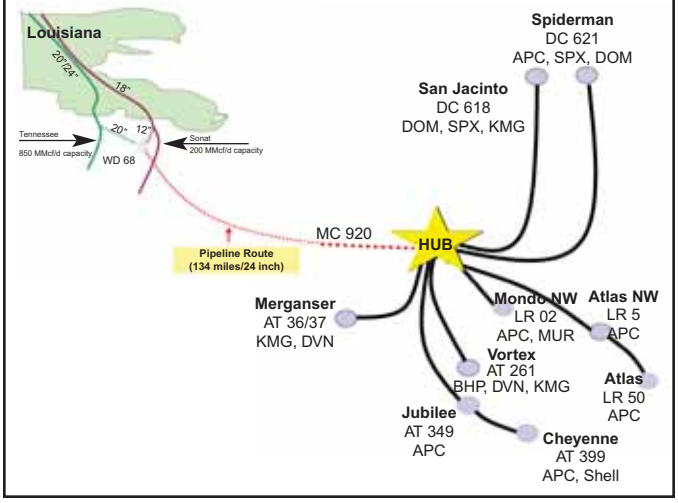
And together, those development projects position the company to dramatically scale up its deepwater production over the next couple years. Following up on the start of production last July at Marco Polo–its first deepwater development–McEvilly notes that Anadarko is bringing on three subsea tiebacks to the Marco Polo platform: K2 was expected to commence production in May, followed by K2 North late this summer, and then Genghis Khan in 2006 (all three are located within several miles of the platform in 3,900 to 4,300 feet of water in the Green Canyon area). First gas is expected the following year at Independence Hub, where Anadarko operates six of the nine initial anchor fields–all in more than 8,100 feet of water.

Pushing The Limits

"Scaling up" is one of the operative terms in any description of the Independence project. Everything associated with it is big, from the 850 million cubic feet of natural gas expected to flow through the production facility every day, to the 47,000-ton displacement of the hub's massive hull, to the 85,000-pound, 12.5-foot tall subsea trees being readied for installation on the seabed. "In many cases, instead of applying new technology, we are pushing proven technologies to new limits–be it larger

FIGURE 1

Independence Hub Project Overview



sizes, deeper water, colder temperatures, longer offsets, or higher flow rates," McEvilly attests.

The concept behind Independence Hub and Independence Trail began to take shape three years ago, after Kerr-McGee announced its gas discovery at the Merganser Field (in 7,900 feet of water at Atwater Valley blocks 36/37), and BHP Petroleum announced its gas discovery at the Vortex Field (in 8,344 feet of water at Atwater Valley 217/261 and Lloyd Ridge 177/221) prospects. "GulfTerra (since aquired by Enterprise) approached Kerr-McGee and BHP about a third-party owned hub, but given the water depths, the reserves on these two discoveries were simply not large enough to warrant a full-scale development," McEvilly says.

But then Anadarko made its Jubilee discovery in April 2003 (in 8,800 feet of water at Atwater Valley 305/349 and Lloyd Ridge 265/309) followed by Atlas in June 2003 (in 9,000 feet of water at Lloyd Ridge 5/49/50). Suddenly, the economic picture changed. "We realized that with all four fields, we had enough of a reserve base for an economic development," McEvilly recalls. "Representatives from Kerr-McGee, BHP and Enterprise met with us and suggested a collaborative field development strategy using a third party-owned hub. It seemed like the correct overall approach."

So in the summer of 2003, the operators formed the Atwater Valley Producers Group and began looking at the various development options. "The group began with informal meetings. We all had stranded gas, and we knew that if we attempted to develop these fields on stand-alone bases, none of us would be successful," McEvilly comments. "The only way to justify the cost of a platform and pipeline was to group the fields. We could either swim together or sink separately. The partners recognized that, and we put egos and secondary agendas aside."

Initially, he says the producers looked at financing the facility themselves versus third-party ownership, and considered a spar as well as competing semisubmersible designs. "Representatives of each company held bi-weekly meetings to work through all the issues and concerns," he details. "Through these meetings, we maintained consensus and common direction, and eventually arrived at a solution that everyone could agree on. In the end, for this application, the concept we felt made the most economic and technical sense was a combination of subsea tiebacks and a semisubmersible hub, with Enterprise supporting the infrastructure development."

