

Selecting Priorities from Large Sets of Alternatives:

The Case of Toxic Substances Regulation

by

Steven Lee Wilhelm

B.S., University of Missouri, 1974

Thesis

Submitted in partial fulfillment of the requirements for the  
Degree of Doctor of Philosophy in the Department of Chemistry  
at Brown University

June 1981

## ABSTRACT

Establishing priorities among very large sets of alternatives is considered in the context of a specific problem involving governmental regulation of chemicals. Several federal agencies are responsible for the safety of tens of thousands of chemicals and must develop means to select the most appropriate candidates for a variety of activities which include: seriatim review by experts, data gathering, testing for biological effects, and regulatory controls. This priority setting is hampered by the number of substances which must be considered, a serious poverty of data, non-independence of the criteria to be utilized, and a general inappropriateness of traditional formulations for simultaneous consideration of multiple criteria. An alternative to the traditional formulations is proposed and subsequently applied to a representative sample of chemicals.