DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

# Coal Resources of Central America

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

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ILLUSTRATIONS

## INTRODUCTION

This report was prepared as background material for anyone interested in the coal resource potential of Central America. It is an updated version of materials assembled and summarized for use in program documents, verbal presentations, and other administrative purposes. A similar, earlier report discussed the entire Caribbean region (Orndorff, 1985).

In particular, this material was prepared for submittal to Los Alamos National Laboratory for their use in assembling an energy atlas of Central America.

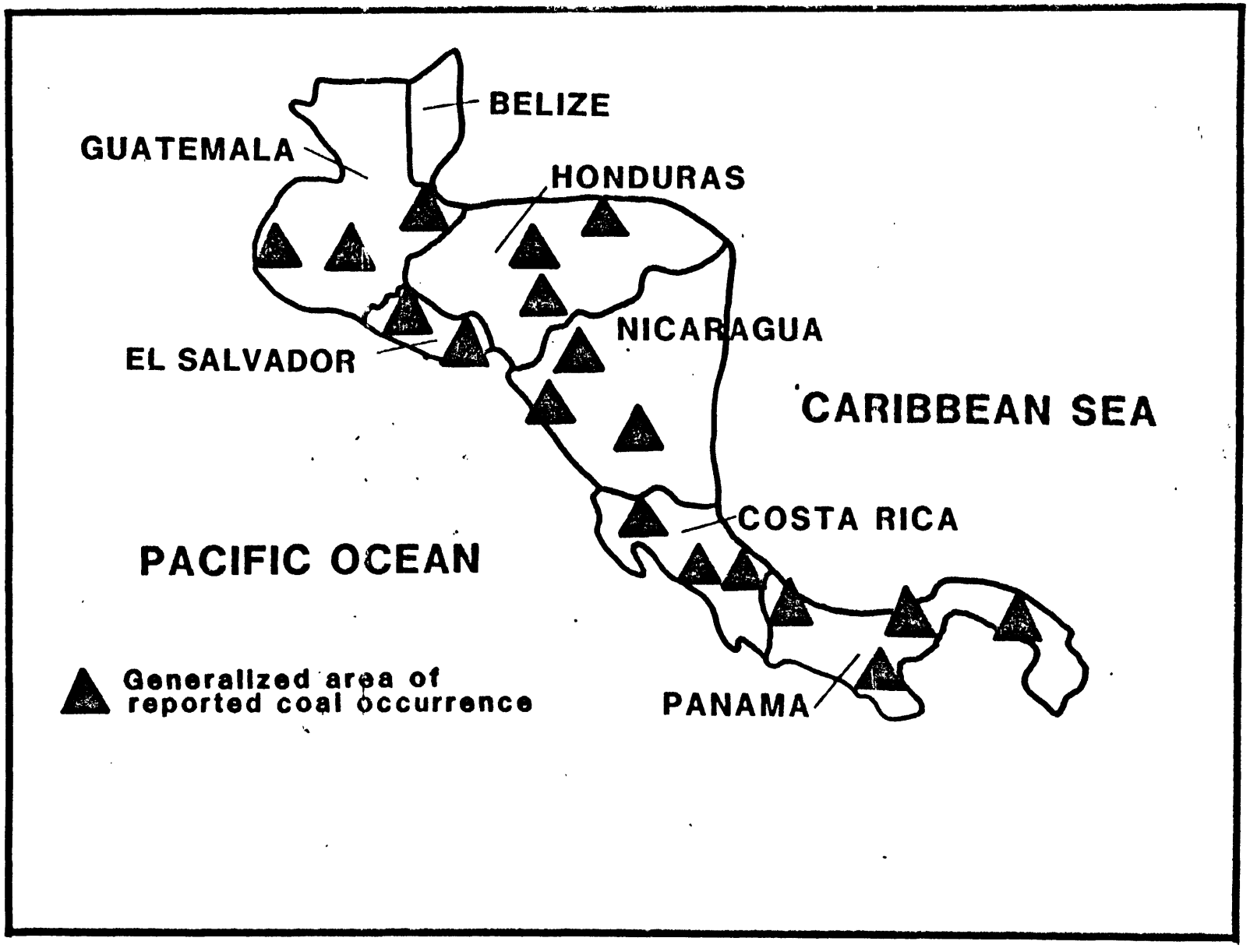
## COAL RESOURCES

The coal resource potential of Central America is essentially unknown despite the fact that coal was observed and possibly used almost 150 years ago. In 1978, Bohnenberger and Dengo summarized the status of coal resource information in Central America as follows:

