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Exploration Operations Logistics

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Abstract

This paper presents a process for systematically approaching a new operation with a focus on reaching project goals, and objectives. Starting up new operations presents some very challenging opportunities. First, we all underestimate the time, complexity, equipment, materials and personnel requirements. However, the greater challenge is the operation of all of these elements as an efficient cost-effective coordinated system that produces the intended result.

The opportunity to meet the challenge and produce a coordinated cost-effective system is primarily a result of the comprehensive planning. This opportunity is many times lost, as comprehensive planning may incur what seems to be "exorbitant" time and money. However, the "exorbitant" time and money spent up front is more than offset by the savings of even 1 day with the seismic or drilling operations daily rates reaching upwards of $300,000 in some situations.

The systematic approach presented here can be used as a template for obtaining the time and money required for comprehensive planning and the subsequent execution of an operation. Recently, this process was successfully utilized on a deep-water Africa project.

Introduction

Starting up drilling operations in a new or undeveloped area is challenging and time consuming. Quite often we underestimate the time and complexity. Comprehensive forward planning is a good start to an economical operation. By covering all the bases, having contingencies and options, the drilling program can be executed in the shortest possible time, the result being reduced rig drilling days. It is important that one always focus on the goals, the safe timely delivery of logged, tested and producible well bores. Sometimes it is necessary to spend what seems like an "exorbitant" amount of time and money up front, but that can be a bargain when compared to the alternative cost in rig day rate or time. Today an operation in deep water offshore can cost anywhere between USD 175,000 to in excess of USD 300,000 a day. See Figure 4 in reference to typical West Africa costs, which in fact are very similar for operation in the Gulf of Mexico. In short a day of rig time is worth a substantial amount of money. Also the more productive each well is, the fewer wells that will be required to be drilled to maximize commercial production. Relationships with different groups within the company, contractors and officials can make a very substantial impact on the bottom line in terms of time and cost.

Allocate Time for Planning

As drilling operations and life in general becomes more complex, so does the planning process. Thus it is imperative that sufficient time be allocated. Because of a heightened sense of awareness of what we do today and how it may affect us in the future, as a company and as a society, more time, effort and documentation must be applied to planning and conducting operations. Going into an area with fair infrastructure may take six months to a year of planning, in an undeveloped area more than a year may be required.

Planning begins as soon as our exploration staff identifies the potential for commercial hydrocarbons. Planning begins at the home office, be it Houston, London or Paris. One of the most important steps is to lay a solid foundation or outline that can built upon. The two obvious corner stones of that foundation are information about the prospect and the area.

Typically by the time a prospect has been identified, members of the Exploration staff have spent time on the ground, a license or partnership will have been established. Most companies have well stocked libraries or data banks with country studies etc. And there are service/sister companies that have experience or exposure in the area. These resources can provide a comprehensive first glance that can help to set the stage. Often it is helpful to call people on the ground, with service and related companies; to get very cost efficient information. Some of the topics that should be looked into are Concession / Joint Operating Agreement Conditions and Requirements, as shown in Figure 1.

Cost Estimating

Part of the planning process involves putting together a good cost estimate of the program that can be easily modified as information becomes available and conditions change. Because on the ground information at this point is limited, this estimate will have a large margin of error. However it is a start that can aid in making important decisions about the course forward. As information is collected, the accuracy of the cost estimate can be refined and the margin of error reduced. Along with this cost estimate and just as important is an initial "time line", a target date for spud date and testing. These first date maybe off the wall, but it will set a benchmark or reference. Again the time line will need to be revised as information is gathered and be presented as an estimate, until the facts are available and included. These two pieces of "paper" very critically guide management decisions. As you go along a checklist should be developed to ensure that items are not overlooked

Multi disciplinary Team

To ensure all facets are addressed in the planning process, a multi disciplinary team should be formed as soon as possible consisting of the following disciplines:

- Exploration (Geologists and geophysicists)
- Well Construction (Drilling, Completion and Testing specialists)
- Administration
- Legal (Contracts and Compliance)
- Tax and Accounting
- Communications

The general operations plan should be reviewed with this group to ensure that everyone shares the same vision or goal and that viable processes are put in place. Meetings with this group should be very structured and the time controlled, so that a focus is maintained. A smaller operational team will be formed to deal strictly with drilling/well construction issues and objectives.

