

## DWOPs, CWOPs, WOWOPs, and AWOPs for Fun and Profit!

Mark S. Ramsey, P.E., Texas Drilling Associates

Copyright 2019, AADE

This paper was prepared for presentation at the 2019 AADE National Technical Conference and Exhibition held at the Hilton Denver City Center, Denver, Colorado, April 9-10, 2019. This conference is sponsored by the American Association of Drilling Engineers. The information presented in this paper does not reflect any position, claim or endorsement made or implied by the American Association of Drilling Engineers, their officers or members. Questions concerning the content of this paper should be directed to the individual(s) listed as author(s) of this work.

### Abstract

In deepwater drilling and completion planning, even a few hours of operational time saved may result in hundreds of thousands of dollars of project cost savings. A tried and true method of ensuring better project execution is through the use of “Drill Well on Paper” (DWOP) and “Complete Well on Paper” (CWOP) and related exercises<sup>A</sup> and meetings.<sup>1</sup>

These pre-operational meetings take a variety of forms, depending on several factors, including:

- Familiarity of operator personnel with drilling contractor and service company personnel
- Complexity of the drilling or completion (or workover or abandonment) operation
- Specific well risks that are known and are to be mitigated and avoided, typically stuck pipe, lost circulation, narrow pressure windows, well control risks, difficult casing seat location determinations, and slow drilling issues.
- Number of broad topic areas of the meeting—for example will the meeting be pure operational information, or will it include other aspects such as HSE, regulatory, etc.
- Whether the meeting will have breakout sessions, and how much time will be allotted to these breakout sessions
- Whether team-building will be included
- Whether project specific training will be included
- Location logistic considerations
- Number and types of attendees

Hybrid meetings are also now common, combining elements of technical training, safety awareness, logistics, operational planning and trouble avoidance, along with team building.

This paper covers a quarter century of these meetings, the ins-and-outs of what make these meetings successful!

### Introduction

The use of meetings before a well commences is a long-proven practice dating back to the beginning of upstream operations. Prior to offshore operations the number of people involved in and the complexity of various technical disciplines was relatively limited. Simple pre-spud meetings were commonly held just before the wells started (or spudded) or sometimes just after the surface pipe was in the ground, which was and is sometimes a separate operation conducted by a less capable and less expensive rig.

Pre-spud meetings would serve to explain the upcoming well to the rig-site and office personnel involved, and alert them to any particular well hazards or difficulties anticipated. They were usually short—perhaps only a couple of hours long—and since most of the people involved already knew each other from prior work, there was nothing in the way of introductions or team-building.

Similarly, there was little emphasis on non-drilling items that while important, were not part of the drilling itself.

With the advent of offshore drilling came increased complexity and many new technologies. With this increased complexity came increased specialization, similar to how the medical profession specialists have expanded as medical options have increased in recent decades. Several decades ago, a land rig site crew might consist of ten or fewer individuals.

Today’s deepwater operations, in stark contrast, usually have well over one hundred individuals on site at the same time, with that number often pushing two hundred. What we used to call simply a pre-spud meeting had to change accordingly.

Importantly, what drove the smaller pre-spuds is the same thing that drives the DWOPs, CWOPs, WOWOPs, and AWOPs and others today—the need to reduce trouble related downtime. With deepwater operations, trouble costs can commonly exceed 10%-20% of the overall well costs, and 50% or more, particularly on exploration wells, is not unheard of.

<sup>A</sup> The operative portion of the nomenclature is “Well on Paper”. When DWOPs were started, the well was figuratively drilled on paper during the meeting as a way of going through the well operations plans coming up. Similar Completions meetings

(CWOPs), Work Over meetings (WOWOPs), Abandonment meetings (AWOPs) and others have now become commonplace. In this paper, the DWOP term will be used, but comments apply to whatever type of meeting is being held in most cases.

## The Main Goals

In order to achieve the main goals associated with having an efficient trouble-free operation, the task is usually broken into several categories for discussion. These include but are not limited to building the team, creating an open environment for candid discussions, conveying both overall well plans and specific critical details of the well to the personnel involved, obtaining good feedback and buy-in to the project, and where needed, modifying the plan based on the feedback. Time permitting, additional items are commonly addressed, such as a corporate overview, environmental considerations, safety culture and awareness, and a favorite of most rig crews, bonus incentives.

