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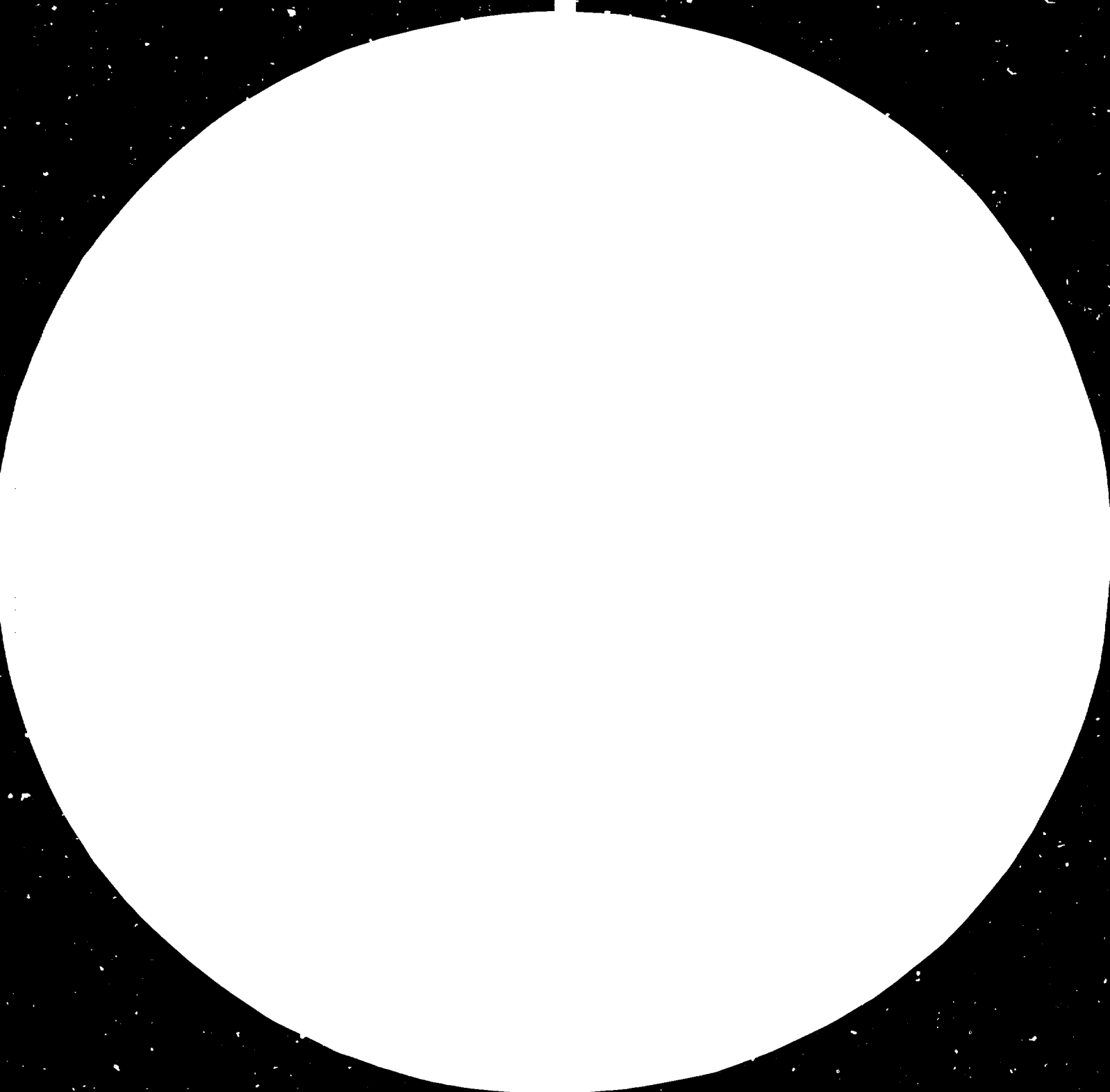
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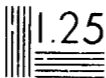
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CONSULTANTS IN COAL GASIFICATION AND ETHANOL PRODUCTION

SI/CHI/81/801

REPORT ON *

MISSION TO CHILE

1 - 11 November 1981

by

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United Nations Industrial Development Organization

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The purpose of the project was "to provide high-level technical advice in the Chilean government's plans for coal gasification". Duties were to study the projects including the "Utilization of Natural Gas in Magellanes".

The most important meeting I had was on November 11 at 9 A.M. when Miss Evelyn de Carazo of UNDP, Santiago, and I went to see Dr. Bruno Phillipi Irarrazabal in Santiago. He is the Deputy Chief of the Energy Commission. He explained to us the following:

1. In the "Natural Gas to Gasoline" plant --- the Energy Commission has talked to companies and plan on advertising in December 1981 (tentatively) to find which

companies or consortiums will be willing to make a contract (or contracts) with the government. The government wants (on their part) only to sell the natural gas (NG) to a group and also to collect taxes. Otherwise the government doesn't care whether the contracting company makes LNG, gasoline, petrochemicals or any other product.

The government has discussed with the Sasol people to find the cost of a plant (and the product) to use NG instead of coal to make gasoline via the Fischer-Tropsch process. These discussions were for informational purposes only.

2. On the use of the coal fields in the Magellan area --- they are treating this raw material the same as NG. They have a contract already with a consortium to mine the coal (about 2 million tons per year when it is fully developed). The consortium can sell the coal where there is a market but it will be mostly a Chilean market. On "Coal to Gasoline" it is up to the companies if this project is to develop.