- Drilling Manager
- Drilling Engineer
- Drilling Supervisor – Onsite
- Administrator
- Communications Specialist
- Materials Man

Depending on the type of well being drilled, there will be variations to this basic organization.

Logistics Trips

To complete the foundation it is necessary to make an on the ground visit or logistics trip, not only to confirm what has been learned, but to identify potential problems, service companies, start making actual arrangements, establish working relationships with contractors, service company personnel and local officials. This logistics trip can take place within two or three months of the start of the process, once available information has been gathered, reviewed, organized and filed.

It is important that this visit consist of a group of at least four operations / administration personnel and a communications specialist. This first visit typically should be scheduled for about a week. The reasoning behind having a group of at least four people is so that you can break into two groups and have at least two individuals attend each meeting. In a "new" setting, it is a good idea to have two individuals to ensure all information is captured, there is mutual understanding, clarification, and it brings another perspective to the conversation. Meetings and the travel time between them generally take longer than planned. Typically four meetings a day can be pretty aggressive. It is important for the group to schedule time in the early morning and late afternoon, to compare / review notes, identify issues that require further attention and plan future activities. Also the trip report and recommendations should be prepared on site, as it is much easier to verify items when one is "in town" as opposed to several thousand miles away.

Forming relationships is also a very important function of the logistics trip. Learning "Who's who" can provide valuable sources of information and prevent a lot of frustration. It is important to stress that contact with local officials and authorities should take place, if possible with the assistance of locally based staff if there are any or an intermediary such as a business group or service company representative. A preliminary guide for setting up and conducting the logistics trip is shown in Figure 2.

We hadn't mentioned the Communications Specialist, but it is very important that he or she get on the ground early. In many countries before any communications equipment can be set up or imported, a license or government permission has to be granted. Some of the licensing processes can be extremely time consuming. Your own communication specialist or consultant that is familiar with the spectrum of your communications needs (voice, data, radio, telephone, etc.) is the one best qualified to tailor a system that best suits your requirements.

Upon completion of the logistics trip, it is important to revise the projected time line and cost estimate, identify potential issues along with current and changed assumptions. A list of action items should be put together along with the need for follow up. This information needs to be shared with the multi-disciplinary team and upper management. Before any operation can proceed some important decisions have to be made in terms of timing of the commencement of the operation and spud. Some factors that need to be taken into account are shown in Figure 3.

Base Startup

In most parts of the world it is recommended to have accessory equipment and materials in place one to three months prior to commencement of operations. This allows sufficient time for late deliveries, customs and clearing formalities, and early rig arrival etc. The cost of running a typical supply base for a month, is less than two days all up rig time, even for a low cost land based operation.

The timing for personnel on the ground will depend on the distribution of work between the head office and local area office. With a good understanding of the infrastructure in the area, many services can be bid out, evaluated, and the contracts completed at the head office. However local and international accounting, legal and tax issues have to be taken into account. Other issues that go along with bidding and contractor / service company selection are partner, government and cost recovery concerns. Typically a minimum of three to six months would be sufficient. However if there are governmental or partner issues, you may want to budget additional time and have someone on the ground sooner.

Permits for drilling, operations (port, aviation, communications etc.), and environmental compliance are best worked in country. It is very important that sincere relationships and rapport be established with the officials administering these permits and monitoring operations.

The importance of an up and running office and supply base should not be underestimated. It is critical to the running of the operation from a technical, logistical, and political basis. People work effectively and efficiently in a comfortable and familiar setting. Communications is another key, we all have spent hours of unproductive time trying to get through on a telephone or radio to make a five-minute call.

We need an office, but just as importantly we need to have a staff that can effectively support the operation. Time spent selecting the staff can pay dividends in a very short period of time. A good source would be international business organizations and established companies. It is very important to check the background and references. It is also very important that potential employees be interviewed by several individuals and tested in computer skills, translation, reading and verbal skills. For short-term operations', personnel can generally be contracted through firms such as Price Waterhouse, Arthur Anderson, Panalpina, etc.

Conclusions

A timely and well-planned drilling operation can save numerous operational headaches and time. However, the real savings are the reduced rig days per barrel of oil produced as a result of people applying themselves to the task at hand, which is supporting the drilling operation, and not putting out brush fires.