### ***Jump Start Building the Team***

The first step to helping to build the well site team is to have all of the relevant personnel actually at the meeting! This includes operator personnel (who may not need review of the well plans themselves as they have been planning the well for a good while already), the drilling contractor personnel, and the specialized service company personnel involved.

Different operators will have different criteria for who attends the meeting, but at a minimum it should include:

- All operator office personnel involved in the planned operations
- All operator rig-site personnel
- All drilling contractor rig-site personnel
- Drilling contractor rig management personnel
- Service company rig site personnel, especially rig-site supervisory personnel

Some operators will also opt to include:

- Health, Safety and Environment (HSE) personnel
- Maintenance personnel
- Other support service personnel such as the catering crew

As one can imagine, the meetings tend to be fairly large, with a typical one having 70-100 people in attendance. Note that to maximize efficiency and minimize costs associated with the “well on paper” meetings, they are typically scheduled just before a crew change, and will combine two crews in one meeting, and the other two crews will be in a second, very similar but not identical meeting.

With two meetings to accommodate all of the offshore personnel involved, the operator personnel will generally opt to attend both meetings. This gives the operator personnel, whether office-based or rig-site based, the opportunity to get to know the drilling contractor and service company personnel in a more relaxed setting than on the rig itself when the clock (and costs) are ticking away.

Depending on the length of the meeting, one or more formal

team-building events should be considered. For a compact, one-day meeting there is likely insufficient time given the rest of the items that need to be covered, but if the meeting will span two or more days, then generally speaking, a formal team-building event can be worked into the schedule. (More later on what these might consist of.)

### **Review the Corporate Mission and Issues**

Oftentimes, especially if the meeting will last more than a single day, items other than the operations plan will be covered, since a large number of people working the project are already going to be there.

For smaller and larger operators alike, it is common to have a senior management person welcome the attendees and give a bit of a vision for the project, reflecting the culture and mission of the operator. Exploration focused companies may use this time to highlight their exploration successes.

For the longer-than-one-day meetings, safety is usually covered in some form or fashion, commonly from both the operator and the drilling contractor perspectives. This not only serves to put the proper focus on safety awareness but provides an opportunity to have frank and candid discussions of accident statistics and solicit ideas for what can be done better. Sharing best practices is also encouraged, particularly since both service companies and drilling contractors alike usually work for multiple operators.

Similarly, environmental issues, goals and objectives are discussed and planned for.

An important part of the “management” portion of the day is to manage expectations. This guidance from the top on what constitutes “success”, both from the meeting standpoint and that of the overall project, is an important element to achieving that success endpoint.

Of course, good clear communications must be emphasized from the start and continued throughout the meeting (and the project). This is particularly important in a situation like DWOPs, since

- Many offshore personnel are by their nature, introverted, and
- Many of the best technical solutions come from introverted individuals, but
- Those individuals will not normally push their better solution beyond a simple mention of it, if at all, and
- It is easier to not be very vocal in a large meeting where there are lots of extroverted individuals present.

Hence, any exercises should be carefully structured, planned, and executed to solicit all of the input on the break-out teams, not just the more vocal input.

### **Well Plans**

The meat-and-potatoes of the meeting are to present the plans, alert the operating personnel to potential difficulties or

looming issues, and solicit candid ideas for improving the operations and hence enhancing returns for the well.

This typically is accomplished with a thorough overview of the well first. This overview might include a seismic and/or geologic overview, time permitting. This is often helpful since many of the drilling contractor and service company personnel will have drilled similar formations for other operators and will have ideas on what to look for and even what might be a better way to address formation specific issues.

The drilling portion of the overview will highlight the casing plan, the mud program, and start raising awareness on potential trouble issues such as tight pore pressure by fracture pressure windows, gumbo zones, rubble zones, and squeezing salt zones. If the plans include optional items, such as a contingency liner, that would at least be mentioned as well. Relevant offset wells, time-lines for the work, (i.e. a days-depth curve) and possibly the budget for the work, might be presented and explained as well, especially if potential bonuses may be involved on the well.

The overview might wrap up with some logistics issues (where to go to catch the helicopter, or details on vendor delivery procedures, for example).

