

# AIR PERMIT FOR THE CONSTRUCTION AND OPERATION OF A CALCIUM CARBIDE MANUFACTURING PLANT

Emily Wilbur

Dr. Thomas Marrero, Thesis Advisor

## ABSTRACT

The purpose of this thesis is to determine the regulatory requirements necessary for constructing calcium carbide manufacturing plants. Material and thermal balances were made on the basis of biomass as a substitute for typical carbon raw materials. The calcium carbide plant design was adapted from a novel concept that gasifies biomass in three stages to form the carbon raw material. Emission rates to air were calculated using comparable emission factors to determine compliance to current State of Missouri air pollution regulations.

The results show that the emissions associated with the calcium carbide plant allow for 1,657 tons per year of production for a true *de minimis* source, without the need for a construction or operating permit. For higher levels of production, a *de minimis*, minor or major permit is required with the addition of control devices. The results of this thesis are significant for the design and operation of a pilot or permanent calcium carbide manufacturing plant because permitting of air emissions is necessary prior to the start of any construction activities.