References

1. Stefanov, M.,"Setting-up International Drilling Operations "A Systematic Approach", presented at the Offshore West Africa Conference and Exhibition 2000, Abidjan, Cote d'Ivoire, March 21-23.

2. Stefanov, M. " A, B, C 's of Exploratory Drilling Operations", Unpublished Manuscript, Fall 1997.

Figure. 1- Topics to consider when starting up an operation

- Concession / Joint Operating Agreement Conditions and Requirements
  - Partnering Agreement and Requirements
  - Country Study
  - Geological/Geophysical Evaluation
    - Well Objectives
      - Logs
      - Testing – Will the well be tested, if logs are favorable?
      - Is the well to be “expendable” or a “keeper”
      - Are we willing to pay a premium for the lower portion of the well?
  - Culture
    - Accepted Practices
    - How to conduct business properly
    - Timing
  - Environment
    - Weather
    - Terrain
    - Protection and Safety
  - Infrastructure
    - Service Companies
    - Airports, Harbors, Roads, Railways etc.
    - “On the ground contacts”
  - State Department Reports
    - Security
    - Stability – Business and Political
    - Economics

Figure 2- Checklist for Setting Up and Conducting the Logistics Trip (6 months to 1 year prior to spud)

Participants	
• Drilling Manager	• Materials Man
• Drilling Engineer	• Communications Specialists
• Administrator	
Logistics	
• Transportation (Air, Ground, Marine)	• Accommodations
• Interpreter	• Airport Formalities (Meet and Assist)
Base of Operation	
• Base of Operation – Hotel Suite	• Hotel Rooms
Meeting with "In country" Company Personnel	
• Review Plans	• Review Management Concerns
• Review goals and objectives	• Review operational timeline
Meetings with	
• Operators in the area	• Customs
• Service Companies	• Port
• Government officials	• Airport
• Petroleum Agents	•
On Site Visits	
• Yards	• Quays
• Oilfield	• Airports
• Service	• Facilities
What to Bring	
• Maps	• Tape Recorder
• Camera	• Notebooks
• Computer	
Discussion Topics	
• Compliance with Local procedures/Regulation	• Petroleum monitoring Organizations/Compliance
• Customs/Taxes	• Availability of equipment, materials, and services
Infrastructure	
• Telephone	• Roads
• Radio	• Airports
• Housing Facilities	• Medical Facilities
• Fixed wing and rotary services	• Hospitals/Doctors
• Harbors	• Machines Shops
• Fuel	• Water
Typical Practices	
• Casing	• Cementing
• Mud	• Drilling
Materials	
• Availability, Cost, and Lead Time	• Mud
• Compatibility with established area operators	• Cements
• Casing	• Drilling Equipment
Potential Problems	
• Formation Integrity/Lost Circulation	• Import/Export Guidelines
To be completed during the Trip	
• Daily Log	• Revised Cost Estimate
• Hypothetical Drilling, Testing and Completion Program	• Revised Time Line
Information to be collected	

Figure. 3- Factors Affecting the Commencement of Operations and Spud (Three to Six months prior to spud)

Finalize Drilling Program	
Prepare and Bid out Materials and Services	
• Partners approvals	
• Accounting, Legal, Personnel and Tax Issues	
Contracts	
• Legal	• Cost Recovery Issues
• Tax	• Review with Partners
• Partner	
Obtain	
• Government Permits	• Environmental Permit
• Drilling Permit	• Testing Permit
• Abandonment Permit	• Work Permits, Visa
• Company Registration	• Drivers License (Local/International)
• Rig Clearance	
Timing of Arrival/Delivery	
• Equipment and Materials	• Drilling Rig
• Services	• Personnel
Of fice and Yard/Warehouse Set-Up	
• Location and Space Requirements	• Equipment compatibility(English and French keyboards)
• Security and round the clock access	• Telephone, Radio, and Computer links and licenses
• Office Equipment	
• Import versus Local Purchase	
o Time and cost	
o Duties and Transportation	
o Efficiency	
• Staffing	
o Operational Personnel	
o Administrative	
o Materials	
o Local	
• Secretarial	
• Materials	
• Administrative	
• Interpreters/Drivers	
• Support/Housekeeping	
• Utilities (Power, water and sanitation)	
• Emergency Services	
o Medical	
o Medical Evacuation	
o Oil spill response equipment and services	
o Security	
Notifications	
• Petroleum monitoring Organization	
• Coast Guard	
• Environment Agency	