In the first design iteration in late 2003, Enterprise proposed installing a bulk gas gathering semisubmersible capable of handling up to 500 MMcf/d. "As we went through the front-end design and engineering process, we kept the facility's size open ended and flexible. We did not want to get locked into a particular size early on," McEvilly notes.

That turned out to be a smart decision, because the discoveries kept coming in the Atwater Valley area. In short order, Anadarko discovered Spiderman (in 8,100 feet of water at DeSoto Canyon Block 621), Mondo Northwest (in 8,340 feet of water at Lloyd Ridge 2), Atlas Northwest (in 8,810 feet of water at Llyod Ridge 5), and Cheyenne (in 8,987 feet of water at Llyod Ridge 399). In addition, Dominion brought in its San Jacinto discovery in 7,850 feet of water at DeSoto Canyon 618/619.

Semisubmersible Design

Suddenly, the Atwater Valley Producers Group had grown to six companies with interest positions in nine fields and enough reserves to anchor an even larger hub facility. "At that point, the group determined that the facility could be expanded to 850 MMcf/d, with subsea tiebacks linking the fields to the semisubmersible using a daisy-chain design scheme," McEvilly explains.

Enterprise turned to Atlantia Offshore Ltd. to engineer and construct the hull and mooring system. The design is based on Atlantia's new-generation deep-draft semisubmersible (Figure 2) that is motion-optimized to enable steel catenary risers (SCRs) to be used for importing and exporting hydrocarbons. "This SCR-friendly semisubmersible is the first floating production structure engineered specifically to maximize the strength and fatigue performance of SCRs in ultradeep water," says David Snell, vice president of Atlantia.

The semisubmersible design effort began in 2003 with a comprehensive analysis of SCR motions and stresses, defining critical areas adversely affected by extreme motions. Atlantia then developed a deep-draft hull design, drawing on the expertise of sister company, GustoMSC.

"One of the biggest challenges for a deepwater floater is to design the facility to support numerous risers impacted by fatigue caused by vortex-induced motions (VIM), vortex-induced vibrations (VIV), and wave impact," McEvilly explains. "Because we had limited data in this ultradeepwater frontier, we have to monitor actual conditions against analytical and theoretical data, and adjust the design accordingly as required."

Instead of a conventional design approach driven by payload capacity, Snell says Atlantia focused on ways to limit motions that adversely affect SCRs and their connection points. "We started with the limiting motion requirements of the risers and essentially worked backward to derive a hull and mooring configuration that delivered acceptable responses. The hull configuration–particularly the draft–was engineered out of these limiting SCR requirements. The result is a deep-draft, four-column, ring-pontoon hull that can support large topside facilities while providing SCR strength and fatigue performance," he remarks, noting that Atlantia subcontracted riser engineering consultants, MCS, to assist in the detailed design of import and export SCRs.

As with other aspects of the Independence project, Snell says the semisubmersible builds on adaptations of existing floating offshore structural engineering and design. "We have taken ex-

