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Environmentally Considerate Lubricants

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Editor:
In-Sik Rhee



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Foreword

This compilation of *Selected Technical Papers*, STP1575, *Environmentally Considerate Lubricants* contains 9 papers presented at a symposium with the same name held December 9, 2013 in Tampa, FL, USA. The symposium was sponsored by ASTM International Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and Subcommittee D02.12 on Environmental Standards for Lubricants.

The Symposium Chairman and STP Editor is Dr. In-Sik Rhee, United States Army TARDEC, Warren, MI, USA.

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Overview

In recent years, there has been an increasing interest in Environmentally Acceptable (EA) or Environmentally Considerate (EC) Lubricants, especially among vessel, agricultural, construction, forestry, lumber, and mining industries where involuntary or accidental fluid leakage or spillage is detrimental to the environment. Another good reason to use EA lubricants is to find an alternative source of lubricants from the agricultural feed stocks and to reduce the consumption of petroleum crude oil. Currently, the biobased lubricants are considered as EA lubricants due to their environmental properties such as a high biodegradability, low toxicity, and no bioaccumulation. The biobased lubricant is currently formulated with oils extracted from renewable resources such as plants, crops, trees, or animals. These types of fluids are considered less toxic and more biodegradable than conventional petroleum based oils. The U. S. Department of Agriculture's (USDA) biobased product guideline also defines exactly what products and how much concentration of renewable product associated with final product would be considered as a biobased product. Recently, the U. S. Environmental Protection Agency (EPA) has also defined the EA lubricants based on the environmental properties and issued the Vessel General Permit (VGP) guide which requires the use of EA lubricants for all commercial vessels longer than 79 feet operated within three nautical miles of U. S. coastlines and in the Great Lakes. In response to the demand of EA lubricants, many oil companies have formulated EA lubricants for limited applications. To explore further this developing technology, research has already been or is being conducted in the broad science field using biobased oils.

ASTM D02.12 Subcommittee on Environmental Standards of Lubricants has a responsibility to promote the knowledge and the development of standards to measure environmental persistence of lubricants (e.g., biodegradation, ecotoxicity and bioaccumulation). To hold a forum for discussions related to current trends for EA lubricants, the Subcommittee D02.12 initiated the *Second Environment Symposium on Environmentally Considerate Lubricants* which was held on December 9, 2013 in Tampa, Florida. The purpose of this symposium was to provide details on current research efforts to advance the use of biobased and other environmentally considerate lubricants, and to develop new and improved environment test methods. Eleven symposium papers were presented on the various topics related to the fundamentals of biobased lubricants, industrial trends, applications, new test methods, and environmental policies. All presentations were very innovated and well-received from more than 100 attendees. Nine papers among them were selected for presenting in

the STP (Selected Technical Papers) after being peer-reviewed. These papers are presented here.

Finally, the Editor would like to acknowledge that this STP is a product of tremendous diligent efforts of many people. In particular, the Editor would like to thank ASTM D02.12 symposium organizing committee, all of the authors, paper reviewers and session chairs who devoted their valuable time for this endeavor. Special thanks are due to Mary Mikolajewski, David Bradley, Suze Reilly, and Heather Blasco for their enduring support, constructive feedbacks, and timely assistance.

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