

REST ASSURED

FLOW ASSURANCE TEAM KEEPS PRODUCTS MOVING

Bringing oil to the surface offshore doesn't always go smoothly. A number of factors can cause the flow of product to be slowed, disrupted or even stopped. To keep such issues from costing time, money and effort, McDermott Subsea Engineering includes a team of flow assurance specialists.

"The main threats are hydrate formation and wax deposition," said Dr. Amir Alwazzan, Senior Flow Assurance Specialist. "Hydrates are a mixture of water and gas molecules that crystallize to form a solid 'ice plug' under certain temperature and pressure conditions. Wax crystals start to precipitate out of the product once the fluid temperature reaches a certain point."

Flow assurance is the technology that identifies such risks in systems and their design, as well as strategies to prevent them.

"These challenges can exist in virtually any field development, but it's in deep and ultra deepwater scenarios that special focus is required," Alwazzan added. "Environmental conditions tend to be harsh the deeper you go, and the subsea topography can be uncooperative."

While deepwater assets often require a floating facility, some reservoirs are not large enough to justify the expense. Instead of ignoring such fields, however, they can be tied back to existing platforms serving other fields. Flowing from remote reservoirs through numerous components – wellheads, manifolds and risers – before reaching the delivery point, these tiebacks are a prime candidate for flow assurance.

Picking daisies

On a recent tieback project in 6,200 feet of water in the Gulf of Mexico, McDermott conducted flow assurance analysis to help with concept selection. The investigation included the possibility of solid depositions, line configuration and sizing, insulation requirements and high-level operability guidelines.

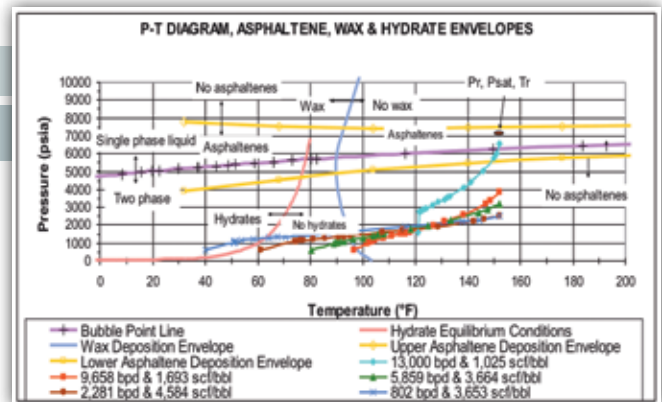
Results revealed that a daisy-chain configuration with short subsea tie-back would perform better than the client's current concept. This flow assurance was also helpful in suggesting that a more thorough study be carried out when more reliable data was available.

"The results provided by flow assurance have noticeably helped the client project team reduce the number of choices and come up with a clear road map toward the next step," said Alwazzan.

All clear

Flow assurance studies also influenced detailed design of a Middle East subsea water injection system with a long tieback. Steady state analyses covered line sizing and pumping capacity calculations. Transient analyses, including different scenarios for surge analysis, were conducted in order to determine the system's boundaries and ensure proper selection of system components. Ultimately, analyses revealed that line sizes and grades in use by the client were appropriate.

"In this case, flow assurance saved the client time and money," added Alwazzan, "by ensuring a robust design in advance and allowing time for procurement of long-lead items."



Revealing analyses

Another example is a large-diameter, long tieback project in the Middle East that was experiencing flow assurance challenges. For the detailed design, McDermott conducted both steady state and transient analyses, and line sizing and pumping capacity calculations.

The analyses revealed one pipeline was not large enough to avoid erosion issues. Modifying the onshore system to respond safely and economically to the production operation resolved the issue. The client was also advised when an emulsion formation issue arose.

"Success in offshore developments is directly related to engineers' ability to come up with an optimum design that is capable of preventing, mitigating and remediating flow problems, without compromising safety and economics," Alwazzan said. "The bottom line is that we conservatively design according to real conditions, prepare for the worst and hope for the best."