ENERGY AND PROTEIN PRODUCTION
FROM PULP MILL WASTES

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ABSTRACT

The first three months of this project were devoted to obtaining the required staff and equipment to execute the program plan. All major pieces of equipment were ordered, have been received and installed. Shake down experiments indicate that the equipment is operable. The post graduate associate and a graduate student have been recruited and the research program is ready to procede.

INTRODUCTION

On April 30, 1976 Michigan Technological University was advised that the Energy and Research Development Administration had accepted our proposal and negotiations for finance of the research would be undertaken. These negotiations were successfully completed in May and plans for initiating the project on June 15 were agreed upon. The rapid progress through the acceptance and negotiation phases necessitated starting the project with only minimal assistance from Dr. Jurgensen, who was pre-committed to concluding a research project in Montana during the past quarter. He will join the project on a full-time basis October, 1976.

STAFFING

In addition to two principal investigators the program calls for a post graduate associate and one graduate student. Advertisements were placed as required by the Equal Opportunity regulations. Responses were screened for suitable candidates and all those meeting the program requirements (4) were interviewed. Mr. Craig Brennom having a Master's degree in microbiology from South Dakota State University was selected to fill the post graduate position. He has moved to Houghton and is well along in setting up the laboratory and checking out the equipment. In the interim, before Mr. Brennom arrived, the position was temporarily filled by Mr. Don Kostrzewa.

Mr. Kostrzewa was instrumental in ordering the major pieces of equipment and developed some standard laboratory procedures to be followed for routine analysis analytical work during the course of the project.

Recruitment of a graduate student proved to be more of a problem. Few applications were received from students having the required background in chemistry, chemical engineering and biology. In July the fellowship was offered to Mr. Sushil Dugar, Jaipur, India. Mr. Dugar accepted the appointment and has just arrived in Houghton. Unfortunately the stipend provided by the contract will not provide adequate support for his wife and daughter who have remained behind in India. Mr. Dugar is now enrolled and his work is commencing.

In Dr. Jurgensen's absence, the service of Dr. Yuan-Zong Lai, Professor of Pulp and Paper Technology at Michigan Tech, was secured to assist in designing the required experiments. His participation was financed by monies budgeted for Dr. Jurgensen's work. Dr. Lai was assisted in his effort by Dr. P. H. Beckwith who devoted thirty-three percent of his time to the project during the past quarter. The overall effort was organized and directed by Dr. John T. Patton, principal investigator on a full time basis during the quarter.

MAJOR EQUIPMENT

Bids were obtained for the research equipment provided by the contract and required for the execution of the research program. The major item consisted of an ozone generator, model T-816 manufactured by the Wellsbach Ozone Systems Corporation, Philadelphia, Penn. This particular model was selected in consideration of its reliability, wide operation flexibility and its availability for immediate delivery. Preliminary testing indicates that it meets or exceeds all of the project requirements.

Miscellaneous laboratory apparatus for screening bacterial cultures,

analyzing samples of reacted and unreacted spent sulfite liquor, SSL, and for conducting the ozonolysis treatment were also purchased. A study of available fermentation equipment was conducted and a decision is eminent on selecting these items.

EXPERIMENTAL

In preparation for initiating the program a volume of spent sulfite liquor was obtained. Twenty-five gallons of calcium based sulfite liquor was donated by the St. Regis Paper Company, Rhinelander, Wisconsin. A decision was made to secure a large enough inventory of SSL at one time to support the experimental work for a large portion of the project. This will eliminate variability in SSL quality from being a factor which might cause difficulties in interpreting the experimental results.

Three types of microorganisms will be employed in the research program. Potential sources of these organisms have been investigated and contacts made with potential suppliers. Calorifics Inc., Oklahoma City and the University of Missouri at Rolla have both agreed to contribute methane producing bacteria from their stock cultures for use in the study. Great Lakes Yeast Company in Rhinelander, Wisconsin will serve as a source for the Torula yeast to be utilized for protein production in that phase of the program. Enzymatic desulfonation of the lignin or organic fractions produced by ozonolysis will be accomplished by cultures already collected in prior research in this area at Michigan Technological University.

CONCLUSIONS AND PLANS

The first quarter of this project proceeded smoothly with rapid implementation of the preliminary work required to initiate the project. The project is fully staffed and all equipment required for the immediate future has been received and installed. It is envisioned that the next quarter will be characterized by exploratory experiments designed to provide familiarity with the equipment and establish the useful range of variables to be studied in

the program. Both the ozonation and biological synthesis stages will proceed concurrently during the next quarter. During this period Dr. Jurgensen will devote approximately 50% of his time while Dr. Patton will reduce his contribution to approximately 15% to maintain the manpower level budgeted for the period.