

GATE KEEPER

GAT2004-GKP-2010.004
April, 2010
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Keys to a Successful Initial Startup

Deepwater oil and gas facilities are designed, constructed and commissioned by multiple teams with multiple objectives. Effectively managing those interfaces is important in every phase of the project and critically important at Initial Startup. The Initial Startup is the moment of truth where everything from subsurface to topsides becomes a single entity and has to work together. Design disconnects will become apparent. Also, the Initial Startup phase is transient in nature, which presents significant challenges. Careful planning will minimize many of the risks that may arise. This article provides a set of suggestions for planning the startup of a deepwater oil and gas facility in an effective and efficient manner to ensure a smooth transition from Final Commissioning to Initial Startup and Operations exists.

A successful Initial Startup will depend on many different factors and many different people specializing in many different disciplines. This paper discusses six issues of particular importance:

- Start Early: Planning for an Initial Startup should begin early in the project
- Use a Multi-Disciplined Startup Team
- Utilize a Systems Engineering Approach
- Build the Startup Plan in Stages
- Risk Management and Contingency Planning
- Training

Start Planning Early

The Initial Startup puts demands on the facility that design engineers are often not aware of. The earlier design problems and omissions are discovered, the easier it is to correct them. The Startup Team leader should be identified and begin evaluating the process in the FEED phase of the project or very early in the detailed design phase. Initial efforts need not be extensive; it is critical to get a few things right early including:

- High level flowline and pipeline final commissioning plans. Is the planned topsides and subsea kit adequate? What temporary kit might be needed?
- Well control at startup. Both subsea and topsides chokes are often too large to control wells at low initial startup rates. Develop a plan early for dealing with this.
- Flow Assurance Strategy. Are all of the flow assurance challenges addressed? The initial startup effort should work to mitigate flow assurance risks and develop contingencies.
- Flowback fluid treatment. Is flowback to the host or rig? How will the fluids be treated and disposed of? What kit is at risk from corrosion? What temporary kit will be needed?

Take a Systems Approach with a Multi-discipline Startup Team

With deeper waters, comes more challenges and hence more specialists. The challenges facing the Startup Team are many and diverse. A multi-disciplined team is needed to effectively identify and address all issues.



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Typically Required for Startup Team	Other Specialists Used on Occasion
Startup Leader	Metering Specialist
Topsides Process/Facilities Engineer	Rotating Equipment Engineer/Vendor Rep
Flow Assurance Engineer	Control Systems Engineer
Operations Specialist	Subsea Engineer
Production Engineer	Reservoir and Well Testing Engineer
Commissioning Engineer	Chemical Specialist

Build the Startup Plan and Procedures in Stages

There are usually many options for startup. The startup team grapples with many difficult decisions. Startup plans should grow gradually from these efforts. It is important to grow the plan in stages; generating too much detail too early results in rework and increases the chances of errors. An additional benefit to building in stages is that it facilitates reviews; it is very difficult to review a detailed procedure from scratch. We recommend development of procedures in three stages:

- High Level Startup procedures. These have steps such as “Start Well P1 through the South Flowline”. At this level an entire startup procedure fits on one or two pages and is easy to review.
- Major Step Level procedures. Each step in the high level procedure is further defined by major actions. These have steps such as “Align South Flowline to Test Separator”. The procedures at this level are still easy to review.
- Detailed procedures. Details are developed once the Major Step Level procedures have been agreed. Detailed procedures are difficult to review and should be reviewed by a small team via a structured approach.

Risk Management and Contingency Planning

Many things can go wrong during the Initial Startup and a main role of the Startup Team is to identify and plan for these risks. Identification of risks is facilitated by a staged procedure development process. Risks should be identified at each stage. At the High Level Procedure stage we simply ask “What could go wrong with this step?”. At the Major Step Level an effective HAZID is possible. Procedure HAZOPs can be done at either the Major Step Level or the Detailed Procedure level.

Managing the risks identified requires judgment. Some risks can be designed out; some are minor and/or highly unlikely to occur and so can be accepted; for some risks, we identify contingency plans designed to mitigate the consequences. The key is to identify as many risk scenarios as possible so that the right discussions can occur prior to the actual startup. A Startup Team should never be in the position of dealing with a problem in the field that they did not imagine in a meeting room.

Training

Even the best laid plans and procedures can go wrong during implementation. Human error is likely if the operators do not understand the startup plan and the reasons behind it. Operations should be represented on the Startup Team to ensure their buy-in. The final approved plan should be presented to operations via a training workshop. Ideally this workshop will be conducted within a few days/weeks of the startup to minimize chances of details being forgotten once the startup begins. A couple of days of presentations and discussions of the plan and the procedures should be sufficient for experienced operators. Also, having the operators attend the procedure HAZID or Initial Startup Procedure Reviews provide an excellent training opportunity.

Upstream engineering for offshore oil and gas specializing in:

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- Materials & Corrosion
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- Waterflood
- Commissioning & Startup



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