After overviews are complete and participants are back from a break or lunch (the overview portion is commonly an hour or more by itself), then the various sections of the well might be presented in a more detailed fashion. Open water work traditionally would be presented, followed by setting the conductor, surface pipe, stack-running, and intermediate hole sections and the production hole.

As each hole section is presented, usually by one or more of the drilling engineers involved in the planning, other service company presentations would also be appropriate. The drilling contractor might present on how the stack will be stump tested, handled and run to the mud line, latched and tested. Mud engineers might highlight the synthetic mud to be used and how to work around it best, once the hole section is reached where it will be put in the well. Usually one or more cementing presentations are included, especially for the deeper hole sections.

If any new technologies are going to be used, their respective vendors will normally give a short presentation on those items. It might be a new running tool, a new casing scraper, a new bit, or perhaps a new logging tool for the BHA LWD package.

Where pore and fracture pressures are critical, the service companies tracking and predicting those may explain a little of what they do.

And so on.

Importantly, having a variety of presenters is a good thing. It serves two important purposes for the well operation. First, having different presenters tends to make the meeting more interesting than just one or two. Second, especially important for service companies, the very fact that the presentation must be made tends to ensure a higher level of attention is given to well operation details and equipment and plans!

Most presenters, especially those who are relatively new to presenting to large groups, will tend to rely on PowerPoint or similar. However, it is perfectly acceptable in these situations to have experienced personnel speak from physical models, to sketch something by hand (on flip chart or in a projection system where all can easily see), to play an informative video through the projection system, or to simply lead a discussion on a topic of concern. Variety is a good thing.<sup>2</sup>

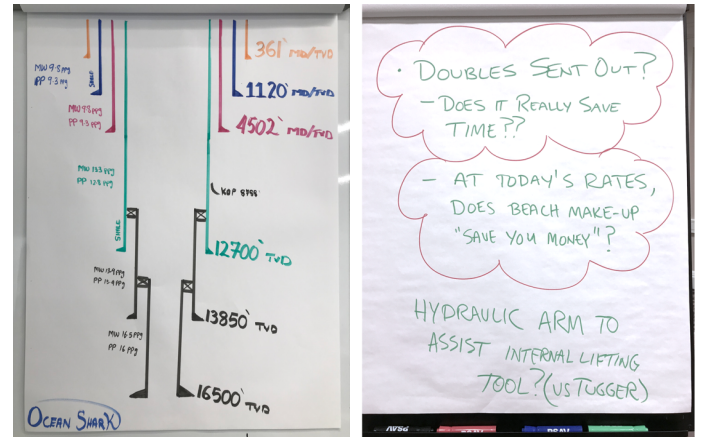


Figure 1 - Flip chart notes and sketches can be effectively utilized

The topic of Management of Change (MOC) has become a common discussion item, time permitting. This extends not merely to the overall well plan, but to relatively small details that vendors and the drilling contractor may be involved in as well.

### Capturing Relevant Input

Once the plans have been overviewed and described in detail, and technical vendor presentations are done, some sort of breakout session is commonly used to obtain buy-in and feedback from the participants. This is normally accomplished in smaller groups ranging in size from three or four to twenty or so, broken out from the full participant list.

There are many different ways to split the groups up. None are perfect and all have merit. However, several common denominators for successful breakout sessions include:

- Having relevant expertise on each breakout team. (It does little good to have a team examine a particular aspect of the well they know little about and have no experience with.)
- Having operator personnel fully participate in the breakouts. They should generally not lead the discussion but participate just like anyone else on the breakout team. They can also clarify anything that the breakout team may not quite understand relating to the plan. (Needing to clarify is an indication that the well plans themselves need to communicate the plan better.)
- Having a variety of skill sets and experience and companies represented on the breakout teams. Since

most operations involve more than a single company, it makes little sense and experience teaches that a breakout team dominated by one or maybe two companies will generally not be as helpful.

- Clear instructions for the breakout teams to follow. The breakout should not be an unstructured discussion of a well section or particular operation but guide the breakout team through a specific set of operations to comment on in a relatively specific way.
- The important discussion items must be captured in some fashion for follow-up after the meeting dismisses.

### **Mind the Gaps**

An important function of a DWOP or similar is to help identify any gaps that might prevent the plan from being successfully and efficiently executed at a low cost to the operator.