Figure. 4- Typical West Africa Well Costs

Item	Daily Rate USD	Monthly Rate USD	Well USD	Comments
Rig(Floater-DP)	175-200 K			Dynamically Positioned
Rig(Moored)	125-175 K			Anchored Vessel
Workboat(8K HP)	8 –10 K			For use with DP Rig
Workboat(25K HP)	25 – 35 K			For running anchors
Workboat (15K HP)	12 – 18 K			For assisting in running anchors
Helicopter (S-76)		225 K		Based on 90 hours a month at USD 900 per hour plus 5,000 USD fixed rate per day.
ROV	5 K			Includes crew
Supply Base	5 – 6 K			Based on Angola and Nigeria
Weather Forecasting	100			Daily Weather Report
Personnel				
Drilling Manager	1600			Includes airfare
Drilling Foreman	1400			Includes airfare
Drilling Engineer	1400			Includes airfare
Administrator	1200			Includes airfare
Geologist	1600			Includes airfare
Materials Supervisor	1200			Includes airfare
Materials Asst.	400			
Administrative Asst	400			
Secretary	200			

Figure. 4- Typical West Africa Well Costs (Cont'd)

Item	Daily	Monthly	Well	Comments
Services				
Anchoring Specialist			3000	On location for about 5 days
Cementer	850			
Cement Helper	250			
Cementing Unit	1750			Including L.A.S. unit
Cement Job 30"			35 K	30" cement job
Cement Job 20"			40 K	20" cement job
Cement Job 13-3/8"			125 K	13-3/8" cement job
Cement Job 9-5/8"			125 K	9-5/8" cement job
Cement Job 7"			75 k	7" Liner cement job
Cement Head	150			For use with top drive
Centrifuges	1200			Two centrifuges
Centrifuge Tech.	800			Full time on rig
Coring Equipment	1000			Equipment rental-standby
Coring Equipment	40 K			Useage charge for a 60' core
Core Hand	1200			Daily Charge for Core hand
Core Analysis	25 K			Per 60' core
Electric Logging Unit		40 K		Includes unit and triple combo rental
Electric Logging Crew		20 K		Includes 15 days service per month
Fishing Package	500			Fishing package on rig on spec.
Gumbo Chain	200			For use at bell nipple
Jars(Drilling)	400			Daily rental one in hole, one standby
Mud Engineer	800			Typically will have two on rig
MWD Tool Standby	1500			Standby per day
MWD Tool Operating	20 K			USD 20,000 per day operating
MWD Crew	1000			Two operators and pressure engineer
Rig Positioning			25 K	Rig positioning per well.
Storm packer		400		
Stabilizer Rental				
26"	250			Per stabilizer
17-1/2"	150			
12-1/4"	125			
8-1/2"	75			
Wellhead Service Tools	1000 per day			Wellhead running and test tools
Wellhead Technician	900 per day			Includes airfare

Figure. 4- Typical West Africa Well Costs (Cont'd)

Tangibles				
Bits – Tri Cone				
26"			28 K	Each
17-1/2"			25 K	Each
16"			22 K	Each
12-1/4"			12 – 28 K	Each
8-1/2"			8 – 22 K	Each
6"			6 – 12 K	Each
Casing				
36" 552 ppf			32 K	Per joint
36" 374 ppf			26 K	Per joint
30"				
20" 166 ppf			6 K	Per joint
13-3/8" 72 ppf			2.6 K	Per joint
9-5/8" 53.3 ppf			1.8 K	Per joint
7" 32 ppf			1.2 K	Per joint
5"			95 K	Per joint
Wellhead			390 K	Subsea wellhead
Liner Hangers				
9-5/8" by 13-3/8"			85 K	
7" by 9-5/8"			53 K	
Government and Civil Fees				
Drilling Permit			20 K	Angola
Rig Bond			100 K	Can be negotiated
Duty on Tangibles				Can range from 0 to 60 %
Port Entry/Exit Fee				Luanda can range 2 to 4 K
Consumables				
Fuel				250 Bbls per day DP rig
Fuel				150Bbls per day anchored rig
Fuel				20 Bbls per day per workboat 40 BBls per day sailing
Water(Fresh) per day				1.5 to 2 Bbls per man