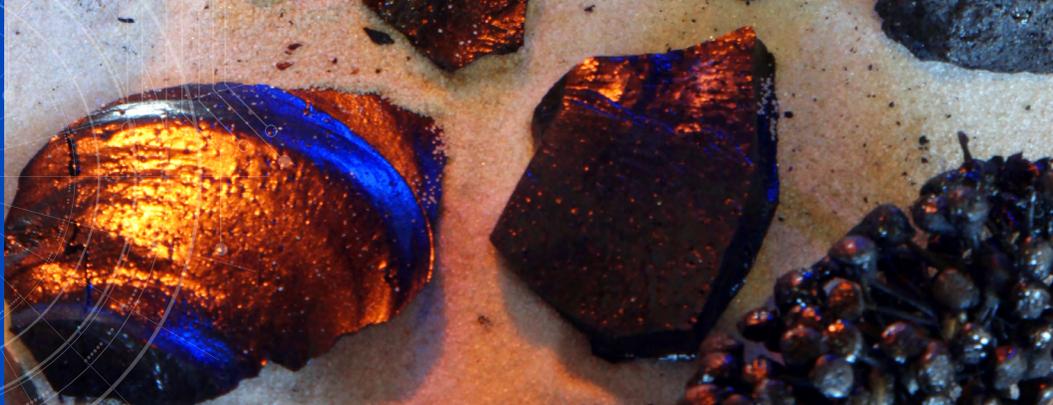




SOUTHWEST RESEARCH INSTITUTE



# Heavy Oil and Residuum Processing

The Chemical Engineering Department at Southwest Research Institute® (SwRI®) has extensive experience in processing and analyzing heavy oil and residuum, including characterizing feedstocks and products. SwRI's scientific and analytical staff has significant knowledge across a full range of both organic and inorganic analytical services for petroleum-based and aqueous samples. These services include standard and nonstandard American Society for Testing and Materials (ASTM) procedures and custom method development.

SwRI's facilities are equipped with a variety of processing units available for our clients' testing needs from laboratory-scale to pilot-plant testing. Existing equipment can be modified to meet clients' specific needs.

## Capabilities

- Processing of unconventional feedstocks such as heavy oil, shale, biocrude, and residuum (upstream, midstream, and downstream)
- Circulating fluidized bed with feed rates from <math><1-200\text{ mL/min}</math>
- Delayed coking with reactor volume up to 2 L and temperature up to 1100°F (~600°C)
- Visbreaking (up to 2 L capacity)
- Slurry reactor (up to 2 L capacity)
- High-temperature flow loop for thermal fouling testing with residuum or high-viscosity fluids
- Laboratory-scale hydrocracker/hydrotreater:
  - 100-200 mL catalyst capacity fixed-bed reactors
  - Liquid flow rates from 0.1–8 mL/min
  - Hydrogen flow rates from 0.1–5 SCFH
- Pilot-scale hydrocracker/hydrotreater:
  - 3 fixed-bed reactors: 1.5 L, 3.5 L, and 4.0 L catalyst capacity (may be operated together in series for higher throughput)
  - Liquid flow rates from 0.2–5 gal/hr
  - Hydrogen flow rates from 20–250 SCFH
- Continuous and batch distillation columns that can fractionate up to 1000°F (~550°C) and 5–55 gal/day

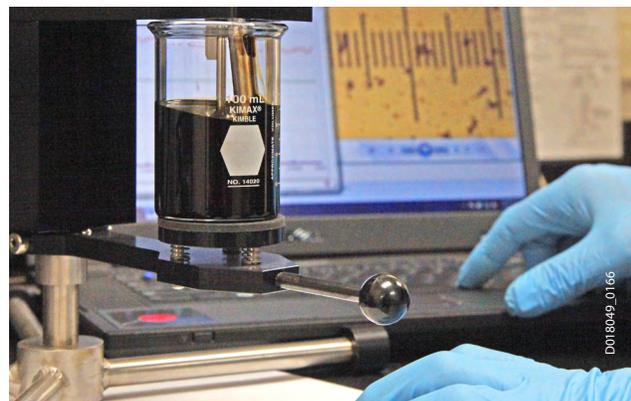
*SwRI operates lab-, pilot-, and demonstration-scale units for heavy oil and residuum processing.*



*Many proof-of-concept ideas for heavy oil and residuum processing are first tested using lab-scale equipment to help identify and solve potential complications before moving to pilot- or demonstration-scale processing.*



*SwRI's Process Chemistry Section coordinates closely with clients to provide custom and quick-turnaround results during 24/7 operations.*





Unconventional feeds can be run through lab- and pilot-scale hydrocrackers/hydrotreaters to economically identify operating conditions and potential complexities prior to a production run.



The lab-scale circulating fluidized bed system can be used for catalytic pyrolysis and feedstock evaluations.



As the industry uses more unconventional petroleum reserves, refiners must develop new, economical ways to process heavy feedstock and residuum.

**We welcome your inquiries.  
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## SOUTHWEST RESEARCH INSTITUTE

Southwest Research Institute is a premier independent, nonprofit research and development organization using multidisciplinary services to provide solutions to some of the world's most challenging scientific and engineering problems. Headquartered in San Antonio, Texas, our client-focused, client-funded organization occupies 1,500 acres, providing more than 2.3 million square feet of laboratories, test facilities, workshops, and offices for more than 2,700 employees who perform contract work for government and industry clients.

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