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Abstract

Objectives/Scope

To drive Normally Unattended Facilities (NUF) as the new operating philosophy in PETRONAS, an initiative has been formed to evaluate the development of standardized design for normally unattended light weight wellhead structures (LWS) with extended planned visit. This is focused on marginal field development with planned crew intervention of once in every 3 months (NUF3M). Ultimately, the NUF end state will be to achieve one-year autonomous operation without crew intervention and expand NUF application to more complicated facilities. The scope, concepts and findings from the evaluation conducted on NUF3M will be further elaborated in this paper.

Methods, Procedures, Process

Using the standardized normally unattended LWS design with monthly crew intervention (NUF 1M) as the basis, the operating & maintenance (O&M) and functional design requirements for extending crew intervention to 3 months (NUF 3M) have been identified based on established standards and PETRONAS' internal guidelines. The anticipated challenges such as remote operations, automation or elimination-by-design of routine maintenance, and technology robustness will need to be addressed to allow the implementation of NUF3M concepts on greenfield developments.

Additionally, implementation of NUF3M in existing fields (brownfield) can provide immediate opportunities to prove the design and O&M changes required for NUF3M. Evaluation was also conducted on identified brownfield assets, with challenges identified especially on well intervention requirements.

Results, Observations and Conclusion

The NUF1M design for standardized LWS has been updated to accommodate 3 monthly visit (NUF3M) requirements and continuous efforts must be made to reduce, substitute, or eliminate the function to ensure lean design concept. This is achievable with the use of high efficiency chemical, non-metallic or hybrid pipelines and selection of high reliability equipment with strategy to allow ease and quick turnaround during repairs. For deviations from inspection and maintenance procedures required to achieve NUF3M, ALARP is to be demonstrated as part of change management. This is proof that some requirements need to be revised to enable NUF application.

With the standardized normally unattended LWS as the basis of NUF3M, it is expected that standardization in fabrication, equipment selection and spares can help expedite the expansion of NUF implementation and provide economies of scale.

Utilization of technology, especially on remote monitoring and control, will further support the case for NUF3M, to allow for longer planned visit durations. Drone technology and CCTV can further support the NUF design and O&M in terms of security surveillance and inspection.

Novel / Additive Information

This study has identified the required changes based on the existing NUF 1M LWS design to increase the planned visit to 3 monthly frequency. The potential value creation contributed by this are;

- HSE – Risk reduction due to elimination of personnel during normal operations
- LCC – CAPEX reduction and between 30-40% OPEX reduction from NUF1M of same design
- Reliability equal or better than attended facilities
- GHG footprint up to about 60-70% improvement due to transportation and logistics optimization, equipment selection and design reliability