> "The available information exhibits a wide range of reliability, ranging from old reports that give only localities to short, but more detailed, recent geologic reports. The information on carbonaceous sedimentary rocks is scarce and is scattered in a few printed papers, in mimeographed pamphlets of local distribution, or in internal office reports that are not readily available. In some countries, government agencies have devoted attention to carbonaceous beds, whereas in other countries almost nothing has been done.
>
> "The information available reveals that emphasis has been placed on proximate analysis of coal samples by some government agencies, although the sampling techniques themselves are never stated. Descriptions of the locations of the coal or lignite outcrops generally are imprecise. Almost nothing is presented in the available reports concerning related geologic factors such as thickness of overburden, extent of the deposit, type and rank of the coal, average thickness of the coal beds, structure of the coal-bearing beds, water-gas content, and amount of coal dust."

Recent work by G.H. Wood, Jr. of the U.S. Geological Survey (USGS) identified 92 reported coal localities in Central America. Wood's research was based on exhaustive review, synthesis, and summation of the geologic literature. His resulting estimate of coal resources in Central America totals 1,069 million tons, of which 355 million tons are classed as hypothetical and the remainder as speculative. Wood's as-yet-unpublished provocative and challenging summation of information and estimate of undiscovered resources indicates that coal could be an important component in the energy budget of the area and shows the necessity for a detailed internationally comparable assessment of the coal resources of Central America.

All of the Central American countries except Belize have reported occurrences of coal (fig. 1). The following summaries, with the exception of Costa Rica and Panama, are based on available literature and a limited amount of verbal interaction with interested, knowledgeable citizens of Central America.




COAL OCCURRENCE IN CENTRAL AMERICA

## Costa Rica

During the period 1983-86, a program of coal exploration was initiated by Refinadora Costarricense de Petroleo (RECOPE) with the assistance of the U.S. Geological Survey under the auspices of the United States Agency for International Development. Technology transfer and training of RECOPE counterparts on-the-job were primary elements of the technical assistance program. Instruction was given by USGS experts during short-term visits to Costa Rica; two 1-week formal training courses were conducted in Costa Rica for the geoscience community; 2 counterparts, 1 geologist and 1 chemist, received on-the-job training in the United States. Both coal quantity and coal quality were emphasized during the program, so assistance in establishing a coal quality laboratory in RECOPE was an important component. Coal assessment techniques and methodologies included in technology transfer were: coal mapping, exploratory drilling, coal sample selection and recovery, geophysical logging (natural radioactivity, density, resistivity, and caliper) of drill holes, interpretation of the stratigraphic and structural framework, and calculations of resource tonnages in various categories.

A report prepared in late 1985 (Bolanos and others, 1986) presented the results, to that date, of the most advanced exploration project in the country. Twenty exploratory drill holes had been completed in Baja Talamanca, samples from drill cuttings and cores were collected and described, coal samples were collected and analyzed in Costa Rica and the United States, and geophysical logs were made and interpreted.

With the data available in mid-1985, a minimum of about 13 million tons of coal are estimated to be present in an assurance category of demonstrated (measured and indicated combined, with about 9 million tons measured) in an area of 6 $km^2$. Much of the estimated resources would have to be recovered by underground mining but some part could be recovered by surface mining.

The coal analyses available in mid-1985 show a range in coal rank from lignite B to high volatile C bituminous. The modal value is subbituminous C coal. The coal samples had an average ash content of 13.8 percent (medium ash content) and average sulfur content of 1.7 percent (medium sulfur content).