FIGURE 2

Ultradeepwater SCR-Friendly Deep-Draft Semisubmersible

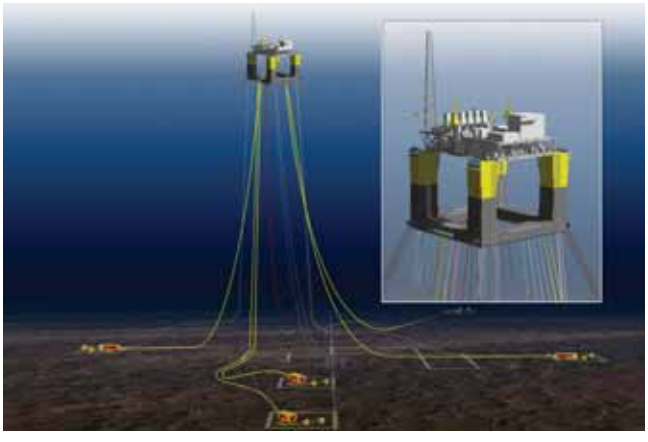


FIGURE 3
Independence Hub Facility Topsides

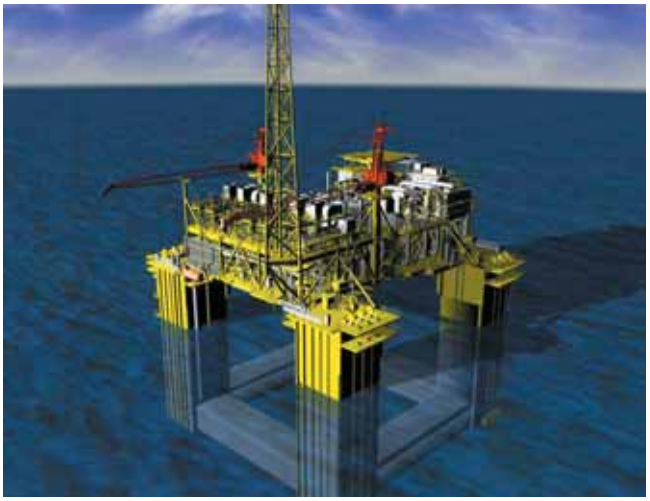
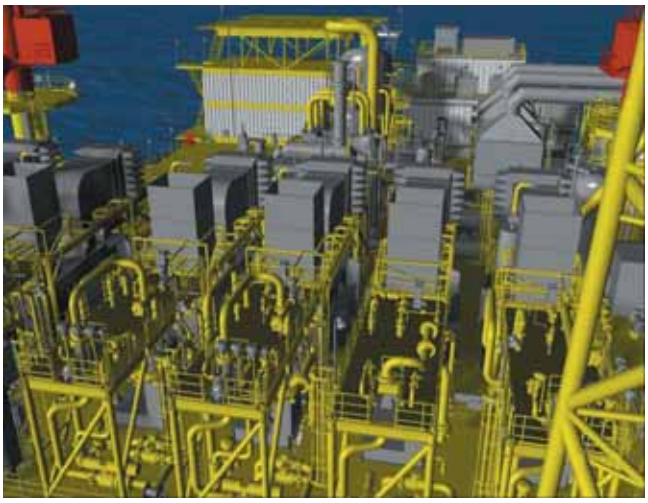


FIGURE 4
Independence Hub Twin-Stage Compression



isting technology and reconfigured it to meet the demands of this ultradeepwater application," he states. "For example, SCR hang-off points (SCR porches) are more robust to accommodate the larger riser loads experienced in 8,000-feet of water. Similarly, the SCR porches are located outboard of the hull's pontoon to better facilitate riser recovery (lift) and installation. The semi-submersible's deck and hull were designed to be fabricated independently, allowing greater fabrication, integration, and schedule flexibility. The two components will be mated quayside utilizing an existing 13,000-ton land-based lifting device, minimizing risks generally associated with a heavy lift offshore."

Before any part of the hull was cast in steel, the deep-draft design was optimized and verified by global analysis and model testing, Snell reports, using both virtual and physical modeling. "We conducted the design analytical work, and then built a physical model to run through a series of wave tests and VIM motion tests," he offers. "The results were then fed back into the design analysis so that we constantly calibrated our analytical tools using physical testing. In this way, we could refine and confirm the design as we proceeded to mitigate risks."

The hull will have an estimated dry weight of 12,500 short tons and an operating draft of 105 feet. Four 46- by 46-foot columns will support a two-level 140- by 220-foot deck structure, with the perimeter of the semisubmersible measuring 220 feet square, and more than 160 feet high. Snell reports that Atlantia struck steel for the hull at the Jurong Shipyard in Singapore in late January, with delivery to Kiewit's Gulf of Mexico fabrication facility expected next April, where the hull will be mated to the topsides.

Topsides Engineering

Alliance Engineering is the contractor responsible for engineering and designing the 8,600-ton topside facilities (Figure 3). The two-level topsides include process equipment, motor control center buildings, three-level living quarters, compressors, the MEG system, a vertical flare tower, etc.

As pointed out by Mike Mahoney, Alliance's vice president and head of its deepwater business unit, "Our work as engineering contractor for the topsides is a natural outgrowth of our involvement in the project from initial concept. We originally developed the design basis and performed conceptual engineering for a semisubmersible host platform in the summer of 2003 working for Enterprise, which was trying to build enough interest among area leaseholders to justify a hub development. We continued with development engineering through front-end design, and during the competitive bid process between hull providers that ultimately ended up with the selection of the Atlantia semi. So it was a natural progression for us to continue with detailed design of the platform topsides."

And these parties have worked together before, continues Mahoney. "We engineered the topsides for the Marco Polo platform, working in very much the same role, with Enterprise as the host facility infrastructure owner and Anadarko as platform operator," he says.

