

REPORT ON

CATALYSIS OF COAL CONVERSION PROCESSES

AND

CHARACTERIZATION OF MINERAL MATTER AND

TRACE ELEMENTS IN COALS

PREPARED FOR

W. F. LIBBY LABORATORIES

BY

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OVER-ALL SUMMARY

The Libby Laboratories requested that Drs. Walker and Gardner assume over-all responsibility for the preparation of a report concerned with catalysis of coal conversion processes, recommending research programs, citing literature, giving budget estimates, and preparing a suggested list of potential investigators. Since minerals and trace elements in coal can play an important part in catalysis considerations, the scope of the report was expanded to include a review of what is now known about the characterization of minerals and trace elements in coal and to recommend areas of future research.

Drs. Walker and Gardner invited Drs. Given, Gluskoter, Johnson, and Yavorsky to contribute to this report. All agreed, but unfortunately Dr. Yavorsky has been unable to meet our dead-line due to a new assignment. Each contributor's material is included in this report, without revision, by Walker and Gardner. Even though this leads to some duplication, it was felt desirable to allow the various experts to fully develop their approach and thinking.

Clearly catalysis considerations in coal conversion processes are going to be of great importance. Because of the magnitude of importance which coal conversion to gaseous and liquid fuels is going to have in all facets of American society, it will be justifiable, and indeed a necessity, to spend large sums of money learning to characterize coal. This means a characterization of the organic phase (the coaly material) and the inorganic phase (mineral matter and trace elements) and the extent of interaction between these two phases. It will also be necessary to follow the change in character of these two phases (and again their interaction) as coal undergoes changes in conversion processes. The goal is to then relate

character to conversion behavior and to be able to predict and understand what effect changes in operation and catalyst additions will have. There are many exciting problems of chemistry, physics, the solid state, geology, and engineering which will require the attention of some of the best scientists and engineers in the United States.

In closing, one more point should be emphasized, particularly since this report is being prepared for the eventual use of EPRI. The most important coal conversion process today, and probably for many years to come, is combustion. Utilities which burn coal continue to have problems with boiler tube fouling and loss of steam capacity. A strong effort to characterize the mineral matter in coals appears quite justifiable, simply on the basis of its potentially resulting in shedding more understanding on how to reduce this boiler tube problem.