



## **WORKSHOP ON ADVANCED RADIOTRACER TECHNOLOGY IN OILWELL/ENHANCED OIL RECOVERY (EOR) APPLICATION**

Malaysian Nuclear Agency has successfully conducted a 3-days workshop from 5-7 November 2019 entitled **ADVANCED RADIOTRACER TECHNOLOGY IN OILWELL/ENHANCED OIL RECOVERY (EOR) APPLICATION** which was held in Bilik Selenium, Agensi Nuklear Malaysia. The participation were from industries, universities as well as staffs from Nuclear Malaysia who have worked in Research & Development & Commercialization (R&D&C), oil & gas industries, oil platform as well as lecturers from Faculty of Petroleum Engineering and Faculty of Oil & Gas Engineering. Dr. Quang Huu Nguyen from Centre for Applications of Nuclear Technique in Industry (*CANTI*), Vietnam was acknowledged as speaker and expert throughout the workshop. The idea of organizing the workshop came after the author met Dr. Quang at TRACER 8 Conference at Da Nang, Vietnam in February 2019. Besides, Malaysia is one of the main oil producers in the world and the author thought it is about time for Nuclear Malaysia to embark in the upstream application of oil industries' utilization. Thus, Plant Assessment Technology (PAT) Group, Industrial Technology Division (BTI) has decided to fully employ the radiotracer technology and nuclear facilities in the upstream application which is oil field and oil reservoir for the benefit of the country. Previously PAT has involved and provided services to industries as well as research and development (R&D) using radiotracer technology in downstream applications.

The objectives of the workshops are as follows:

- Knowledge dissemination and awareness on the application of radiotracer technology in the oilwell and EOR to industries and universities
- Learnt the best operating procedure to execute radiotracer technology at site (oil rig or platform): how and when to do injection of tracer inside the wellhead safely
- Commercialization of radiotracer technology in oilfield whereby common problems such as leakage behind casing and detection of cementing level can be addressed

The first day covers the overview of radiotracer technology in the oil and gas industries as well as several case studies that have been conducted by *CANTI* which includes column and pipe scanning, development of computer tomography system & software and also innovation and field execution of gas tracer such as Argon-41 and Methyl Bromide-82. On the second day, the workshop includes the actual experience and expert mission executed by Dr. Quang and *CANTI* in using radiotracer and chemical tracers in oil field applications. The applications cover Secondary Oil Recovery, Enhanced Oil Recovery (EOR) and utilizing of downhole tracers for measurement of injectivity profile, monitoring hydraulic fracturing, cementing assessment, and last but not least Inter Well Tracer Test (IWTT). Several questions and views were highlighted by audience regarding the acceptance of local oil company and collaboration of oil reservoir owner with tracer engineers.

The participants also visited laboratories and the author has showed to the audience the low cost core flood rig (LCCF-RT) which is used for preliminary study in intervention of radiotracer technology in oilfield application. The innovation of LCCF:RT has received silver award in International Technology Exhibition (i-Tex2019) in Kuala Lumpur, Malaysia. Three grants (2 local grants funded by Ministry of Higher Educations and 1 from CRP-IAEA) have also been secured by author for conducting R&D in introducing the feasibility and intervention of radiotracer technology in Malaysia's applications.



Figure 1. Dr. Quang was giving lectures throughout the course



Figure 2. Some participants from industries and universities



Figure 3. The author showed the preliminary set up of core flood rig and oil well activities

On the last day, the author has arranged a meeting and discussion with PETRONAS, a world renowned Malaysian oil and gas company, at Tower 1, KLCC, Kuala Lumpur, to look at the possible collaboration of Nuclear Malaysia in their oil wells' operation. Dr. Quang has presented slides on the Overview of Tracers in the Oilfield and a few questions were raised up by the audience. We were so blessed because the discussion was attended by well intervention specialist's team thus, the information from them will be the main element in our upcoming research. Some issues have been highlighted such as the ability of radiotracer technology in addressing common problems such as determination of leakage behind casing, measurement of cementing level, metal loss occurrence in oil well as well as utilizing tracers in downhole.



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Figure 4. Meeting & discussion with PETRONAS at Tower 1, KLCC, Kuala Lumpur

Finally, the outcomes from this workshop are amazing. Upon completion, we have been invited to University of Malaya, the oldest university in Malaysia and is the highest ranking Malaysian institution of higher education according to several international ranking agencies, and a series of discussions from Small Medium Enterprise (SMEs) for potential collaboration in R&D and technical services using radiotracer technology for EOR application as well as well intervention studies.

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