

Specification for “Consultation of Technical Evaluation for Shale Gas Development”

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

1. Consultation and technical survey objective

The objective of this consultation is to investigate the original gas in place evaluation, drilling & completion-related technology, production facility-related technology, and recoverable reserves evaluation as below. JOGMEC will request additional proposal on shale gas development term based on applicant’s experience and ability.

This consultation include one’s own investigation, literature research, interviews with company which operate shale gas development, and proposal about technical evaluation method for shale gas development.

Target area: North America. (United States and Canada)

1-1. Research of shale gas development

A. Outline of shale gas development

- ✓ Oil play system (geological play –source rock, reservoir rock and cap rock)
- ✓ Mechanism of shale gas production (e.g, free gas, adsorbed gas, and desorbed gas)
- ✓ Shale gas component (gas specific gravity, composition and concentration of H₂S and CO₂)
- ✓ Decision making for target shale gas layer/reservoir.

B. Developmental technologies and analysis method of shale gas.

B-1. The original gas in place evaluation for shale gas.

- Electrical logging methods, tools and reliability for shale gas development.
- Relationship between porosity and permeability of shale gas layer/reservoir.
- Construction method for shale gas geological model.
- Calculation method of original gas in place for shale gas layer/reservoir.

B-2. Evaluation of recoverable reserves for shale gas layer/reservoir.

- Construction method for reservoir simulation model.(including simple model such as material balance method.)
- Evaluation method using Eclipse or other commercial software.
- Productivity estimation of shale gas well. (including summary of well test analysis in shale gas well)
- Uncertainty parameters.
- Evaluation method of recovery factor and recoverable reserves.
- Production prediction method in shale gas field.

B-3. Drilling technologies of shale gas well.

- Drilling technologies and completion method of shale gas development.
- Drilling cost of shale gas development.

B-4. Fracturing techniques and evaluation such as micro seismic.

- Outline of multi-step hydraulic fracturing.
- Tools and method of multi-step hydraulic fracturing. (e.g. engineering of fracturing, reliability and limitation of tools.)
- Cost of multi-step hydraulic fracturing.
- Outline of micro seismic technique.
- Example of multi-step hydraulic fracturing.

B-5. Production facility of shale gas development.

- Construction cost, operating cost and construction schedule of production facility.
- Differences of production facility between shale gas and conventional gas.
- Differences of gas sales agreement between shale gas and conventional gas/ LNG.

B-6. Other technologies of shale gas development.

C. Environmental measures of shale gas development.

C-1. Regulation production water treatment and control

C-2. Regulation of flare gas control

C-3. Other regulation such as fracturing and eco-activity of shale gas development.

D. Outlook of Shale gas development

- ✓ Outlook about feature of shale gas development for United States and Canada, reservoir, fluid behavior and period (exploration, development and production).
- ✓ Outlook of technique for stage of maturity and development. (e.g. advancement, problem, assignment, future prospects and recommendation.)

E. Interview research for operating company about the above. (including to plan a shale gas field trip with JOGMEC stuff.)

1-2. Consultation of shale gas

- ✓ JOGMEC requests consultation of specific shale gas project/research. Detail information will be informed separately.

2. Deliverables and Presentations

- ✓ Final Report
Hard copy: 3 copies
Digital files: 3 copies like CD-R media
* The digital files including final report should be able to be edited by JOGMEC and to be transferred to another storage device. This report shall be disclosed to Japanese Exploration and Production companies if needed.

3. Deadline of the delivery

- ✓ Deadline is until 31st July, 2010.
- ✓ Monthly progress report: Progress will be reported every one month
- ✓ Interim review (50% review) document: the consultant shall submit an interim review (50% review) document two month after the start of contract
- ✓ Draft of Final Report: The consultant shall submit a draft of final report 1month before the end of contract.
- ✓ Final Report: The consultant shall submit the final report no later than the end of contract.
- ✓ Consultant shall make and submit a report after “F. Consultation of shale gas”.

4. Budget

Budget for the work is about US\$210,000 (JPY20,000,000, at US\$1=JPY95)
(The cost performance is examination item.)

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