The first broad category of potential gaps is that of equipment and supplies. Main rental tools and backup or standby options are examined. Bulk supplies are planned, taking into account variable deck load constraints. Contingencies in case of bad weather or other problems are also examined and at least minimally planned for.

Rig interfaces and deck layout plans are also typically examined and discussed. These might include such things as:

- Does the rig have the correct connections to interface with a frac boat piping?
- Are electrical requirements for a planned hydraulic power unit (HPU) available or is a separate generator power skid required.
- Air supplies
- Drill string equipment cross-overs
- Inspection requirements
- Lifting kit components
- Other rig specific requirements

### **Personnel and Training**

Two major issues related to personnel often surface during DWOPs. One is simply, is there sufficient manpower planned to be on board at the right time to accomplish the work. The second is whether all of those individuals have the correct training, if not experience.

Indeed, an early embodiment of what today are called DWOPs involved not just the pre-spud aspects of a planning meeting, but often include well-specific training on potential trouble spots in the well. The most well-known and successful of these types of trainings—available industry wide for a quarter century—is the BP-Amoco Training to Reduce Unscheduled

Events, or “TRUE” training.<sup>3</sup> Though this course, originally a four or five day standalone trouble prevention course is not as commonly taught in its entirety as when it was developed, parts of it are still utilized to train the crews on well specific issues such as stuck pipe or lost returns.<sup>4</sup>

### **Obtain Meaningful Feedback – Breakouts and Evaluations**

In an important part of a DWOP meeting is to obtain meaningful feedback from the participants. The best way to obtain this feedback for the DWOP to include one or more exercises formally going over the well operations plan in a step by step fashion. These “break-outs” also take a variety of forms and depending on available time can be a single session or more commonly, two or more, complete with reporting back what smaller break-out teams found worthy of noting, modifying, or emphasizing in one way or another.

While breakouts are the preferred way of ensuring most important issues are examined and potentially improved upon, two other capturing and feedback mechanisms are worth noting. First, during presentations, side discussions should be encouraged, and key items in those discussions should be captured on the fly by the facilitators of the meeting. This might be as simple as use of flip charts or full audio and/or video recording of the meeting for future reference.

The second additional feedback mechanism is to have the participants themselves evaluate the effectiveness of the meeting format. Often the second in a pair of meetings can be tweaked to incorporate such feedback, and over time meetings can be planned and conducted such that nearly everyone agrees it was a productive use of their time to be there, either from their learning, them being able to meet the other team participants, them contributing in a meaningful way to the meeting outcome, or some combination of these.

### **Roll Out Incentive Bonus Plans**

Especially popular with rig site crews are bonus incentive programs. The operators that utilize them, especially during times when rig rates are considered high, find they are very helpful in keeping the crews focused on the work at hand. To minimize any chance that the incentives could be counterproductive to environmental or safety goals, the better structured incentives typically have a tiered structure, requiring goal achievement in three areas in order for the crews to obtain all or part of the bonus. The three common legs of the bonus “stool” include

- Environmental performance, such as having zero spills or incidents
- Safety performance, such as no lost time accidents
- Well project performance based on offset well times to do similar work

Incentives may be structured in a wide variety of ways, such as having the three criteria stand separately so that 1/3 or 2/3 might be achievable should one goal be lost. In long duration projects, the incentive might reset at project milestones, so that

an bonus earned over perhaps several months of exemplary achievement is not entirely lost due to a relative minor problem at the very end.

### **Personality Profiles**

In cases where a rig is being utilized by an operator for the first time, personality profile testing is sometimes utilized. Some companies do this routinely for their employees, but successful teams also will do these tests to jump start the communication aspect of the rig team.

