

Appendix 1 (“Study Specifications”) - Trend Survey on Sand Management

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Survey and Technology Department
Oil & Gas Upstream Technology Unit
Japan Oil, Gas and Metals National Corporation (JOGMEC)

1. Title of Study

Trend Survey on Sand Management

2. Objective of Study

JOGMEC-TRC identified sand control technologies as one of the key and critical technologies in development of oil/gas fields, especially for offshore field development in deep sea due to its difficulties of access to wells. In general, development wells in offshore fields are drilled with long horizontal section to maximize oil/gas production with minimum number of a development well. Therefore sand problems make more serious impact on production and operation costs.

JOGMEC-TRC would like to conduct the study entitled as “Trend Survey on Sand Management” to investigate current status of technological development for sand control including sand problems identified in actual operating fields by oil companies and its countermeasures applied to such fields.

One of JOGMEC-TRC’s charters is to provide technical assistance and services to the Japanese E&P industry. The primary objective of this study is to provide information on sand management technologies to Japanese oil companies.

3. Scope of Study

Primary tasks are defined as:

(1) Literature research/ Collection of background information for Sand Management

Contractors shall survey the recent (2000-2009) literature (SPE, OTC, OGJ (Oil Gas Journal) E&P etc.) for examples, and summarize technologies including the following items.

- Mechanism and basic theory of sand production
- Current situation and problems related to simulation models for predicting rock failure and sand production rate with their advantage/disadvantage
- Sand control by production control. Reduction of production volume needed for sand control will also be investigated in this survey.
- Well completion tools and technologies to prevent sand production, including those indirectly contributes to sand problems, such as water management by Inflow Control Devices
- Sand management on surface processing facilities, including issues related to monitoring technologies of a pipeline and its maintenance, separation of sand, treatment of sand separated (disposal of sand) and so on
- Flowchart for selection of the proper operation when the sand problem happens, including Production Control, re-completion of well, remedial work and Surface Processing Facilities. Differences in selection criteria of completion tools by service companies will be investigated

and compared

- Operation costs for sand control
- Results of the operation, success or failure

(2) Interview with oil companies and service companies

- Contractors shall interview with oil companies and other service companies for obtaining current status of technology development for sand control including sand problems encountered during their field operation and its countermeasures to overcome such problems, and future outlook in sand control technologies. Contractors will also investigate company policy for selection of the proper operation in managing sand production
- Contractors shall collect the addresses and contact person of oil companies, service companies and consultants highly qualified by oil companies

(3) Case Study

Contractors shall carry out at least 4 (four) case studies of “Sand Problems and Solutions” applied to actual fields. Studies will cover the items below;

- Deep sea
- Horizontal well
- Heavy oil
- Multi-reservoir
- Troubles encountered during sand control operation and countermeasures for such troubles
- Operation costs and results of the operation

(4) Outlook on the future of Sand Control/Management

- Contractors shall survey the future trend of technological development for sand control/management.
- In the case of critical issues identified through this study, they will be investigated and reported on.

4. Duration of Study

It is expected to take about four months from the execution date of the contract.

5. Deliverables

(1) Reports

Reports shall include and satisfy all of the following items:

- ① Bi-weekly progress report: Progress will be reported every two weeks to JOGMEC person in charge.
- ② Interim reports (50% review): Interim reports (50% Review) shall be submitted two months after the start of the contract.
- ③ Draft of final reports: A draft of final reports shall be submitted one month before the end of the contract. The draft of final reports will be finalized after JOGMEC review.
- ④ Final reports: The final reports shall be submitted no later than the end of the contract with:
 - Three bound hardcopies
 - Electronic files: Twenty copies of a CD including the final reports and the information contained in the final reports

* The electronic files shall be in MS Word or other editable/copyable format. The final reports shall be disclosed to Japanese oil companies.

(2) Presentation and Seminar

The contractor shall make a presentation for the results of this study by the middle of February 2009. The contractor shall conduct a few days seminar in more detail after the presentation.

* All materials used in the presentation and seminar are to be distributed to participants.

6. Workplace

The workplace shall either be at the Contractor's workplace or a place designated by JOGMEC-TRC.

7. Budget

Maximum lump-sum budget for this study is JPY 25,000,000 (Twenty Five Million Japanese Yen only, approximately equivalent to Two Hundred Fifty Thousand US Dollars). The cost performance is one of evaluation items.

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