

Life Cycle Assessment, Produced Water, and Waste Management Analyses

FEW 49177

Project Goal

This project covers three distinct and not closely related tasks:

Task A, Life Cycle Analysis (LCA). Argonne National Laboratory (ANL) will describe the concept of LCA and how it might be used to evaluate oil and gas environmental issues and improve decision making in the industry. ANL will identify examples of oil and gas products or processes to evaluate or compare using life-cycle approaches.

Task B, Produced Water Discharges to the Hypoxic Zone. ANL will coordinate a study to sample 50 platforms in the Gulf of Mexico hypoxic (low-oxygen) zone to determine the concentration of pollutants in produced-water discharges.

Task C, Waste Management. This task represents the first phase of a larger project to distill a preliminary draft framework of guidelines for waste management at exploration and production sites in countries without comprehensive waste management regulations. The Task C report compares and reviews for each international jurisdiction the general approach used to organize or subcategorize groups of waste and the basic principles they use.

Performer

Argonne National Laboratory, Washington, DC

Results

ANL completed a draft report on LCA methods, case studies, approaches, tools, and data requirements in June 2007. When comments from DOE and other reviewers have been received, a final report will be prepared.

The final report of the Task B project was completed and submitted to the U.S. Environmental Protection Agency in early August 2005. The project was undertaken to meet a requirement of a discharge permit issued in October 2004.

Task C was completed in December 2004. ANL completed a lengthy report that summarizes waste management requirements under six jurisdictions (United States, Louisiana, Canada, Alberta, South Africa, and World Bank Group). Researchers also prepared a shorter, side-by-side comparison of the requirements. Both documents were submitted to DOE and the Petroleum Environmental Research Forum.

Benefits

The oil and gas industry will be able to use the LCA information resulting from the Task A project to help improve environmental protection, increase operating efficiencies, and provide a scientific basis for interacting with regulatory agencies. The project results will provide a foundation for conducting more-detailed LCA applications for specific oil and gas products and processes in subsequent efforts.

The Task B study, conducted by a national laboratory using good scientific design and principles, provided unbiased data to help the Environmental Protection Agency (EPA) determine if additional permit limits will be required in the future. In December 2006, EPA announced that it had evaluated the data from the ANL report and decided that no additional permit requirements would be necessary to control oxygen demand in produced-water discharges. This avoids millions of dollars of potential costs for offshore operators.

Phase II of Task C (not funded by DOE) will develop a framework that potentially can be used to convince developing countries that a range of waste management options, applied in a risk-based manner, is acceptable. This should provide more flexibility to U.S. companies that are operating in developing countries. Phase I provided necessary background before Phase II could be started.

Background

These projects were selected by industry representatives as having important consequences for the oil and gas industry. The industry, through PERF, recommended that DOE fund these three projects. Each project addresses a different need: Use LCA to develop better ways to manage wastes and processes; identify the impact of produced-water discharges to the hypoxic zone in the Gulf of Mexico in comparison with other sources of pollutants; and identify the types of regulatory requirement used to govern management of oil field wastes.

Summary

The task responsibilities break out as follows:

Task A. ANL identifies, evaluates, and summarizes various LCA approaches and tools for evaluating and comparing particular oil and gas products and processes in terms of environmental and energy inputs and outputs, and where feasible, impacts.

Task B. The completed report provides important data to EPA to assess the need for additional permit requirements on offshore discharges.

Task C. The completed report has been used by ANL and industry researchers to develop a draft framework for managing oilfield wastes.

Current Status (July 2007)

Tasks B and C are completed. Task A is still underway and will be completed during 2007. A draft Task A report was submitted in June 2007. Several conference presentations have been and will be made on the results of the project. ANL was asked to provide assistance to EPA modelers who are using data collected in Task B. The funds in this project for Task B have been exhausted. DOE provided additional funds for hypoxia work under project FEW49342.

Funding

This project was selected based on recommendations from PERF to DOE. It was not part of a formal solicitation.

Project Start: May 18, 2004

Project End: August 18, 2007

Anticipated DOE Contribution: \$250,000

Performer Contribution: \$0

Other Government Organizations Involved: Task B was coordinated with EPA and Minerals Management Service.

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Publications

Task A

The draft report was submitted to NETL in June 2007.

Task B

Bierman, V.J., Jr., S.C. Hinz, D. Justic, D. Scavia, J.A. Veil, K. Satterlee, III, M.E. Parker, and S. Wilson, "Predicted Impacts from Offshore Produced-Water Discharges on Hypoxia in the Gulf of Mexico," SPE 106814, presented at the 2007 SPE E&P Environmental and Safety Conference held in Galveston, TX., March 5-7, 2007.

Veil, J.A., "Outcome of Produced-Water Sampling Program from Platforms in the Hypoxic Zone," presented at the 17th Produced Water Seminar, Houston, TX, January 17-19, 2007.

Veil, J.A., "Characteristics of Produced Water Discharged to the Gulf of Mexico Hypoxic Zone," MMS Information Transfer Meeting, Kenner, LA, January 9–11, 2007.

Veil, J.A., Kimmell, T.A., and Rechner, A.C., "Characteristics of Produced Water Discharged to the Gulf of Mexico Hypoxic Zone," prepared for DOE/NETL, August 2005, 74 pp.

Parker, M.E., Veil, J.A., and Satterlee, K., "Impacts from Oil and Gas Produced Water Discharges on the Gulf of Mexico Hypoxic Zone," SPE 98651, planned for presentation at SPE International Conference on Health, Safety, & Environment in Oil & Gas Exploration, Abu Dhabi, U.A.E., April 2-4, 2006.

Veil, J.A., "Do Offshore Oil and Gas Platform Discharges Affect the Gulf of Mexico Hypoxic Zone?," 16th Produced Water Seminar, Houston, TX, January 18-20, 2006.

Veil, J.A., "Do Offshore Oil and Gas Platform Discharges Affect the Gulf of Mexico Hypoxic Zone?," 12th International Petroleum Environmental Conference, Houston, TX, November 8-11, 2005.

Veil, J.A., "Sampling Program to Characterize Gulf of Mexico Produced Water Oxygen Demanding Materials," 15th Produced Water Seminar, Houston, TX, January 19-21, 2005.

Task C

Puder, M.G., and Veil, J.A., "Review of Waste Management Regulations and Requirements from Selected Jurisdictions: United States of America, Louisiana, South Africa, Canada, Alberta, World Bank Group," prepared for DOE/NETL and ChevronTexaco Energy Research & Technology Company, acting on behalf of PERF, December 2004, 137 pp.



Acculab set up to digitize and record the produced-water fluid samples to identify oil and gas traces. Photo by John Veil.



Technicians measuring fluid samples for life-cycle analysis at the Acculab analytical laboratory. Photo by John Veil.