### **Team Building Fun**

If the DWOP will last more than a single day, it is more common than not to include some form of formal team-building. The teambuilding should not simply provide an opportunity for the team members, who may not have ever met, to get to know each other a little in a non-threatening environment, but also be enjoyable. Competition often helps as well. Many team building activities have been used over the years, including:

- Simple but nicely done dinners
- Dinners with a dinner speaker, often combining a motivational or safety message
- Skeet shooting
- Go-Cart racing
- Whiskey/Bourbon/Wine tasting (hosted by a Scottish expert)
- Model car racing competitions
- Drone racing competitions
- Various team exercises literally building something—a structure to support a gallon of water, a Lego or other interlocking block rig, spaghetti constructions, etc.
- Singing competitions
- Mud racing
- “Casino nights”

While all of these can be fun, the key is to have something that encourages interaction among the teams, is competitive, and if possible, can be held at the facility where the DWOP meeting itself is being held. (Having something off site uses much more time and is generally much more expensive as well.) Additionally, if spouses can participate in the teambuilding, it is almost always appreciated by all. Most operators include an open bar as part of the team building, usually limiting free drinks through the use of coupons.

The team building is generally most effective the evening of the first day of multi-day meetings. Those that span three or more days may consider an additional event for the additional

evenings, even if a simpler group dinner setting at a nice nearby restaurant.



*Figure 2 - Preparations for Drone Competitions*



*Figure 3 - Rig Team Singing Fun!*

### **AFTER the Meeting**

The success of the meeting itself should not be the end of the DWOP. Several “after action” items should be part of the plan for the meeting itself.

#### **Revise the Plan**

Feedback from the DWOP/CWOP, whether captured on flip charts, from small team breakout sessions, or any other source should be compiled into one or more usable documents for the design team to review and evaluate for possible inclusion into or changes to the plan presented to the DWOP/CWOP participants. This doesn’t mean all feedback will be incorporated, but a good practice is to at least review all feedback, all within the confines of MOC.

#### **Good Execution on Well Site**

Ideally, once the time comes to execute the plan, it will be the best of the design team, along with improvements suggested

by the four rig crews from either of the two sessions of the DWOP/CWOP.

Often there is a related or parallel rig-site effort to ensure that lessons learned are implemented.

### Logistics and Facilitation

As these are major meetings with many people in attendance and considerable logistics involved, the operator often chooses to contract with an outside consultant or consultants to ensure a smooth and productive meeting occurs. The duties of a facilitation can also vary widely, from an advisory role to active participation leading the meetings or providing some of the session talks, as best suited to the operator.

### When Needed?

The first decision point is whether or not a DWOP style meeting is even needed. While every case is different, the most relevant driving factors include

- Expense of the operation (and similarly, the potential expense of trouble costs). For expensive deepwater operations the frequency of such meetings is much higher than lower cost land or shallow water operations, though the latter two are also held.
- Complexity of the well operation
- Regulatory issues
- Efficiencies—e.g. if an HSE component can be included, or perhaps a rig simulator exercise added, are there economies to be realized compared to separate efforts?
- Familiarity of the operator with the particular rig being utilized. If the operator has worked with the people repeatedly on similar operations, the need for the meeting is less than if picking up a rig for the first time.
- Logistics difficulties and complexities
- Training needed, such as Stuck Pipe Prevention refresher or a full or partial TRUE course.
- Degree of difference between this well operation and prior ones.

### Outside Facilitator-Make or Buy?

Operators may choose to set up, facilitate, and conduct the post-meeting follow-up either in-house or as mentioned, use an outside company who offers such services.

The decision is fundamentally a “make or buy” decision, often influenced by the experience levels of internal personnel with running such meetings, coupled with the time available. Adam Smith 101 “division of labor” considerations would generally point to use of an outside firm, particularly those with large amounts of relevant experience in the technology and running the meetings. In that way, the operator personnel

planning the well operation may focus on just that, rather than their time be diluted with meeting logistics, etc.

While a single facilitator is the norm, this author has participated in others where multiple outside facilitators were utilized, also with excellent results.

### Venue and Creature Comforts

Successful meetings must also include creature comforts expected by rig crews. These include proper scheduling of the meeting, a schedule conducive to participants paying close attention and getting involved, snacks, meals, hotel accommodations, audio-video equipment requirements, and so forth.

Many varieties of venues have been experimented with over the past quarter century some of these include

- Hotels near the helicopter jump off point or field location
- Luxury hotels in a nearby city
- Resort hotels
- Casino and Convention hotels
- Rig-Site
- Airport hotels
- Company offices
- Training centers, oftentimes run by the drilling contractor or service companies<sup>5</sup>

Of note, experience teaches that offshore in particular is difficult, as crews typically have only a limited amount of time to spend each day on a meeting.