But Independence Hub presents a different set of challenges, relates Mahoney. "Simply being able to handle the production stream–reducing the inlet pressure to 1,900 psi, separating out condensate and glycol, dehydrating the gas, and then compressing to 3,100 psi export pressure–is no simple exercise when you are talking about a volume of 850 MMcf/d on a floating platform in 8,000 feet of water, where weight and space requirements are critical factors in total system design," he remarks.

To accommodate the compression needs, the platform will be fitted with up to six 15,000-horsepower Mars™ 100 turbine gas compressors from Solar Turbines, a Caterpillar company (Figure 4). "The total installed ISO rating will be 90,000 hp of compression, of which 75,000 horsepower (five turbines) will be installed initially," Mahoney notes. "This is obviously a significant offshore compression facility, and we had to engineer it to be compact and lightweight to manage payload, using, for example, extremely compact heat exchangers."

Another feature is the unique compressor configuration, designed for efficient utilization during both early and late stages of service life. "As the wells age, some gas will reach the facility at much lower pressure, so we had to be able to take inlet gas at pressures as low as 600 psi and boost it to 3,100 psi in two compression stages. The compressors are convertible from first- to second-stage compression with a very quick swap-out of a few components," he says. "Making full utilization of the initial in-

stalled horsepower, as opposed to having dedicated machines for the first and second stages, saved significant facilities costs."

Because the produced gas contains associated water that could form hydrate plugs in the long-distance flowlines, Mahoney notes continuous injection of hydrate inhibitor is required, in the form of subsea MEG injection. Independence Hub will house a super sized MEG reclamation system to continuously recover and recycle the glycol (Figure 5).

"The required glycol volumes are so large that there are excellent economics in reclaiming it using a vacuum flash system with distillation to separate water from the MEG," he relates. "But this is a very specialized technology with huge heating and cooling requirements. There were a lot of challenges in accommodating the system on the facility within the footprint and weight constraints."

According to McEvilly, the Independence Hub planning area extends 60 miles from north to south and 35 miles from east to west. The longest tieback is more than 45 miles from the wellhead to the import riser at the hub. "With a seafloor temperature of 38 degrees, the long offset distances make flow assurance absolutely critical to system reliability," he stresses. "Without the ability to reclaim glycol on the platform, we would have to send vessels several times a week to deliver fresh MEG."

Regardless of its status as the world's largest MEG reclaimer, McEvilly points out that the principles behind the system are similar to those used on smaller units at other deepwater fields, such as Kerr-McGee's Red Hawk.

Nonetheless, it was still a considerable scale-up in size, points out Mahoney, noting that as designed, the reclaimer will have a feed capacity of 7,800 barrels a day, compared to 580 bbl/d capacity at Red Hawk and 750 bbl/d capacity at Shell's Mensa Field. Importantly, however, the Independence Hub reclaimer includes design advances that help reduce unit size and cost, according to Mahoney "The system's capacity will be 40 percent greater than the largest existing system in the world at Statoil's Asgard Field in the North Sea, yet weigh only half as much," he observes.

Installation Challenges

The platform includes 17 slots to accommodate 8- and 10-inch SCR flowline risers, and a 20-inch export riser connecting on the seafloor to the 24-inch Independence Trail Pipeline. The platform is slated to begin installation next fall, with Heerema Marine Contractors wet towing and installing the facility and mooring systems. The scope of the installation work includes connecting suction pilings to 12 chain/polyester/chain mooring lines manufactured by Marlow–only the third application of polyester moorings in the Gulf.

"Synthetic mooring lines are lighter than steel moorings in water, offering more neutral buoyancy and a much lighter load on the overall platform system. As a result, operators can dedicate more space to payload, such as production equipment, and less to supporting the weight of heavy steel wire," explains Bob Major, ABS project manager.

ABS is the classification society selected for the Independence Hub (a class society acts as a third-party verification agent to determine the structural and mechanical fitness of marine structures). With the Independence Hub to ABS class, Major says, it will adhere to ABS standards. The society also coordinates regulatory compliance with the Minerals Management Service and U.S. Coast Guard. The society's previous experience with synthetic moorings on work for Petrobras offshore Brazil was of interest, since ABS wrote the first set of comprehensive guidance notes on the application of synthetic ropes for offshore mooring, Major explains.