## Panama

Coal has been reported from a minimum of fifteen (15) localities in Panama, but an area of primary interest is in the Province of Bocas del Toro. The coal-bearing rocks in the Bocas del Toro area are extensions (continuations) of the coal-bearing rocks of the Province of Limon, Costa Rica. Much of the general stratigraphic and structural information developed in Costa Rica is directly applicable to the adjacent coal-bearing rocks in Panama.

Particular interest in the coal resource potential of the Bocas del Toro area has been expressed for three reasons: 1) if coal of sufficient quantity and quality is present and recoverable, it could be used as a substitute for imported oil now used to generate electricity in the farming area around Changuinola, in the Chiriqui Grande area, and for other electricity needs as that part of Panama is developed in the future; 2) knowledge of the resource potential of the area is required for regional and local planning; for

example, preliminary planning has been done for 11 or more dam-reservoir sites and at this time the locations cannot be evaluated relative to potential coal resources; and 3) as population increases deforestation can become a problem; this suggests that coal might be a potential substitute for fuel wood at some future time.

The resource potential of the entire country should be evaluated, but the area of primary activity may be the Bocas del Toro area because of the perceived priorities.

## Honduras

Coal has been reported in about 20 different locations in Honduras. According to recent information some of the reported localities are erroneous, some places where coal is present may not be in the list of known localities, and coal of possible future interest may be present in some other areas. Verbal information indicates deforestation for fuel wood is a problem in part of Honduras. The coal resource potential of the country needs to be evaluated.

## Guatemala

As many as 31 different coal localities in Guatemala have been reported in the geologic literature; descriptions of as many as 58 samples of coal from as many different localities have been noted in agency files in the country; and a verbal report of 81 different localities was recently received. Regardless of the exact numbers of reported or known coal localities, the coal resources of Guatemala seem to deserve investigation. At least three different reports on coal in parts of Guatemala have been done in the last 20 years or so by different groups and these reports indicate, as a minimum, a recurring interest in the possibility of utilizing the coal of Guatemala. However, as far as is known, no compilation, synthesis and/or summary of coal information have been done.

## El Salvador

Seventeen different localities in El Salvador have been reported to have coal present. Many of the known coal areas are reported to be of very small size and the coal of low grade. Therefore, the resource potential is considered to be small. However, the true potential will remain unknown in the absence of definitive studies.

## Belize

Belize is the only Central American country that is not known to contain coal. Whether there really is no coal, or whether it has not been observed and reported, remains to be determined. According to available geologic maps, the presence of rock sequences that contain coal in other countries is possible. It is possible that less detailed, credible, geologic information is available for Belize than for any other similar area in Central America or nearby areas.

## QUALITY AND UTILIZATION

Obviously, the quantity of coal present in Central America is essentially unknown. The quality is equally unknown, but is commonly reported as lignite in surface exposures.

Coals of low rank, lignite and subbituminous coal, are commonly dismissed as of low value as sources of energy. However, 19 of the 20 largest mines in the United States produced coals of lignitic or subbituminous rank in 1986. These 19 mines produced more than 20 percent of the coal mined in the USA in 1986. Almost all of their production is used to generate electricity.

Electrical energy in the Central American countries is produced mainly at hydroelectric stations, geothermal installations, and oil-fired electricity generating plants. Wood is an extensively used local fuel. Both hydroelectric and geothermal sources are being continually developed, but each have very long lead times and may require very large capital expenditures prior to generation of electricity. The lack of indigenous petroleum and the scarcity of foreign exchange to purchase imported fuel oil results in a tremendous drain on each country's energy budget. Use of wood has created severe deforestation problems in some areas. Exploration and development of coal resources indigenous to Central America may help alleviate energy problems in each country by 1) substituting coal for imported oil in electricity generation, either by conventional combustion or perhaps by coal-water-mix fuel combustion; 2) substituting a coal briquett product for fuelwood; 3) substituting coal for imported fuel oil in brick and cement plants and other small industries requiring process heat; and 4) creating jobs in labor intensive coal exploration, mining, transportation, and utilization companies, which will increase employment and, in turn, raise standards of living.

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