Similarly, if the meeting location is too close to corporate offices, there can be some difficulty by corporate attendees to focus on the meeting at hand, as opposed to brush fires back at the (nearby) office.



Figure 4 - Multiple small breakout teams and multiple A/V screens

Airport, Convention, and Casino hotel locations are especially good all around, especially if the hotels provide ground transportation for those flying in, and by holding the meeting at that hotel, little or no separate ground transportation (or time associated with it) is required. It may be that the best location for the attendees, all things considered, is some location that is easier for the bulk of the attendees to get to either by driving or air. With overseas meetings in particular, attendees are arriving from many nations, and some DWOPs have even been

held on a different continent than the well was to be drilled in!

### **Shareholder Return?**

While the DWOPs, CWOPs and similar are major efforts and incur significant costs—most significantly the salary cost of the attendees which can be much higher than the facilitation or logistics costs, the benefits of such kick-off meetings are well known by operators that now routinely hold them.

In deepwater operations with their associated expensive spread rates, the decision is a relatively easy economic one. A few hours or a day of avoided trouble costs easily pays for the costs of the meeting, without even considering less tangible benefits.

In lower cost land or shallow water areas, the payback might be measured more in terms of a few days rather than hours, so the DWOPs tend to focus on upcoming multi-well campaigns, and often include some technical training in trouble prevention on items the particular field program may encounter over the several well program.

### **Conclusions**

DWOPs, CWOPs and similar, though not trivial to pull off, are a powerful tool to ensure a planned well operation is efficient, represents best available technology, and is executed with minimal downtime. Successful ones jumpstart team formation, transfer technical concepts to the team, improve

upon the initial plan from the operator, and help to minimize both the frequency and expense of any unscheduled events.

### **Acknowledgments**

The author would like to thank the thousands of individuals over the past quarter century who have enthusiastically participated in hundreds of DWOPs, CWOPs, WOWOPs, AWOPs, and other project meetings. Though many may have been skeptical at first—most offshore or land rig personnel didn't get into the oil patch in order to go to meetings—they have helped make our great industry what it is today. For more information if needed, this author may be contacted at [markramsey@texasdrillingassociates.com](mailto:markramsey@texasdrillingassociates.com).

### **Nomenclature**

Define symbols used in the text here unless they are explained in the body of the text. Use units where appropriate.

|              |   |  |
|--------------|---|--|
| <i>DWOP</i>  | = | <i>Drill Well On Paper</i>                   |
| <i>CWOP</i>  | = | <i>Complete Well On Paper</i>                |
| <i>WOWOP</i> | = | <i>WorkOver Well On Paper</i>                |
| <i>AWOP</i>  | = | <i>Abandon Well On Paper</i>                 |
| <i>BHA</i>   | = | <i>Bottomhole assembly</i>                   |
| <i>HSE</i>   | = | <i>Health, Safety, and Environmental</i>     |
| <i>TRUE</i>  | = | <i>Training to Reduce Unscheduled Events</i> |

### **References**

1. Mark S. Ramsey, P.E., SPE, Texas Drilling Associates, "Improved Drilling Technical Training and Communications for Effective Rig Utilization and Accelerated Promotional Schedules During the Big Crew Change and Associated Fleet Expansions," presented at the 2007 AADE National Technical Conference and Exhibition held in Houston, Texas, April 10-12, 2007.
2. Jogi, P, Macpherson, J., et.al., Visualization of BHA Dynamics Improves Understanding of Downhole Drilling Conditions, Speeds Up Learning Curve, IADC/SPE 99181, IADC/SPE Drilling Conference February 21-23, 2006.
3. Massie, Gary W., Ramsey, Mark S., et.al., "Amoco's Training Initiative Reduces Wellsite Drilling Problems", Petroleum Engineer International, March 1, 1995, pp. 48-55.
4. Hodgson, R., Hassard, P., "Reducing the Learning Curve Through the Use of an Advanced Drilling Simulator", IADE/SPE 98107, IADC/SPE Drilling Conference February 21-23, 2006.
5. Bradley, W.B., Cocking, D., et.al., "Task force reduces stuck-pipe costs", Oil and Gas Journal 89:21, May 13, 2001, pp. 84-89.