Among the challenges during the installation phase will be the recovery and hang off of the risers into the individual SCR porches, notes Atlantia's Snell. "The process of picking the risers off the seafloor and hanging them from the semisubmersible requires careful planning and consideration in this extreme water depth; you are talking about a mile and a half of pipe," he remarks.

Independence Trail will deliver the gas from Independence Hub to the Tennessee Gas Pipeline, located 134 miles to the northwest in shallow-water West Delta Block 68 (Figure 6). The single-phase line is designed for operating pressures to 3,250 psi. Allseas USA will install the main export line and flowlines. "The pipeline system faces its own installation and operational challenges," McEvilly says. "For example, it will make 34 pipeline crossings with 16 miles of burial before reaching West Delta 68."

In a multiwell, multifield development, another primary challenge is accurately allocating production. To address that issue, the development scheme calls for installing multiphase wet gas flowmeters immediately downstream of each wellhead, according to McEvilly.

"The flowmeters will not only allocate production volumes to the individual wells, but also will assist in reservoir management by providing data on pressures, flow rates, the distribution between gas and liquid phases, etc.," he relates. "We will know, for instance, if a well starts to make increased water. In that case, the chemical injection rate would have to be increased to that well, which in turn, would impact the chemical and operational costs allocated to it."

Independence Hub will be permanently anchored on unleased Mississippi Canyon 920 along the border between the Central and Eastern Gulf planning areas. McEvilly points to the process of selecting that site as a prime example of the give and take that has occurred between the stakeholders in the Atwater Valley Producers Group.

FIGURE 5

MEG Reclamation System

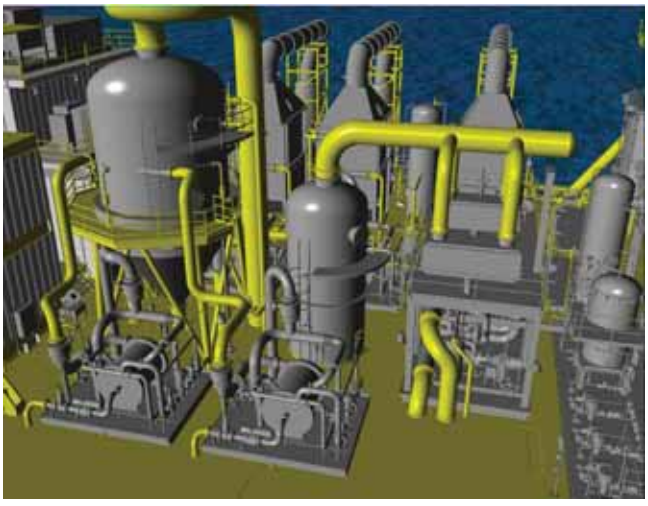
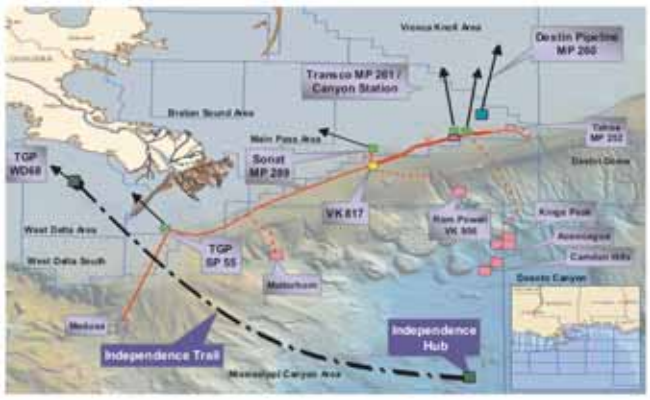


FIGURE 6

Independence Trail Pipeline Route



"The producers with wells in the southern part of the development area naturally wanted the hub closer to them, while those in the north wanted it closer to their fields," he offers. "Everyone had to compromise to some extent, and as a group, we had to reach consensus about what location made the most sense for everyone. Ultimately, the location was selected on the basis of favorable seafloor conditions and proximity to the anchor fields."

Hub-And-Spoke

The hub-and-spoke concept allows offset prospects to become more economically attractive while creating increased opportunities for developing new discoveries in the hub vicinity, according to McEvilly. "The Independence project extends infrastructure both to the east and south, providing a development infrastructure to tie into as operators push deeper into the Eastern Gulf," he remarks. "Once infrastructure is in place, you can expand the development radius by tying back satellite developments that might otherwise remain stranded."

