

## Construction of a Semi-commercial Plant Using High Severity Fluid Catalytic Cracking (HS-FCC)

~Developing technologies for innovative next-generation oil refining~

Nippon Oil Corporation (President: Shinji Nishio) has been participating in the development of High Severity Fluid Catalytic Cracking (HS-FCC) technologies applicable to Heavy Oil upgrading process, a part of the publicly solicited project “Developing Technologies for Innovative Next-Generation Oil Refining” sponsored by the Ministry of Economy, Trade and Industry, and has accordingly been engaged in the development of the HS-FCC\*1 process. The Mizushima Refinery (Kurashiki City, Okayama, Japan) of the Nippon Petroleum Refining Company, Limited (President: Hiroshi Ono), a Nippon Oil Corporation Group company belonging to the oil refining section, today saw the launch of construction of an semi-commercial plant using the HS-FCC process with a processing capacity of 3,000 barrels per day.

During the HS-FCC process, heavy oil and a catalyst are brought into contact evenly in a down flow reactor\*2 at high temperature within a short period of time in order to facilitate the cracking of the heavy oil. This is a breakthrough in technology that enables a higher yield of propylene and high-octane gasoline as compared to conventional fluidized catalytic cracking (FCCs).

Research and development of the HS-FCC process has been subsidized by the Ministry of Economy, Trade and Industry and the R&D projects undertaken thus far include overseas technical assistance initiated by the Japan Cooperation Center, Petroleum (JCCP) in 2000-2004. Through this project, a small-scale experimental oil refining system has been built and operated in Saudi Arabia with a daily processing volume of 30 barrels per day. This project is the result of collaboration between JCCP and both the King Fahd University of Petroleum and Minerals and the state-controlled oil company of Saudi Arabia. Following the result, the technical development project was initiated by the Japan Petroleum Energy Center (JPEC) in 2007 to design a semi-commercial plant with a daily processing capacity of 3,000 barrels. The ultimate goal is to improve technologies which enable the design of a HS-FCC commercial-scaled plant with a daily processing capacity of tens of thousands of barrels. In order to achieve this, both the building and operation of the semi-commercial plant is necessary on the basis of research and development results thus far. The construction of the semi-commercial plant is expected to be completed by the end of January, 2011 and experimental operation is scheduled to begin in May, 2011.

### Details

Overview of the project participated in by Nippon Oil Corporation

- (1) Name: “Developing Technologies for High Severity Fluid Catalytic Cracking Applicable to Heavy Oil”  
 (2) System construction location (planned): Mizushima Refinery, Nippon Petroleum Refining Co., Ltd.  
 (Address: 4-2, Mizushima Kaigan-dori, Kurashiki-shi, Okayama, Japan)  
 (3) Operation launch (planned): May, 2011  
 (4) Overview of the system : Capacity: 3,000 barrels/day  
 Yield (weight based): Propylene: Approximately 20%,  
 Gasoline: Approximately 35%

(\*1) “HS-FCC” is an abbreviation for “High Severity Fluid Catalytic Cracking.”

(\*2) Please refer to the attached document (“Overview of a down flow reactor”) for further details.

#### Attached document

1. Overview of a down flow reactor
2. Comparison between the conventional FCC process and the HS-FCC process
3. Rendering of the experimental system (3D)