3. The government is involved in hydroelectric projects because they believe this is necessary but this is the only energy source that will be subsidized.

Phillipi and the Energy Commission believe the proper role of the government is to provide for the general welfare (education

etc.) but not get mixed up in projects that should be best handled by the private sector. He also said the Chilean government doesn't want to spend 1 or 2 billion dollars (1×10^9) if they tried the subsidy route (like the U. S. is doing) and then find out they (the government) have a non-paying proposition on their hands.

Following is a detailed account of other activities:

On arrival in Santiago, Chile, on Sunday, November 1, I proceeded to Valparaiso with others who came to attend the Conference on Energy. I was not met by UNDP personnel but by Dr. Cavaretta from Catholic U. in Valparaiso.

On Monday I went to Catholic U. with M. D. Schlesinger. We talked to the Chemical Engineering Department of Catholic University. Their work on the "Natural Gas to Gasoline" project was to make a detailed study of the process as a technical problem for their students. They spent 70,000 engineering hours (6 months) making a minute study using kinetic data, thermo data, plant designs and flow sheets putting all information into a computer.

The process refines natural gas to synthesis gas, uses the gas to make methanol, then uses the methanol via the Mobil Oil

Process to make gasoline. All steps are commercial except the Mobil gas step which is a proprietary process developed by Mobil.

There is no government decision to proceed on this process. If they proceed private companies will plan on constructing this plant on an island in the Magellan Straits area where the gas is. Presently they are removing 240,000 M³/day removing the LPG and pumping the stripped gas back into the ground.

If they proceed with the plant, they will use the natural gas until it is depleted after about 30 years (so say the University professors).

They then plan (this is not the government plan) on proceeding to change the feed gas from natural gas to coal to make their synthesis gas. This will be at least 30 years if they proceed at all. (This is opinion of the professors.)

The logistics of the problem in the Magellan Straits area are formidable. No plans have been formulated yet, but if they plan on building the coal gasifier on the island where the natural gas reformer would be in order to use the rest of the plant (which then would be obsolescent) all coal would have to be shipped there. If they plan on abandoning the natural gas plant and build the "Coal to Gasoline" plant where the coal is, they would have to build docks and a \$3 billion plant there

where they would house and take care of all the personnel for the mines and plant. These problems haven't been mentioned as far as I know.

Conversely, either one of these planned plants would help develop this area, just as the Sasol plants in South Africa supplied thousands of jobs and a large industrial complex.

On November 2, Monday afternoon, I met Dr. Roberto Martinez Ordinez of UNIDO who suggested that I work with him on looking at the role of the Chilean Universities in reference to coal research. Since I had no contract which spelled out my assignment and the "Natural Gas to Gasoline" scheme in Valparaiso was only a student project at Catholic U., I started to work with M. D. Schlesinger, Dr. Martinez and Dr. Sota-Krebs. (Since the conference on Monday, Tuesday and Wednesday was all in Spanish I didn't attend these sessions.) I received my contract on Friday, November 6, when I met Miss Evelyn de Carazo and Mr. Gonzalo Perez del Castillo. On November 4 we talked to professors from Catholic U. at Valparaiso again. They are only working on the Mobil project. When this study is finished in several months they will present it to the government.

CUV professors admit their plant design is preliminary and not for decision. CUV has no experience working with coal.

November 5 we talked to Professor Aldo Moisin Jobet of the University of Concepcion. They are doing some work in fluidization of coal apparently in relation to combustion, studying gasification and are doing some work with industry. Dr. Jobet was a ME and was giving the above information second hand. They are also doing some Solar work(drying of grapes), wind energy studies and testing Ethanol (12% in gasoline).

We also talked with Dr. Sergio Fuentes of the University of Santiago. He is their coordinator of research programs in energy. They are planning for a course in energy in 1982. They plan later for coal research, also nuclear energy and air pollution but apparently nothing is now ongoing.

November 10 --- In A.M. went to the Catholic U. in Santiago and talked to Juan de Dios Rivera, Professor Miguel Rodriguez and Professor Gaston Tanregui. Rodriguez is working on reduction of iron ore with coal directly to make steel, bypassing the blast furnace step which makes pig iron. They mostly seemed to be asking me what they should do in energy work. I gave them several suggestions.

Later on (November 10) I went to the University of Chile. They are doing projects on energy including:

1. Characterization of Chilean coals
2. Gasification of coal

3. Studying the reactivity of Chilean coals
4. Liquefaction of coal (Catalytic and SRC type systems)
5. Hydroprocessing of coal liquids from Chilean coals
6. Studying coal-oil-mixtures
7. Pyrolysis of coals
8. They are starting on coal combustion (Concepcion is already doing this type of work)

Their equipment was the best I have seen in Chile and they have the graduate students to operate them.

In conclusion I agree with Dr. Roberto Martinez Ordinuz' statement at the end of the conference at Catholic U. of Valparaiso:

1. Catholic U. of Valparaiso is best able to do work on the utilization of natural gas and in the field of biochemistry (although I think the University of Chile at Santiago is also very strong in this field).
2. Chile U. at Santiago is very well equipped to study and research the coal resources in the country.

If these Universities could get together as a consortium they could decide on who does what research to avoid too many conflicts. This way they could also be a more powerful force when dealing with the government.