That is certainly part of the long-term plan for Independence Hub. "The whole idea is to tie in additional discoveries to backfill capacity on the facility as production from the nine anchor fields declines over time," he holds. "There is a lot of potential in this area, so hopefully, a number of new fields will be discovered that can eventually be connected to the hub by subsea tiebacks as capacity becomes available."

In fact, McEvilly says both Anadarko and Spinnaker are already preparing to drill separate exploration prospects in the Atwater Valley area, which if successful, could be tied to the hub at some point. "We certainly have a large number of leases that we plan to drill, beginning this summer with the Daredevil prospect at Lloyd Ridge 94/95," he reports. "All the operators understand that it is in everyone's interest to collectively work to find new fields to keep the hub operating at full capacity."

Enterprise is financing the construction and installation of the hub and export pipeline. "There are no immediate out-of-pocket costs to the producers related to these two components. Instead, producers will pay an allocated demand charge, and operating and maintenance charges will be allocated on a volume throughput basis," McEvilly explains. "The Atwater Valley Producers Group has guaranteed 100 percent of the 850 MMcf/d capacity for the first five years, and 50 percent of capacity for the following five years."

This is not the first time Anadarko has used the third party-owned hub-and-spoke model to develop its deepwater prospects, he points out. Marco Polo produces to a mini tension leg platform stationed in 4,300 feet of water at Green Canyon 608 that acts as a hub to the Marco Polo, K2, K2 North and Genghis Kahn fields. As with Independence Hub, the Marco Polo mini TLP is owned jointly by Enterprise and Cal Dive International, but is operated by Anadarko.

"Using subsea tiebacks in combination with a hub makes sense because it allows you to develop multiple outlying fields in a large area. It is not always the right answer, but we will consider it each time out," he assures. "And having a third party support infrastructure development certainly makes it more feasible for independents to venture into ultradeep water, where costs and risks are higher. As a producer, Anadarko can use its capital most effectively by directing expenditures to finding new reserves through the drill bit, versus spending hundreds of millions on platforms and pipelines."

Collaborative Development

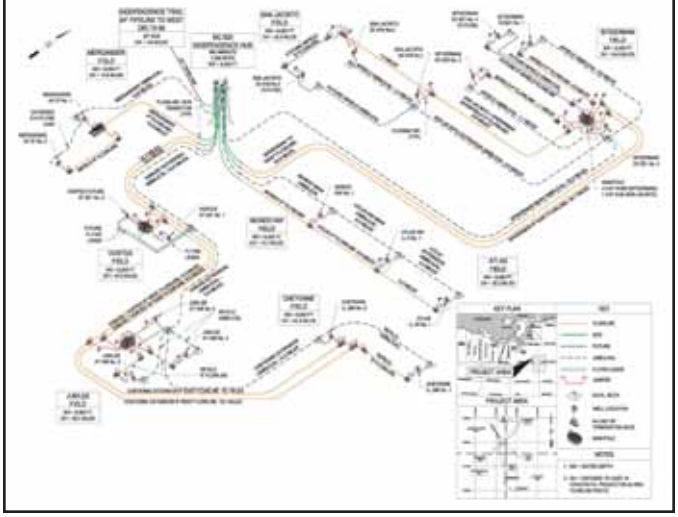
Combine third party-owned hubs with multicompany collaborative field development and the benefits of each approach are multiplied across the board. For that reason, McEvilly suggests, the Independence project may serve as a blueprint for independents to follow in the ultradeep Gulf.

"This commercial model is particularly attractive for independents in ultradeepwater frontier fields, but it provides a win-win situation for all parties," he insists. "Operators benefit by having infrastructure extended to monetize their existing discoveries and develop future discoveries. The facility and pipeline owner benefits by having enough production dedicated to justify installing infrastructure in a prospective new business area, as well as the ability to service future discoveries made in that region. As long as the reserves are there, everyone wins together."

Collaboration among operators also has other less obvious benefits, especially for independents with limited deepwater experience. "With a multicompany project management team, you can pull individual experts in all the disciplines from the various organizations so that no one company has to provide

FIGURE 7

Independence Hub Subsea Layout



100 percent of the expertise. This can be very helpful given practical resource limitations and the scope of ultradeepwater engineering," McEvilly explains. "It also allows multiple companies to come together and work toward a shared objective: developing a world-class project in collaboration, versus each organization having to build expertise on the grassroots level."

