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Dear Dr. Mayfield:

SUBJECT: Economic Impact of Algal Biofuel Research

As requested, SANDAG has estimated the anticipated economic impact of algal biofuel research on the regional economy during the course of one year. This impact analysis is based upon 328 employees engaged in private sector research in algal biofuels and financing for biofuels research, and 82 academic faculty and research assistants, for a total of 410 workers in algal biofuels. The analysis was conducted using the IMPLAN economic impact model and focuses on the work occurring in San Diego, which is concentrated in research and development.

Future production of biofuel from algae has the potential to produce a sustainable and easily produced fuel source for the nation. This may result in advantages such as a cleaner environment, lower fuel costs, and other benefits. Those benefits are in addition to, not included in, the economic impact analysis below.

The analysis describes the direct, indirect, and induced impacts of algal biofuel research on the San Diego region's economy. The direct impacts reflect jobs and expenditures that are directly related to research in algal biofuels. The indirect impacts are the numerous business products, materials, and services required and supplied locally to support the direct activities of algal biofuel research. The induced impacts are the local household expenditures of employees involved in the research.

From an economic perspective, based on current funding levels, research in algal biofuels is expected to employ 410 workers in San Diego and provide nearly \$28.8 million in payroll and \$56.2 million in economic activity for the San Diego region per year.

The \$56.2 million in economic activity of algal biofuel research supports other local industries. As a result of its day-to-day operations, research in algal biofuels is expected to generate \$6.6 million in annual payroll and approximately \$20.6 million in additional economic activity at other local companies. This \$20.6 million can be considered the result of the goods and services that companies engaged in algal biofuel research purchase from local vendors. The top industries affected by algal biofuel research's business are shown in the table below.

Industry	Jobs Generated
Services to buildings and dwellings	15.2
Employment services	12.7
Real estate	10.3
Food services and drinking places	9.2
Architectural, engineering and related services	7.5
Management, scientific, and technical services	7.2

Overall, an estimated 141 jobs are generated by the economic activity of companies supporting algal biofuel research.

In addition to these impacts, research in algal biofuels also has an impact on the region through the expenditures of its employees. The industry's \$28.8 million payroll generates an additional \$31.5 million in economic activity in the region. This induced effect generates 233 jobs and an additional \$9.2 million in payroll for the region. The top industries affected by the expenditures of employees engaged in algal biofuel research are shown in the table below.

Industry	Jobs Generated
Food services and drinking places	27.1
Offices of physicians- dentists- and other health	13.9
Wholesale trade	9.4
Real estate	8.7
Retail stores – food and beverage	8.7
Retail stores – general merchandise	8.4

A summary of algal biofuel research's impacts is shown below:

	Direct	Indirect	Induced	TOTAL
Employment	410	141	233	784
Wages*	\$28,800,000	\$6,600,000	\$9,200,000	\$44,600,000
Output*	\$56,200,000	\$20,600,000	\$31,500,000	\$108,300,000

*rounded to the nearest 100,000

Furthermore, additional investment of venture capital into algal biofuel research has the ability to generate additional impact to the regional economy. During the year the investment is spent, for every \$10 million of venture capital funding, private sector research in algal biofuels directly generates \$1.5 million in economic activity and nearly three-quarters of a million dollars in payroll for 10 employees. In turn, the company receiving funding and its employees make local purchases which combined generate an additional \$1.4 million in economic activity and \$412,000 in payroll for 11 employees.

A summary of the effects of \$10 million in venture capital investment toward private sector research in algal biofuels is shown below:

	Direct	Indirect	Induced	TOTAL
Employment	10	4	7	21
Wages*	\$772,000	\$162,000	\$250,000	\$1,184,000
Output*	\$1,509,000	\$514,000	\$884,000	\$2,907,000

*rounded to the nearest 1,000

Sincerely,

BETH JAROSZ
 Senior Economic Analyst
 BJA/ais