

## ANALYTICAL LABORATORY SERVICES

Thermochem's analytical laboratories specialize in the analysis of trace-level constituents in steam condensate for steam purity analysis; fixed, trace and hydrocarbon gas analysis; cooling water to hyper-saline brine analysis; and corrosion/scale deposit analysis. Our analytical methods were developed over 30 years by Thermochem to overcome the analytical interferences encountered in natural geochemical and complex chemical process samples. Thermochem provides analytical laboratory services from our two laboratories, based in California and Indonesia. The laboratories also provide services compliant with standard EPA, ASTM, and NIOSH methodologies as required for regulatory work.

Thermochem is a pioneer in low-level reservoir tracer analysis, with development of new tracers and analytical methods for reservoir, interwell tracer testing (vapor, liquid and multi-phase). Numerous tracers and analytical methods have also been developed for Tracer Flow Testing (TFT<sup>®</sup>) and production separator efficiency testing used to optimize the steam quality in geothermal production facilities.

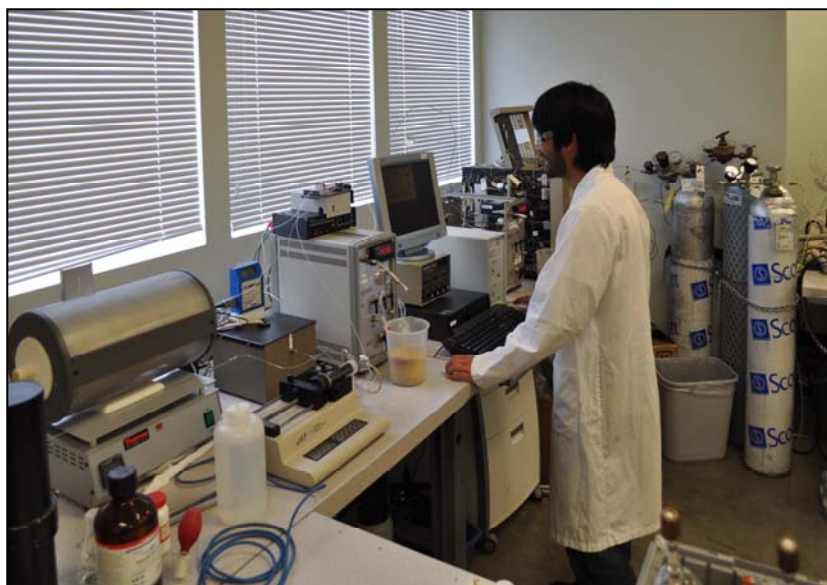
### The Highest Quality Laboratory Serving the Geothermal Industry

- Top Performing Lab in Chevron Round-Robin Blind Gas Analysis Study
- Top Performer in 2015 – 2019 Annual Chevron Round-Robin Blind Produced Water Analysis Studies
- The Only Tracer Lab to Qualify in the Chevron Minas Sumatra Interwell Tracer Analysis Study
- ISO 17025, ISO 9001 and KAN-certified in Indonesia

### Gas Analysis Services

Gas analysis instrumentation includes Agilent Gas Chromatographs with packed, capillary and megabore columns, cryogenic LN2 cooling:

- Thermal Conductivity Detectors
- ECD, Flame Ionization Detectors
- Agilent GCMS 7890/ 5975
- Purge and Trap Concentrator
- CO<sub>2</sub> and NH<sub>3</sub> Flow Injection Analyzers
- Thermo Scientific Trace 1310 GC with ECD and TCD Detectors



## Trace Metals, Reservoir Geochemistry, and Corrosion Process Analysis

Trace metal, reservoir chemistry, and corrosion process analysis instrumentation includes:

- PinAAcle 900F Atomic Absorption Spectrophotometer
- Perkin Elmer Optima 7000DV ICP Optical Emission Spectrophotometer

## Reservoir Tracer Testing and TFT<sup>®</sup> Analysis

Reservoir tracer testing and TFT<sup>®</sup> analysis instrumentation includes:

- Agilent 6460 LCMS with Triple-Quad Mass Spec detector
  - Agilent 1260 Infinity Binary Pump
  - Agilent 1260 Standard Autosampler
- Waters Acquity UPLC
  - FLR Multi- $\lambda$  Fluorescence Detector
  - TUV Dual- $\lambda$  UV absorption Detector
- Agilent 7890 Gas Chromatographs
  - Electron Capture Detector
  - Custom Fluorine-Specific Detector (HFCs)
- Thermo Scientific UltiMate 3000 UPLC
  - Photodiode Array Detector
  - RS Fluorescence Detector



## Trace Anion Analysis

Trace ion analysis instrumentation includes:

- Thermo Scientific 5000+ Dual-Channel High-Performance Ion Chromatograph with Eluent Generation
- Thermo Scientific 5000+ Dual-Channel High-Performance Ion Chromatograph with Gradient System