Figure 7 shows the subsea equipment layout as designed by INTEC Engineering, which performed the concept engineering and the front-end engineering design to develop the basic subsea equipment arrangement of the hub-and-spoke architecture to connect the wells from all nine fields to the Independence Hub. "The complexity of the subsea design in these water depths, and the number of wells and fields can be daunting if not carefully managed and coordinated among the various fields," he says.

So on Independence Hub, the integrated project management team supervises and coordinates every aspect of field development–all the way to the individual well clusters. McEvilly points to the subsea trees and control systems as an example. Most of the fields will use enhanced horizontal trees supplied by FMC Energy Systems (Figure 8). They will connect to an intricate web of flowlines and 112 miles of Kvaerner Oilfield Products' carbon fiber rod enhanced steel tube umbilicals–the largest individual umbilical contract ever awarded. A total of 12 subsea production control modules will be mounted on the trees, and two more will be installed on the subsea manifolds. Another integrated control system will be dedicated to well intervention and workover.

"We are using as much common subsea hardware as possible, and a discipline lead–one individual–on the project management team is responsible for everything related to each component of the subsea systems–trees, control systems, manifolds, valves, connectors, etc.," McEvilly relates. "A big issue is eliminating or minimizing potential interface issues. We rely on contractors/suppliers to assist in making certain there are no interface problems with their equipment, but the discipline lead is ultimately responsible for interfacing all the integral components."

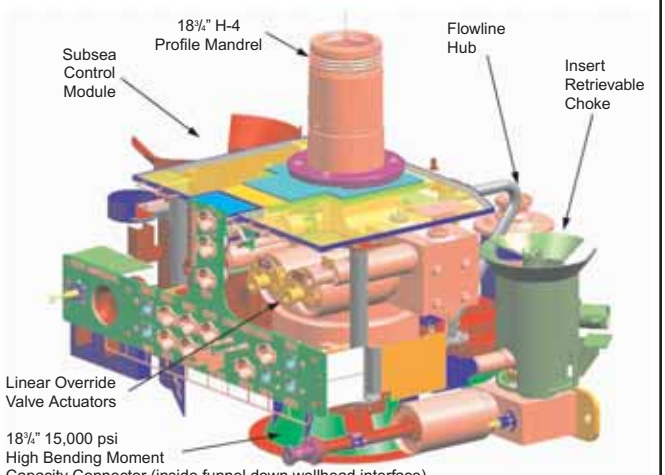
The size and complexity of the Independence project mean a whole range of operational and technical issues must be worked through for each well and each field, but with a fast-track project, the clock is always ticking. "We expect things will come up; they always do. We have to remain adaptable as a group to respond to unforeseen events, and then integrate everything as best we can into the design basis," McEvilly says. "At the end of the day, all fast-track projects have to progress that way in order to be successful."

Even though the execution phase has just begun, rest assured that Anadarko and its partners are learning from the experience. "We have applied what we learned at Marco Polo to Independence, and while it is too early to draw definite conclusions, we will most certainly apply knowledge captured on this project the next time out of the box," McEvilly comments.

And each lesson learned will help ensure future successes for the operators, surmises Atlantia's Snell. "I tip my hat to them. Working as a group, these independents identified the requirements and challenges, selected the most appropriate technologies going forward, and then moved quickly and decisively to hone in on a final overall development plan. I think that has a lot to do with their past deepwater experiences. What each company learned in previous projects helped the group as a whole quickly come up with a solution for the world's deepest floating platform. This project will give them an even broader experience base to draw on as they continue to execute their deepwater strategies."

FIGURE 8

Enhanced Horizontal Subsea Tree



That, of course, is exactly what these independents have in mind as they blaze new trails across the ultradeepwater frontier and deliver new gas supplies from the distant reaches of the Eastern Gulf.

"The Independence project reinforces the commitment we made as a company to deep water; our deepwater Gulf program is expected to be the single largest contributor to Anadarko's targeted 5-9 percent overall annual growth rate through 2009," McEvilly concludes. "It also adds to our momentum in deep water, and positions us to take the next step in our progression as our strategy builds toward bigger projects in deeper and deeper water." ❐