**EXHIBIT B**

**SCOPE OF WORK**

1. **GENERAL**

As part of Muara Labuh Development Drilling and following well completion, a series of well testing will be conducted. During well testing /production test chemistry sampling and TFT should conduct to get the information and characteristic from fluid reservoir and well production capacity.

* Geochemical analysis from water, NCG, condensate and stable isotope (brine & steam) to define various chemical characteristic on reservoir fluids. In order to support this analysis, chemical sampling of reservoir fluid on well apparatus are needed to support the program. Timing of fluids sampling will be conducted during well testing schedule.

Objectives of chemical analysis on fluid & gas:

* Understanding characteristic of reservoir from chemistry (salinity, pH, TDS, element cation & anion contain, etc.).
* Understanding the reservoir process (boiling, cooling, steam excess and etc)
* Understanding reservoir fluid temperature
* Understanding risk based on chemistry (acid, silica scaling, calcite scaling and etc)
* Identify gas characterization on reservoir. Gas analysis will help to identify boiling and condensation on reservoir fluids and also to identify magmatic influence on geothermal system.
* Isotope analysis will help in identifying the origin of water, linking between steam and water, and reservoir system (temperature and rock type).
* Tracer flow test (TFT) to define the well production flow, cross check well production parameters with James Lip Pressure Method and provide the parameters for chemistry Total Discharges calculation.
* Quick NCG identification using wet test meter during chemistry sampling.
* Arsenic (As) and Mercury (Hg) analysis from Non Condensable Gas (NCG) sample as an optional activity for each flowing well.

The current plan of work commencement is estimated on May 2017 with the duration of 24 months.

1. **DETAIL SCOPE**

# Activity

CONTRACTOR shall conduct chemical sampling on up to 11 (eleven) development wells plus 2 (two) contingency wells. The sampling activity will be as follow:

### Chemistry sampling in production wells will be conducted in 4 (four) different well head pressure condition in each production wells

### Brine and isotope sample from production wells should take from bottom port sampling point in 2 phase line.

1. Non condensable gas (NCG) sample from production wells should take from top port sampling point in 2 phase line
2. Chemistry sample that should take for each well head pressure are:

* Brine from 2 phase line
* Non Condensable Gas (NCG)
* Steam Condensate
* Weir box brine
* Isotope brine from 2 phase line
* Isotope from steam
* Isotope from weir box brine

1. Chemistry sampling in injection wells will be different, only brine from 2 phase line will be collected.

# Chemistry Sample Analysis:

### Brine sample from 2 phase line production wells, weir box production line and injection wells should analyze for comprehensive water analysis (Na, K, Ca, Mg, Li, Sr, Ba, Fe, Mn, Al, As, Sb, B, SiO2, Cl, F, SO4, HCO3, NH3, H2S, CO2, pH, and TDS)

### Non Condensable Gas (NCG) sample from production wells should analyze for Total non-condensable gas analysis (Total NCG, CO2, H2S, NH3, Ar, N2, CH4, H2, O2).

### Condensate sample from production wells should analyze for comprehensive steam condensate analysis (Na, Cl, B, SiO2, As, Hg, Fe, pH)

### Isotope sample from brine 2 phase line production wells, steam 2 phase line production wells and weir box production wells should analyze for stable isotope analysis (Deuterium and Oxygen 18)

# Tracer Flow Test (TFT) in Production wells:

* 1. Tracer Flow Test (TFT) will be conducted in 4 (four) specific well head pressure condition in each production wells.
  2. During TFT operations at the well site, overview process will be given for COMPANY staff on site.
  3. In performing tracer flow test, the CONTRACTOR shall provide special tools and equipment’s required to perform the tracer flow test. Since it’s a development wells, Contractor shall bring all the tools & equipment’s needed both for single phase or two (2) phase steam.
  4. The tracer chemicals are injected at the above well head trough double valve at flow tee. The samplers are collected between 10 – 50 meters downstream of injection from sample ports on top and bottom of two phase line.
  5. The chemicals of tracer that should inject are SF6 for tracer in steam and Thermo Tracer for tracer in brine.

# Non Condensable Gas (NCG) wet test measurement

1. Wet test sample should take in 4 (four) specific well head pressure condition in each production wells during chemistry sampling.
2. For wet test measurement, the CONTRACTOR shall provide special tools and equipments required to perform the tracer wet test.

### This work considered as optional work as per requested by the COMPANY through Instruction to Perform (ITP).

1. **SCHEDULE ACTIVITY**

# Sampling

## Chemistry and tracer flow test (TFT) will conduct during production test. COMPANY will inform to CONTRACTOR regarding the schedule minimum 10 days before activity.

## Tracer Flow Test and chemistry sampling will conducted in sequence. TFT will be performed earlier before chemistry sampling.

# Analysis result

In analysis chemistry and tracer flow test samples, the CONTRACTOR should provide the result of chemistry and tracer flow test analysis maximum 3 weeks after sample arrive in CONTRACTOR laboratory due to analysis result will be used as guidance for planning and decision for the next drilled wells.

1. **PERSONAL AND TOOLS SPECIFICATION**
   1. CONTRACTOR should provide technical people with 2 years experiences or more in well chemistry sampling and tracer flow test
   2. Qualification for personnel taking chemical samples is Geochemist
   3. The Service engineer shall have experience in tracer single phase or two phase steam in geothermal field.
   4. During chemistry sampling CONTRACTOR should bring the digital chloride probe tools measurement and also high range and low range Quantabs
2. **CONTRACTOR’S RESPONSIBILITY**
   1. Advice, reports and recommendations shall be directly submitted to COMPANY representatives on any finding during performing the work.
   2. The CONTRACTOR at their own cost shall be responsible to provide and arrange payment, lodging, meals, medical/health, and transportation for manpower, tools and other support equipments from-to-and within the project site.
   3. The CONTRACTOR shall provide their own PPE to comply with COMPANY safety and environmental regulation in particular safety helmet, safety shoes, ear plug, and eye protection.
   4. The personnel shall attend the safety induction conducted by COMPANY before start working in the project site.
3. **COMPANY’S RESPONSIBILITY**
   1. COMPANY will give ten (10) days notification to CONTRACTOR to start performing the work by issuing Instruction to Perform (ITP).
   2. COMPANY will provide safety induction to CONTRACTOR’s Personnel which will perform the Work.
   3. For tracer flow test, COMPANY will:

* Set up well test program
* Prepare tapping pint connection for inject tracer chemical and sampling port valve
* Set up position of production test flowing well head pressure
* Provide fresh water for cooling and condensation steam in portable separator

1. **WORK PERFORMANCE REPORTING**
   1. The CONTRACTOR shall provide daily report and conduct the daily technical meeting with COMPANY representatives during the work performed.
   2. Before leaving the site, CONTRACTOR shall provide preliminary report and submitted to the COMPANY representatives before leaving project site.
   3. CONTRACTOR shall provide COMPANY with final report of each well and shall be submitted within four (4) weeks after taking samples. The formal report shall be in English. The TFT report shall include the following:

* Well characteristic
* Steam rate, brine rate and total mass flow
* Flowing enthalpy
* Recommendations

1. **COMPANY AND CONTRACTOR REPRESENTATIVES**

During work implementation, all formal communication shall be passed through in writing to the relevant persons as listed below.

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